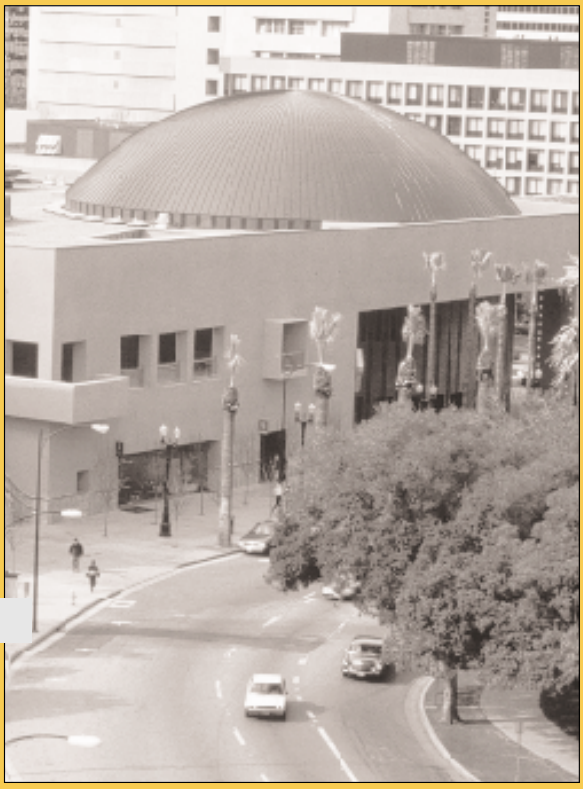
THE SILICON VALLEY CHALLENGE

INFORMS Annual Meeting

Nov. 17-20, 2002

San Jose, CA



informs® Institute for Operations Research and the Management Sciences

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Copies of papers abstracted in the meeting program are available only from the authors. Requests for papers should be sent to the authors at the addresses shown in the program. Published annually prior to the meeting by the Institute for Operations Research and the Management Science. Individual issues of the program are available for $20US per copy. Orders must be prepaid and sent to INFORMS, P.O. Box 631704, Baltimore, MD 21263-1704.

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VALLEY CHALLENGE
THE SILICON

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These companies and universities have made generous contributions to the success of the INFORMS Annual Meeting 2002. Their support has helped create an expansive, diverse and exciting technical program and enhanced special events.

INFORMS gratefully acknowledges their sponsorship.

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Message from the General Co-Chairs

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Message from the General Co-Chairs

Welcome to San José, the "Capital of Silicon Valley." We hope you enjoy and profit by the time you spend here, and that when you return home you will have a better appreciation of the role OR/MS can play in the world of high technology.

When we set the theme of the conference, "The Silicon Valley Challenge," we were thinking in terms of creativity, innovation, entrepreneurship, technology and management. Little did we know that another, much larger challenge–the state of the economy–would dominate the scene at this time. Hence, it is more important than ever to ensure that the tools of the management sciences and operations research are applied to the extent possible for the benefit of both industrial and governmental organizations. That is the reason we have put a special emphasis on the practice sessions, and we hope you have the time to attend one or more of them.

This is the 50th anniversary of the formation of the Operations Research Society of America. For those of you who can remember back to the beginning, or who have read about the history of the field, the early days were problem based. The issue was to solve large, complex problems by means of the development and application of analytical tools. The founders came from many different disciplines, each bringing a different set of insights, and collaboration was a key to much of the early progress. As the development of analytical tools became an end in itself, The Institute of Management Sciences came into being in an attempt to refocus the field on problems and applications rather than solutions. We've been through this cycle of practice to theory to practice several times, and the pendulum continues to swing. Our objective for the INFORMS Annual Meeting 2002 is to demonstrate that there have been a great many valuable contributions made by OR/MS researchers, teachers and practitioners, and that we have just scratched the surface of possibilities.

The program in terms of both academic and practitioner contributions is as large as ever. Few if any fields of endeavor that fit within the INFORMS umbrella have been left out. Specific attention has been paid to those that have particular importance for Silicon Valley. These include entrepreneurship and innovation management, managing in a high tech environment, e-business and information systems. There are a number of tutorial sessions and case study presentations, many sessions by and for practitioners, and outstanding plenary and keynote speakers.

We also want to ensure that you have a good time. In addition to tours of Silicon Valley companies, we have two very interesting all-day expeditions for spouses. And, as usual, there are two major evening social events: the Welcome Reception on Sunday and the General Reception at the Tech Museum of Innovation on Monday.

Last but not least, we have a great many people to thank for their tremendous contributions to the success of the meeting. Two people deserve special recognition for their hard and extremely effective work: Candi Yano, Program Chair and Abdel El-Shaieb, Arrangements Chair. Equally important were the contributions from the INFORMS staff. Many others played key roles (and we apologize if we have overlooked anyone): Oliver Yu, Practitioner Program Chair; David Woodruff, Tutorial Chair; Harlan Crowder, Steve Nahmias and Rick Rosenthal from the Organizing Committee; and Dinah Cheng, Jacob Tsao and Steve Kwan from the Local Arrangements Committee.

We're glad you're here, be informed and enjoy!

David W. Conrath
Co-Chair

Burton Dean
Co-Chair

The California State University
Chancellor's Office
Bakersfield, Chico, Dominguez Hills,
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LINCOLN ALMOND
GOVERNOR

Greetings from Governor Lincoln Almond

As Governor of the State of Rhode Island, it is my distinct pleasure to extend g
the participants of the Institute for Operations Research and the Management
(Informs) Annual Meeting being held in San Jose, California.

informs, with offices in Maryland and Rhode Island, is a fast-grow
organization dedicated to several areas of operations research. Since
1952, its membership has increased to include over 10,000 operations
from the United States and the world.

There are countless ways in which operations research techniques ar
in the areas of management, military, health care, investment and
many others. This organization, with members in business, gover
has proven their commitment to assist with decision-makin
operations and for this, each member should be commended.

On behalf of the citizens of the Rhode Island, I want to extend
fiftieth year of providing outstanding service in these fields
wishes for a most productive meeting and all members of info

Sincerely,

Lincoln Almond

GOVERNOR GRAY DAVIS

Commendation

Institute for Operations Research and the Management Sciences
50th Anniversary

November 17, 2002

It is a great pleasure to recognize the Institute for Operations Research and the Management Sciences (INFORMS) as it celebrates its 50th Anniversary.

This is an important milestone for INFORMS. I commend all the employees and members for their dedication to professional excellence. Their hard work has made a lasting impact.

On behalf of the people of the State of California, I extend best wishes for continued success.

Gray Davis

Governor Gray Davis

The State of Maryland

Governor of the State of Maryland to

INFORMS , Greetings:

Be it Known: That on behalf of the citizens of this State,

in recognition of the occasion of the Golden Anniversary of the Institute for Operations Research and Management Sciences... in honor of the significant contributions to society which have been made by your more than 10,000 members during the past 50 years, and as the people of Maryland join together in expressing our congratulations, great respect and sincere best wishes for continued success in the days and years to come,

we are pleased to confer upon you this

Governor's Citation

November

and two

Governor

Secretary of State

THE WHITE HOUSE

WASHINGTON

October 15, 2002

I send greetings to those celebrating the 50th anniversary of organized operations research in America.

For a half century, operations research has improved productivity, management, and operations of areas ranging from health care to the Internet, and from Wall Street to the military. Through use of scientific methods, including mathematical and computer modeling, operations research has made vital contributions to the strength and prosperity of our Nation. I commend the Institute for Operations Research and the Management Sciences (INFORMS), and all those involved, for ensuring that operations research will continue to make significant advances in countless aspects of our society.

Laura joins me in sending our best wishes for a successful meeting.

Program at a Glance

NOTE:

Technical sessions are held at the Convention Center, Fairmont and Hilton hotels. Check the Master Track Schedule on page 152-153 for specific room locations.

KEY:
C-Convention Center
F-Fairmont
H-Hilton

San Jose 2002 QUICK REFERENCE including the Master Track Schedule

Don't miss this handy reference. It's a separate flier that came with your program. The Master Track Schedule is also printed on pages xxx-xxx.

SATURDAY, NOVEMBER 16

8:15am-4:10pm	CIST Conference	F - Hillsborough
3:00pm-7:00pm	Registration	C – Concourse 1
5:00pm-6:00pm	INFORMS Membership Meeting	C – Ballroom A8

SUNDAY, NOVEMBER 17

7:00am-5:00pm	Registration	C – Concourse 1
8:00am-9:30am	Technical Sessions (SA)	Center, Fairmont, Hilton
8:30am-5:45pm	CIST Conference	F - California
9:30am-10:00am	Coffee Break	C – Concourse 1, F – Tower Lobby
10:00am-11:30am	Technical Sessions (SB)	Center, Fairmont, Hilton
11:40am-12:30pm	Plenary Presentation	C – Exhibit Hall 1
12:00pm-5:00pm	Exhibits, Job Placement, Email Center	C – Exhibit Hall 2
12:30pm-1:30pm	Lunch Break (on your own)	
1:30pm-3:00pm	Technical Sessions (SC)	Center, Fairmont, Hilton
3:10pm-4:00pm	Plenary Presentation	C – Exhibit Hall 1
4:00pm-4:30pm	Coffee Break	C – Exhibit Hall 2, F – Tower Lobby
4:30pm-6:00pm	Technical Sessions (SD)	Center, Fairmont, Hilton
6:15pm-7:15pm	Subdivision Business Meetings	Center, Fairmont, Hilton (see p. 11)
7:30pm-9:00pm	Welcome Reception/50th Anniversary	C – Exhibit Hall 2

MONDAY, NOVEMBER 18

7:00am-5:00pm	Registration	C – Concourse 1
8:00am-9:30am	Technical Sessions (MA)	Center, Fairmont, Hilton
9:00am-5:00pm	Exhibits, Job Placement, Email Center	C – Exhibit Hall 2
9:30am-10:00am	Coffee Break	C – Exhibit Hall 2, F – Tower Lobby
10:00am-11:30pm	Technical Sessions (MB)	Center, Fairmont, Hilton
11:40am-12:30pm	Plenary: Welcome & Awards	C – Exhibit Hall 1
12:30pm-1:30pm	Lunch Break (on your own)	
1:30pm-3:00pm	Technical Sessions (MC)	Center, Fairmont, Hilton
3:10pm-4:00pm	Keynote Presentations	C – Room J2 & Exhibit Hall 1
4:00pm-4:30pm	Coffee Break	C – Exhibit Hall 2, F – Tower Lobby
4:30pm-6:00pm	Technical Sessions (MD)	Center, Fairmont, Hilton
6:15pm-7:15pm	Subdivision Business Meetings	Center, Fairmont, Hilton (see p. 11)
7:30pm-9:00pm	General Reception	Tech Museum

TUESDAY, NOVEMBER 19

7:00am-5:00pm	Registration	C – Concourse 1
8:00am-9:30am	Technical Sessions (TA)	Center, Fairmont, Hilton
9:00am-5:00pm	Exhibits, Job Placement, Email Center	C – Exhibit Hall 2
9:30am-10:00am	Coffee Break	C – Exhibit Hall 2, F – Tower Lobby
10:00am-11:30pm	Technical Sessions (TB)	Center, Fairmont, Hilton
11:40am-12:30pm	Plenary	C – Exhibit Hall 1
12:30pm-1:30pm	Lunch Break (on your own)	
1:30pm-3:00pm	Technical Sessions (TC)	Center, Fairmont, Hilton
3:10pm-4:00pm	Plenary	C – Exhibit Hall 1
4:00pm-4:30pm	Coffee Break	C – Exhibit Hall 2, F – Tower Lobby
4:30pm-6:00pm	Technical Sessions (TD)	Center, Fairmont, Hilton
6:15pm-7:15pm	Subdivision Business Meetings	Center, Fairmont, Hilton (see p.11)

WEDNESDAY, NOVEMBER 20

7:30am-10:00am	Registration	C – Concourse 1, F - Tower Lobby
8:00am-9:30am	Technical Sessions (WA)	Center, Fairmont, Hilton
9:30am-10:00am	Coffee Break	C – Concourse 1, F - Tower Lobby
10:00am-11:30am	Technical Sessions (WB)	Center, Fairmont, Hilton

Schedule of Special Events

FRIDAY, NOVEMBER 15	LOCATION	TIME
Colloquia Registration & Dinner	F - Gold	5:00pm–9:00pm

SATURDAY, NOVEMBER 16	LOCATION	TIME
CIST Registration	F - Hillsborough Foyer	7:30am–9:00am
Colloquia Breakfast	F - Regency Ballroom 2	8:00am–8:30am
CIST	F - Hillsborough	8:15am–4:10pm
Meetings Committee Meeting	F - Boardroom 20th floor	8:30am–5:00pm
Teacher Colloquium	F - Valley	8:30am–5:00pm
Doctoral Colloquium	F - Gold	8:30am–5:00pm
Industry Colloquium	F - California	8:30am–5:00pm
Organization Science Dissertation Proposal Competition	F - Piedmont	9:00am–5:00pm
Colloquia Luncheon	F - Regency Ballroom 2	12:00pm–1:00pm
INFORMS Executive Committee Meeting	F - Plaza	12:00pm–6:00pm
Meeting Registration	C - Concourse 1	3:00pm–7:00pm
INFORMS Membership Meeting	C - Ballroom A8	5:00pm–6:00pm
CPMS Dinner	H - San Carlos	6:30pm–9:00pm

SUNDAY, NOVEMBER 17	LOCATION	TIME
New Member/First-Time Attendee Breakfast	F - Imperial Ballroom	7:00am–8:00am
Meeting Registration	C - Concourse 1	7:00am–5:00pm
INFORMS Board Meeting	F - Crystal	8:00am–6:00pm
Guest Breakfast	F - Terrace	8:00am–9:00am
OR/MS in Practice Poster Display	C - Concourse 1	8:00am–6:00pm
Nicholson Student Paper Prize Competion	C - Ballroom A8	8:00am–11:30am
CIST	F - California	8:30am–5:45pm
Colloquia Committee Meeting	F - Terrace	11:30am–12:30pm
Junior Faculty SIG Forum Luncheon	H - Almaden 1	11:30am–1:00pm
Omega Rho Distinguished Lecture: James G. Roche	C - Exhibit Hall 1	11:40am–12:30pm
Exhibits/Job Placement/Email	C - Exhibit Hall 2	12:00pm–5:00pm
Section/Society Officers Luncheon	F - Empire	12:00pm–1:30pm
Job Fair	C - Exhibit Hall 2	12:00pm–2:00pm
CIST Lunch	F - Club Regent	12:30pm–1:30pm
Teachers Program for INFORMS Members	F - Valley	1:30pm–4:00pm
Plenary: Randy Pond	C - Exhibit Hall 1	3:10pm–4:00pm
Roundtable Reception & Dinner	F - Valley	5:00pm–8:00pm
Manufacturing and Service Operations Mgt. Reception	F - Club Regent	6:15pm–7:15pm
Decision Analysis Society Council Meeting	Offsite	
Military Applications Society Council Meeting	F - Terrace	6:15pm–7:15pm
Revenue Management & Pricing Council Meeting	C - Room H	7:15pm–8:15pm
Welcome Reception/50th Anniversary	C - Exhibit Hall 2	7:30pm–9:00pm
Roundtable Meeting	F - Gold	8:00pm–11:00pm
Minority Issues Forum Reception	F - Garden	8:00pm–10:00pm
Student Reception	F - Crystal	8:00pm–10:00pm
Women in OR/MS Forum Reception	F - Empire	8:00pm–10:00pm

KEY:
C - Convention Center
F – Fairmont
H - Hilton

COFFEE BREAKS

Sunday, Nov. 17

9:30am – 10:00am	C - Concourse 1 F – Tower Lobby
4:00pm – 4:30pm	C – Exhibit Hall 2 F – Tower Lobby

Monday, Nov. 18

9:30am – 10:00am	C – Exhibit Hall 2 F – Tower Lobby
4:00pm – 4:30pm	C – Exhibit Hall 2 F – Tower Lobby

Tuesday, Nov. 19

9:30am – 10:00am	C - Exhibit Hall 2 F – Tower Lobby
4:00pm – 4:30pm	C – Exhibit Hall 2 F – Tower Lobby

Wednesday, Nov. 20

9:30am – 10:00am	C – Concourse 1 F – Tower Lobby

Schedule of Special Events



WHERE TO GO FOR LUNCH?

Lunch will be available for purchase in the Convention Center on Sunday, Monday and Tuesday from 12:00-1:30pm (Concourse I). A list of area restaurants is included in the San Jose City brochure you received with your registration packet. Or stop by the San Jose Visitor Information Booth (1st floor, right inside the Center's main entrance) for restaurant information.

MONDAY, NOVEMBER 18	LOCATION	TIME
Board/Editors/Committee Chairs Breakfast	F - Empire	7:00am–8:00am
Meeting Registration	C - Concourse 1	7:00am–5:00pm
Roundtable Meeting	F - Gold	8:00am–3:00pm
Teachers Program for San Jose Area Math Teachers	F - Club Regent	8:00am–3:00pm
Guest Breakfast	F - Terrace	8:00am–9:00am
OR/MS in Practice Poster Display	C - Concourse 1	8:00am–6:00pm
Exhibits/Job Placement/Email	C - Exhibit Hall 2	9:00am–5:00pm
Section/Society Subcommittee Meeting	F - California	10:30am–12:00pm
Plenary: Welcome & Awards Session	C - Exhibit Hall 1	11:40am–12:30pm
Editors in Chief & Publications Committee Meeting	F - Empire	12:00pm–3:00pm
ACORD Luncheon	F - Garden	12:00pm–2:00pm
Subdivision Committee Meeting	F - California	12:00pm–2:30pm
Education Committee Meeting	F - Terrace	12:30pm–1:30pm
Fellows Luncheon	F - Crystal	12:45pm–2:30pm
INFORMS Board & Roundtable Meeting	F - Gold	3:00pm–4:30pm
Keynote: IFORS Lecture, David Ryan	C - Room J2	3:10pm–4:00pm
Keynote: 2002 Edelman Award Winning Reprise	C - Exhibit Hall 1	3:10pm–4:00pm
Management Science Editors Meeting/Reception	F - Garden	4:00pm–5:00pm
Presidents Reception for the Roundtable	F - Crystal	4:45pm–6:00pm
IOL Meeting/Reception	F - Empire	6:00pm–7:00pm
CPMS Isolated Practitioners Workshop	F - California	6:00pm–7:00pm
General Reception	The Tech Museum	7:30pm–9:30pm

TUESDAY, NOVEMBER 19		
Chapters/Student Chapters/Fora Officers Breakfast	F - California	7:00am–8:00am
Meeting Registration	C - Concourse 1	7:00am–5:00pm
Student Chapter Officers Meeting	F - California	8:00am–8:30am
CPMS Council Meeting	F - Crystal	8:00am–10:00am
Meetings Committee Meeting	F - Boardroom 20th floor	8:00am–4:00pm
OR/MS in Practice Poster Display	C - Concourse 1	8:00am–6:00pm
Exhibits/Job Placement/Email	C - Exhibit Hall 2	9:00am–5:00pm
Guest Breakfast	F - Terrace	9:00am–10:00am
Panel: Brand & Market OR/MS	F - Valley	10:00am–11:30am
Plenary: Richard O'Neill	C - Exhibit Hall 1	11:40am–12:30pm
OR Editors Meeting/Luncheon	F - Plaza	12:00pm–1:00pm
Academic/Practitioner Interface Luncheon	C - Exhibit Hall 2	12:30pm–1:30pm
Plenary: Philip McCord Morse Lecture, Gary Lilien	C - Exhibit Hall 1	3:10pm–4:00pm

WEDNESDAY, NOVEMBER 20		
Meeting Registration	C - Concourse 1	7:30am–10:00am
Guest Breakfast	F - Terrace	9:00am–10:00am

KEY:
C - Convention Center
F – Fairmont
H - Hilton

Schedule of Subdivision Business Meetings

Celebrating 50 years of operations research

Organized operations research in America was born 50 years ago. INFORMS is celebrating this golden anniversary with a series of special events, surprises and publications.

50th Anniversary Celebration/Welcome Reception
Sunday, 7:00pm - 8:30pm
Center – Exhibit Hall 2

Gallery of Presidents
Center – Exhibit Hall 2

Special Invited Cluster: Past ORSA Presidents
Tuesday, Sessions
TC 1:30pm - 3:00pm & TD, 4:30pm - 6:00pm
Center – Room J2

KEY:
C - Convention Center
F – Fairmont
H - Hilton

	LOCATION	TIME
SUNDAY, NOVEMBER 17		
Omega Rho Executive Committee & Annual Meeting	H - Santa Clara 1	12:30pm–2:00pm
Railroad Applications	C - Room N	5:45pm–6:45pm
Aviation Applications	C - Room L	6:15pm–7:15pm
E-Business	C - Ballroom A2	6:15pm–7:15pm
Group Decision & Negotiation	H - Plaza	6:15pm–7:15pm
Location Analysis	C - Room M	6:15pm–7:15pm
Revenue Management & Pricing	C - Room H	6:15pm–7:15pm
Simulation	C - Room G	6:15pm–7:15pm
Information Systems	F - California	6:15pm–7:15pm
Energy, Natural Resources & the Environment	F - Regency Ballroom 2	6:15pm–7:15pm
MONDAY, NOVEMBER 18		
Applied Probability	C - Room J1	6:15pm–7:15pm
Computing	C - Room J3	6:15pm–7:15pm
Decision Analysis	H - Plaza	6:15pm–7:15pm
Health Applications	F - Regency Ballroom 1	6:15pm–7:15pm
Military Applications	C - Room B2	6:15pm–7:15pm
Technology Management	F - Sacramento	6:15pm–7:15pm
Manufacturing and Service Operations Management	C - Ballroom A6	6:15pm–7:15pm
Quality, Statistics & Reliability	H - Almaden II	6:15pm–7:15pm
Telecommunications	C - Room B3	6:15pm–7:15pm
Transportation Science & Logistics Joint Meeting	C - Room K	6:15pm–7:15pm
TUESDAY, NOVEMBER 19		
Women in OR/MS Forum	F - Hillsborough	12:00pm–1:00pm
Minority Issues Forum	F - Piedmont	12:00pm–1:00pm
Artificial Intelligence	C - Room M	6:15pm–7:15pm
Forum on Education (INFORM-ED)	H - Pacific	6:15pm–7:15pm
Optimization	C - Room B4	6:15pm–7:15pm
Public Programs & Processes	C - Room N	6:15pm–7:15pm



SPEAKER INFORMATION

Audio/Visual Equipment
Every room will be equipped with an LCD projector and an overhead. Please follow these guidelines to ensure a successful presentation using the LCD projector:

– Bring your laptop PC to your session in San Jose. We supply the projector, but we DO NOT supply the computer.

– Bring your AC power adaptor with you. There will be convenient AC power in every session room.

– Arrive at your session at least 1/2 hour before it begins. All presenters in a session should set up and test the connection to the projector before the session begins.

– Do NOT attempt to run your presentation off the laptop battery, no matter how trustworthy.

– Produce and bring overhead transparencies as a backup.

There will be a special Projector Setup Room available near the registration area during the meeting. You can stop by and practice connecting your laptop to the projector. We will also have quick instructions at each session room and technical assistance available for any problems.

Guidelines for Speakers
The room and location of your session are listed in the Technical Sessions section or in the Master Track Schedule. Please be on time for your session and check in with the session chair.

Presentations should be limited to key issues with a brief summary. Time your presentation to fit within your designated time span and leave an opportunity for questions and audience participation. Bring copies of your paper to distribute or provide a handout with information relating to your oral presentation. INFORMS does not produce proceedings with complete papers. To obtain complete copies of any papers abstracted in the program, please contact the authors directly at the addresses supplied with each abstract.

Guidelines for Session Chairs
The role of the Chair is to coordinate the smooth running of the session. The Chair:

– Begins and ends each session on time. Each session lasts 90 minutes, with the time per presentation determined by the number of papers in the session. Equal time should be given to each paper.

– Introduces each presentation (just the title of the paper and the name of the presenting author).

– Ensures that presentations are made in the order shown in the program. This allows for "session jumping." If a speaker cancels or does not attend, the original time schedule should be adhered to rather than sliding every talk forward.

– Completes the session attendance forms (forms will be in the room)

COFFEE BREAKS

Sunday, Nov. 17		**Tuesday, Nov. 19**	
9:30am – 10:00am	C - Concourse 1 F – Tower Lobby	9:30am – 10:00am	C - Exhibit Hall 2 F – Tower Lobby
4:00pm – 4:30pm	C – Exhibit Hall 2 F – Tower Lobby	4:00pm – 4:30pm	C – Exhibit Hall 2 F – Tower Lobby
Monday, Nov. 18		**Wednesday, Nov. 20**	
9:30am – 10:00am	C – Exhibit Hall 2 F – Tower Lobby	9:30am – 10:00am	C – Concourse 1 F – Tower Lobby
4:00pm – 4:30pm	C – Exhibit Hall 2 F – Tower Lobby		

GENERAL INFORMATION

Email Center
Bring your own laptop to the Email Center, located in the Exhibit Hall, to access your email and the Web. Other computers are also available if you do not have a laptop. Name badges must be worn for admittance. The center will be open during the following hours:

Sunday, Nov. 17	12:00pm – 5:00pm
Monday, Nov. 18	9:00am – 5:00pm
Tuesday, Nov. 19	9:00am – 5:00pm

Exhibit Hall
Name badges must be worn for admittance to the Exhibit Hall, located in the Convention Center, Exhibit Level, Exhibit Hall 2, during the following hours:

Sunday, Nov. 17	12:00pm – 5:00pm & 7:30pm – 9:00pm*
Monday, Nov. 18	9:00am – 5:00pm
Tuesday, Nov. 19	9:00am – 5:00pm

*The Exhibit Hall will reopen Sunday evening for a gala Welcome Reception. Everyone is invited to the reception for the chance to meet colleagues and renew acquaintances.

Registration
The registration fee includes admittance to all technical sessions, the Exhibit Hall, the Welcome Reception on Sunday evening, and the General Reception on Monday evening at the Tech Museum of Innovation. Meals–other than hors d'oeuvres at the evening receptions–are not included.

Name badges must be worn to all sessions and events. Go to the INFORMS registration desk to replace lost badges. All attendees, including speakers and session and cluster chairs, must register and pay the appropriate registration fee. There are additional fees for any special events listed on the registration form.

Visitor Information & Business Center (VIBC)
Located on the first floor of the San Jose McEnery Convention Center, the center offers a full array of services, including:

– restaurant reservations

– visitor information

– computer/internet access

– fax, copying and mailing

The center is open Saturday and Sunday, 11:00am – 5:00pm and weekdays from 8:00am – 5:30pm. Telephone: 888-726-5673, www.sanjose.org.

Guest Program, Tours & Plant Tours

WHERE TO GO FOR LUNCH?

Lunch will be available for purchase in the Convention Center on Sunday, Monday and Tuesday from 12:00-1:30pm (Concourse I). A list of area restaurants is included in the San Jose City brochure you received with your registration packet. Or stop by the San Jose Visitor Information Booth (1st floor, right inside the Center's main entrance) for restaurant information.



San Jose 2002 QUICK REFERENCE including the Master Track Schedule

Don't miss this handy reference. It's a separate flier that came with your program. The Master Track Schedule is also included in this Program

GUEST PROGRAM AND TOURS

The program for registered guests includes a continental breakfast on Sunday, Monday, Tuesday and Wednesday mornings, the Welcome Reception on Sunday evening and the General Reception on Monday Evening. Registered guests will receive a colored name badge that must be worn for admittance to these events. Guests are not eligible to attend the technical sessions.

Guest Breakfast

Sunday, Nov. 17	8:00am – 9:00am
Monday, Nov. 18	8:00am – 9:00am
Tuesday, Nov. 19	9:00am – 10:00am
Wednesday, Nov. 20	9:00am – 10:00am

Fairmont San Jose Hotel
Terrace Room (Ballroom Level)

GUEST TOURS

You may still be able to register for the following guest tours. Go to the INFORMS registration desk for information on availability. Buses for both tours will leave from the front entrance of the Fairmont San Jose Hotel at the beginning time listed for each tour.

I Left My Heart in San Francisco
Sunday, November 17
9:00am-5:00pm $60
This full-day tour gives you an inside look at the special features that make the city so famous. A two-hour guided tour of Chinatown takes you off the beaten path to see the neighborhood from the native's perspective. Lunch is on your own at Pier 39, San Francisco's number one attraction where you can souvenir shop and watch the sea lions cavort. Next stop is Ghirardelli Square, with its upscale boutique shops. Busing to and from San Francisco and within the city is included.

Under the Sea: Monterey and Carmel
Monday, November 18
9:00am-5:00pm $60
Monterey, the famed 17-Mile Drive along the Pacific coast, and Carmel are all included in this full-day tour. The tour starts with a visit to the Monterey Bay Aquarium, followed by lunch on your own and shopping at Cannery Row. Next, travel south along 17-Mile Drive, one of the most scenic and breathtaking roads in Northern California (bring your camera for the photo stops along the way). Then you can explore the winding streets and fascinating shops of beautiful Carmel. Busing and admission to the Aquarium are included.

PLANT TOURS

A limited number of openings may still be available for the following plant tours. Go to the INFORMS registration desk for information on availability. Buses will leave from the front entrance of the Convention Center at the beginning time listed for each tour.

Monday, November 18

Stanford Linear Accelerator Center
9:00am - 12:30pm $20
Home of the first U.S. web site, SLAC is one of the world's leading research laboratories. Located at Stanford University, the SLAC mission is to design, construct and operate state-of-the-art electron accelerators and related experimental facilities for use in high-energy physics and synchrotron radiation research. Work at SLAC has been recognized with three Nobel prizes in physics.

Solectron Corporation
1:00pm - 4:30pm $20
Solectron Corporation, the only company to win the MBNQA twice, is a worldwide provider of electronics manufacturing services to leading original equipment manufacturers. Solectron's integrated design, prototyping and test, manufacturing, packaging, systems assembly, global distribution and post-manufacturing services offer customers competitive outsourcing advantages, such as access to advanced manufacturing technologies, shortened product time-to-market, reduced total cost of ownership and more effective asset utilization.

Tuesday, November 19

New United Motor Manufacturing, Inc. (NUMMI)
9:00am - 12:30pm $20
Find out how and why GM and Toyota came together over 18 years ago. NUMMI cars are at the top of the list for high quality in the U.S. NUMMI came in second for the best plant in the U.S. last year. Tour features a tram ride through passenger assembly, body and weld, stamping and truck assembly. See the Toyota Production System in action.

Cisco Systems
9:15am - 12:45pm $20
See a demonstration of Cisco's mobile office solutions. The underlying technologies will be addressed and a discussion of enhanced productivity benefits will follow.

IBM Almaden Research Center
2:30pm - 5:30pm $20
The tour will feature demonstrations, talks and a reception.

Networking and Social Events

NETWORKING AND SOCIAL EVENTS

At the heart of the INFORMS Annual Meeting is exchange – the sharing of knowledge, ideas and perspectives that takes place not just during the formal technical program, but informally in hallways, over cups of coffee and at these special events.

Saturday, November 16

INFORMS Membership Meeting
5:00pm – 6:00pm
Center – Ballroom A8
The INFORMS Board of Directors encourages all members to bring their ideas, opinions and suggestions to this annual membership meeting. Current business and future directions for INFORMS are on the agenda. Wine and cheese will be served.

CPMS Dinner
6:30pm – 9:00pm
Hilton – San Carlos
A wine reception and elegant dinner, followed by a keynote address by Ed Kaplan of Yale University. Ed will discuss how he has been able to get involved in projects that are both interesting and highly visible. Titled "Adventures in Policy Modeling," the talk will draw on his work in areas such as combating bioterrorism, preventing HIV/AIDS and picking the winners of presidential elections and the NCAA basketball championships. Fee is $65 for CPMS members, $85 non-members (includes 1-yr. CPMS membership). Sign up at the INFORMS registration desk.

Sunday, November 17

Breakfast for New Members & First-Time Attendees
7:00am – 8:00am (Ticket Required)
Fairmont – Imperial Ballroom
The INFORMS Board and Meetings Committee will host this breakfast to welcome and orient people who are new to INFORMS and the meeting. Continental breakfast will be served. New members and first-time attendees will receive a ticket for the breakfast with their registration materials.

Junior Faculty Special Interest Group Forum & Luncheon
11:30am – 1:00pm
Hilton – Almaden 1
All junior faculty are invited to participate. This event gives junior faculty in engineering and business schools the opportunity to discuss career development and exchange ideas. A buffet lunch will be served. Sponsored by Carnegie Mellon University, University of Florida and Purdue University.

Welcome Reception/50th Anniversary
7:30pm - 9:00pm
Center – Exhibit Hall 2
Wear Badge for Admission. Your meeting registration fee covers admission to this reception. If your guest would like to accompany you, a guest registration must be purchased. The $50 guest fee also includes the General Reception and continental breakfast Sunday-Wednesday.

The Welcome Reception features a celebration of 50 years of operations research, with fun, food, surprises, and music by Tuesday Night Live, a 17-piece jazz orchestra. Meet with colleagues and visit the exhibits. Special autographed copies of the 50th anniversary edition of *Operations Research* will be raffled off during the reception. Cash bar, complimentary soft drinks. See sidebar for more details.

Women in OR/MS Forum Reception
8:00pm – 10:00pm
Fairmont – Empire
Everyone interested in encouraging women in the OR/MS profession is invited to this reception. Light hors d'oeuvres and wine will be served. The Forum on Women in OR/MS Reception is sponsored by the Mathematical Sciences Department of IBM Research.

Minority Issues Forum Reception
8:00pm – 10:00pm
Fairmont – Garden
In an attempt to foster discussion and encourage close ties among those interested in issues of particular relevance to under-represented minorities, the Minority Issues Forum invites all conference participants to a reception sponsored by the University of Michigan and the Sloan Foundation. Light hors d'oeuvres will be served.

Student Reception
8:00pm – 10:00pm
Fairmont - Crystal
All students registered for the meeting are encouraged to attend this special reception for an opportunity to socialize and network with other students in your own field as well as those with different specialties and interests.



Organized operations research in America was born 50 years ago. INFORMS is celebrating this golden anniversary with a series of special events, surprises and publications.

50th Anniversary Celebration/Welcome Reception
Sunday, 7:00pm - 8:30pm
Center – Exhibit Hall 2
We're throwing a party and you're invited to celebrate! There will be a giant anniversary cake, fun, food, raffles, a great jazz band and lots of surprises. It's a party you don't want to miss.

Special autographed copies of the 50th anniversary edition of *Operations Research*, with 33 retrospective articles by leaders of the profession including Nobel Prize winners Kenneth J. Arrow and Harry M. Markowitz, and National Medal of Science winners George B. Dantzig and Ralph E Gomory, will be raffled off during the reception.

Gallery of Presidents
Center – Exhibit Hall 2
A photo gallery honoring past presidents of ORSA and TIMS during the early years of both organizations will be on display in the Exhibit Hall throughout the meeting.

Special Invited Cluster: Past ORSA Presidents
Tuesday, Sessions
TC 1:30pm - 3:00pm & TD, 4:30pm - 6:00pm
Center – Room J2
Six past presidents of ORSA will present papers in two special technical sessions organized by Saul Gass, Professor Emeritus at University of Maryland and past president of both ORSA and Omega Rho. Refreshments, complete with anniversary cake, will be served following the program.

Networking and Social Events

Monday, November 18

Welcome & Awards Ceremony
11:40am – 12:30pm
Center – Exhibit Hall 1
Join the INFORMS Board and San Jose Organizing Committee to honor and celebrate the achievements of our colleagues and all they have contributed to the field of OR/MS. The following awards will be presented: the INFORMS Prize, Dantzig Dissertation Prize, INFORMS Expository Writing Prize, President's Award, INFORMS Prize for the Teaching of OR/MS Practice, George E. Kimball Medal, Nicholson Prize, the John von Neumann Theory Prize and a special Recognition Award.

CPMS Isolated Practitioner Workshop & Reception
6:00pm – 7:00pm
Fairmont – California
CPMS, the Practice Section of INFORMS, sponsors this workshop on topics of interest to isolated practitioners, the "Lone Rangers" of OR/MS. The 19th workshop in this series will address timely issues that affect the isolated practitioner community. All are welcome to participate in the workshop, discussion and reception. Wine and cheese will be served.

General Reception – Tech Museum of Innovation
7:30pm – 9:30pm
Wear Badge for Admission. Your meeting registration fee covers admission to this reception. If your guest would like to accompany you, a guest registration must be purchased. The $50 guest fee also includes the Welcome Reception and continental breakfast Sunday-Wednesday.

The Tech Museum of Innovation, with five interactive theme galleries, is the perfect introduction to Silicon Valley. The museum focuses on technology– how it works and the way that technology is changing every aspect of the way we work, live, play and learn. Enjoy great food and musical entertainment. Cash bar, complimentary soft drinks.

Tuesday, November 19

Women in OR/MS Forum Business Meeting & Bag Lunch
12:00pm – 1:00pm
Fairmont - Hillsborough
Interested in issues related to women professionals in OR/MS? Come join us for lively conversation at our business meeting. Bring along a bag lunch.

Minority Issues Forum Business Meeting & Bag Lunch
12:00pm – 1:00pm
Fairmont - Piedmont
Please join the members of the Minority Issues Forum for a "bring your own lunch" discussion and technical meeting. By the end of the meeting, we intend to have every junior minority faculty member paired with a senior faculty member who is willing to serve as an informal mentor.

NEW!
Academic/Practitioner Interface Luncheon
12:30pm – 1:30pm
Center – Exhibit Hall 2
Don't miss this opportunity to network with colleagues, both in the practice and academic arenas. INFORMS leaders and practice session speakers will facilitate roundtable discussions focusing on academic-practitioner collaboration. Sit-down luncheon - $15. Ticket required - sign up at the INFORMS registration desk.

Sponsored by PeopleSoft.

INFORMS Future Meetings

2003

January 8-10
8th INFORMS Computing Society Conference
Sheraton San Marcos
Phoenix/Chandler, Arizona
Chair: Nong Ye, Arizona State University
www.ebrc.psu.edu/ics2003/

May 4-6
INFORMS Conference on OR/MS Practice
Creating Value in the Extended Enterprise
Sheraton Wild Horse Pass Resort & Spa
Phoenix, Arizona
Chair: Grace Lin, IBM T.J. Watson Research Center
gracelin@us.ibm.com

June 12-15
INFORMS Marketing Science Conference
University of Maryland, School of Business
College Park, Maryland
Committee:
Venkatesh Shankar,
vshankar@rhsmith.umd.edu
Brian T. Ratchford, bratchfo@rhsmith.umd.edu
Roland T. Rust, rrust@rhsmith.umd.edu

June 25-27
INFORMS Applied Probability Society Conference
The Great Wall Sheraton Hotel, Beijing, China
Chair: Hong Chen
The Chinese University of Hong Kong
www.aect.cuhk.edu.hk/~aps/

July 6-10
EURO/INFORMS Joint International Meeting
Istanbul, Turkey
Chair: Gulay D. Barbarosoglu
Organizing Chair: Murat Tarimcilar
www.istanbul2003.org

October 19-22, 2003
INFORMS Annual Meeting 2003 Atlanta
Westin Peachtree Plaza
General Chair:
Donna Llewellyn
Georgia Institute of Technology
donna.llewellyn@oars.gatech.edu

2004

October 24-27
INFORMS Annual Meeting 2004 Denver
Adam's Mark Denver
Denver, Colorado
General Chair: Manuel Laguna
University of Colorado
manuel.laguna@colorado.edu

2005

July 11-15, 2005
IFORS Triennial 2005
The 17th Triennial Conference of IFORS
Hilton Hawaiian Village Beach Resort & Spa
Honolulu, Hawaii, USA
Chair, Organizing Committee:
Jeffrey L. Arthur Oregon State University
arthur@stat.orst.edu
Chair, Program Committee:
Martine Labbé, Université Libre de Bruxelles
mlabbe@smg.ulb.ac.be

INFORMS Annual Meeting New Orleans
Chair: James Cochran
jcochran@cab.latech.edu

For Practitioners/Poster Session

RESOURCES FOR PRACTITIONERS

Whether you work in industry, government or consulting, you'll find the best applications resources at the Annual Meeting.

NEW!

Practice Sessions
Sunday – Wednesday
Track 2 - Fairmont – Cupertino
Track 3 - Fairmont – Fairfield
The focus is on OR/MS practice and industry applications, with a special emphasis on academic-practitioner interface. Each 90-minute session offers a professionally reviewed tutorial, panel discussion or two case studies. Practitioners and academics are encouraged to attend.

OR in Practice Poster Display
Sunday – Wednesday
Center – Concourse 1
For the third year, professionals from both the practice and academic arenas will display their work in this poster session on implemented projects. Open continually during the meeting, the display was initiated by the Academic-Practitioner Interface Committee. Poster presenters will be available to discuss their projects on Monday, Nov. 18, 4:30pm – 6:00pm.

Tutorials
Sunday – Tuesday
Track 1 – Center – Ballroom A4
These 90-minute sessions offer an in-depth look at current methodologies. Topics include semiconductor planning, modeling bioterror response logistics, supply chain scheduling and other key topics.

Software Demonstrations
Sunday – Tuesday
Track 47 – Center – Ballroom A8
See new product releases, case studies, and software presented by leading vendors. Publishers will introduce new resources for use in academic settings.

Edelman Competition 2002 Award Winner – Reprise Presentation
Monday, November 18
3:10pm – 4:00pm
Center – Exhibit Hall 1
The $15,000 Edelman Award, sponsored by CPMS, The Practice Section of INFORMS, recognizes outstanding applications of OR/MS. In a keynote session, the 2002 winning team from Continental Airlines and CALEB Technologies will reprise their presentation on crew recovery at Continental Airlines.

CPMS Isolated Practitioner Workshop & Reception
Monday, November 18
6:00pm – 7:00pm
Fairmont – California
CPMS, The Practice Section of INFORMS, sponsors this workshop on topics of interest to isolated practitioners, the "Lone Rangers" of OR/MS. The 19th workshop in this series will address timely issues that affect the isolated practitioner community. All are welcome to participate in the workshop, discussion and reception. Wine and cheese will be served.

NEW!

Academic/Practitioner Interface Luncheon
12:30pm – 1:30pm
Center – Exhibit Hall 2
Don't miss this opportunity to network with colleagues, both in the practice and academic arenas. INFORMS leaders and practice session speakers will facilitate roundtable discussions focusing on academic-practitioner collaboration. Sit-down luncheon - $15. Ticket required - sign up at the INFORMS registration desk.

Sponsored by PeopleSoft.

Search the Technical Sessions
Be sure to check out the 48 technical session tracks, particularly those sponsored by INFORMS subdivisions, which offer many applications-oriented papers and sessions. You'll find presentations on manufacturing, supply chain, optimization, e-business, auctions, data mining and knowledge discovery, financial engineering, biotechnology and many others.

OR IN PRACTICE POSTER SESSION

Sunday – Wednesday
8:00am – 6:00pm
Center – Concourse 1
Professionals from both the practice and academic arenas will display their work on implemented projects. Initiated by the INFORMS Academic-Practitioner Interface Committee, the session aims to showcase applications of OR/MS in different industries and to stimulate discussion between practitioners and academics. On Monday, 4:30pm-6:00pm, poster presenters will be available to explain and discuss their projects.

POSTERS

Optimal Treatment Planning for Radio Frequency Ablation of Hepatic Tumors
Ariela Sofer, George Mason University; Masami Stahr, George Mason University; Bradford J. Wood, National Institutes of Health

Price Quantification and Profit Optimization for Bid Requests
Roger R. Gung, Heng Cao, Yunhee Jang, Rick D. Lawrence, Grace Y. Lin, Yingdong Lu, IBM T. J. Watson Research Center

Supply Chain Analysis and Evaluation for Consumer Electronics Industry
Roger R. Gung, IBM T. J. Watson Research Center; Ramakrishna Desiraju, IBM Global Services

Noncyclic Uncapacitated Economic Lot Sizing with Setups
Shrikanth Mysore, Hemanth Gurur, Satish Ramanathan, Ali Guzel, David M. Miller, Charles P. Schmidt, University of Alabama

The Computation Interface for Operations Research: A Free Software Library for Operations Research Professionals
Tobias Achterberg, ZIB; Lou Hafer, Simon Fraser University; Robert Harder, Pentagon; Ted Ralphs, Lehigh University; Brady Hunsaker, Georgia Institute of Technology; Matthew Saltzman, Clemson University; John Forrest, J.P. Fasano, Laszlo Ladanyi, Robin Lougee-Heimer, Andreas Waetcher, IBM T. J. Watson Research Center

Total Value Chain Optimization
Feng Cheng, Tom Ervolina, Markus Ettl, John Konopka, Grace Y. Lin, Yingdong Lu , Carlos Rodriguez, Roger Tsai, IBM T.J. Watson Research Center; Zheng Wang, David Yao, Columbia University.

Throughput Analysis in Automotive Paint Shops
Jingshan Li, General Motors R&D Center

On Sending the California STAR Report to MARS
Cathleen Ann Platt, San Francisco State University

Application of Integer Programming Model for Pooled Distribution Network Design
Aravindan Rangarajan, Poornachandra Rao Panchalavarapu, Schneider Logistics, Inc.

Poster Session Committee
Kenneth Murphy, Florida International University, murphyk@fiu.edu
R. Jean Ruth, General Motors Research and Development Center
Markus Ettl, IBM Research

JOB PLACEMENT SERVICES

INFORMS Job Placement Service
Sunday – Tuesday
Center – Exhibit Hall 2
This service, open during exhibit hall hours, provides employers and applicants a convenient venue for on-site interviews to explore opportunities in academia, industry and government. In addition, the job placement service offers:

– Online access to job listings and applicant files,

– Expanded information about jobs and applicants,

– Weekly updates of the database,

– Improved database search capabilities,

– Online data entry for applicants and employers,

– Extended availability of the database.

www.informs.org/JPS/

Job Placement Panel Discussions
Sunday, November 17
Center – Room F2

The Industry Job Search
SA25, 8:00am – 9:30pm
The panel will discuss the industry interview process and the do and don't aspects associated with the job search. Participants include current and former industrial recruiters.

The Academic Job Search
SB25, 10:00am – 11:30am
This panel will discuss the academic interview process and the do and don't aspects associated with the job search, with comments by current and former search chairs.
Time will be provided for questions and answers at both sessions.

Job Fair
Sunday, November 17
12:00pm – 2:00pm
Center – Exhibit Hall 2
The Job Fair provides an opportunity for job seekers to meet participating employers in an informal atmosphere and to discuss employment opportunities within those organizations. Employers have the opportunity to meet and collect resumes from many job seekers in a short period of time early in the conference, giving them the chance to set up interviews during the conference.

2002 Combined Colloquia: Doctoral Student, Industry & Teaching Effectiveness Colloquia
Friday – Saturday
Fairmont – Gold, Valley & California
INFORMS has a tradition of offering enriching and stimulating special interest colloquia in conjunction with its regular meetings. Participants in all three colloquia will join together for a welcoming dinner on Friday evening (including a presentation by INFORMS President Mike Trick), as well as breakfast, breaks and lunch on Saturday. Colloquia participants separate on Saturday morning into three narrowly focused sessions. The two afternoon tracks consist of one pedagogically oriented track and another track directed toward industry and government employment.

CIST 2002 – 7th Conference on Information Systems and Technology
Saturday – Sunday
Fairmont – Hillsborough, California
Organized by INFORMS Information Systems Society in cooperation with INFORMS College on Artificial Intelligence and the INFORMS Computing Society. The theme is "IT-Enabled Transformations." The conference will feature many presentations on contributed and invited research contributions that deal with technical, behavioral and economic issues in the use, design and application of information systems.

Organization Science Dissertation Proposal Competition
Saturday, November 16
9:00am – 5:00pm
Fairmont - Piedmont
Now in its twelfth year, the competition is one of the most prestigious available to doctoral students studying organizations. In addition to the career advantages (past winners are now on the faculties at Harvard, Stanford, Wharton and UCLA) and the research advantages (detailed feedback on your work from eight leading scholars), the all-day workshop is a really nice opportunity to interact with a small group of future colleagues.

Nicholson Student Paper Competition
Sunday, November 17
8:00am – 11:30am
Center - Ballroom A8
The George Nicholson Student Paper Competition honors outstanding student papers in the field of operations research and the management sciences. Up to six awards (first and second place awards and up to four awards for Honorable Mention) may be given upon recommendation of the selection committee. First place carries a cash award of $600, second place $300 and each honorable mention $100. The first and second places and honorable mentions are also awarded certificates.

Teachers Program for INFORMS Members: How to Teach the Teachers
Sunday, November 17
1:30pm – 4:00pm
Fairmont – Valley
Bring operations research to math teachers near you. You can help math teachers in your area to enrich high school students' appreciation for operations research by providing them lesson plans with the basics of OR. Attend this special Public Awareness Committee training session and get all the training and material you'll need.

Teachers Program for San Jose Area Math Teachers
Monday, November 18
8:00am – 3:00pm
Fairmont - Club Regent
This program, geared to middle/high school/community college math and science teachers, will consist of introductory OR and computer application presentations followed by hands-on participation. Probability modeling, computer simulations, queueing models and linear programming models will follow an introduction to OR/MS. Participants, who are also welcome to attend meeting sessions, will receive copies of all program materials: videos, software packages with instructions and teacher/student activity guides, and Teacher Introduction Modules.

Panel: The Vital Need to Brand and Market Our Profession
Tuesday, November 19
10:00am – 11:30am
Fairmont – Valley
Many indicators of our profession's health–such as number of groups employed in organizations and membership counts in professional societies–show either significant decline or stagnation. Although we observe growth in some sectors, even there the work usually is not labeled OR, MS or OR/MS. All too often, those who provide our jobs, pay, research funding, courses to teach and general reputation don't know or don't value our overall profession. INFORMS is considering a major campaign to market the profession to our customers, funders and others who influence our professional well-being. The panelists will give presentations on our current process and plans for addressing this critical problem, and then seek reactions and suggestions from the audience.

Plenary & Keynote Presentations

OMEGA RHO

Omega Rho, the official Honor Society of INFORMS, was founded in 1976 to recognize superior scholarship and encourage leadership in operations research, management science and related disciplines.

The society has 35 active collegiate chapters and more than 4,950 student and faculty members. It is a member of the Association of College Honor Societies. In addition to sponsoring Omega Rho Distinguished Lectures at INFORMS annual and international meetings, Omega Rho provides financial support to the annual INFORMS Doctoral Colloquium
and to its local chapters.

Honorary Membership in Omega Rho is bestowed upon individuals who provide leadership and extraordinary support for the encouragement of operations research and management science through their professional activities. Prior to delivering the Omega Rho Distinguished Lecture, James G. Roche will be inducted as the 34th Honorary Member of Omega Rho.

OMEGA RHO DISTINGUISHED LECTURE

Sunday, November 17
11:40am - 12:30pm
Center - Exhibit Hall 1

Operations Research and the Challenge of Transformation
James G. Roche
Secretary of the United States Air Force

The mission of the Air Force is to defend the United States and protect its interests through air and space power. To do so, we maintain a balanced set of capabilities that deliver global mobility, reconnaissance, and strike–to anticipate and deter threats, to curb crises, and to triumph in conflict. Our adversaries, however, have recognized the overwhelming military strength of the United States and are not willing to engage our forces directly. Instead, our enemies have attacked America, and may again in the future, using asymmetric methods. We face a new reality, one in which our traditional defenses–deterrence and the protective barriers afforded by friendly neighbors and two large oceans–may be of limited effect.

These emerging truths form the landscape of our new security environment and underscore the need to transform our air and space capabilities as well as the way we think about and employ forces. We have a set of operational challenges–the threat of asymmetric attacks, a homeland defense mission, the need to defeat anti-access strategies, and a requirement to track, identify and deal with elusive, mobile targets deep in inhospitable territory–that require fresh intellectual energy. Future military leaders must be able to make timely, effective decisions, sometimes under conditions of great uncertainty, as well as be able to accomplish complex missions with highly constrained resources. In these battles of the future, there is a real and significant role for operations research.

The presentation will address this rapidly changing warfare environment, and will challenge the operations research community to think about how the Air Force can remain unequaled in the conventional war fighting business while bringing the compelling and deterrent effect of air and space power to bear against international terrorism and other asymmetric threats.



James G. Roche

Dr. James G. Roche is the 20th Secretary of the Air Force. In this role, he is responsible for the affairs of the Department of the Air Force, including the organizing, training, equipping, and providing for the welfare of its nearly 370,000 men and women on active duty, 180,000 members of the Air National Guard and the Air Force Reserve, 160,000 civilians, and their families. As head of the Department of the Air Force, Secretary Roche is responsible for its functioning and efficiency, the formulation of its policies and programs, and the timely implementation of decisions and instructions of the President of the United States and the Secretary of Defense. With an annual budget of approximately $68 billion, he ensures the Air Force can meet its current and future operational requirements.

Prior to this appointment, Secretary Roche held several executive positions with Northrop Grumman Corporation, including Corporate Vice President and President, Electronic Sensors and Systems Sector. Prior to joining Northrop Grumman in 1984, he was Democratic Staff Director of the U.S. Senate Armed Services Committee. Secretary Roche's previous military service spanned 23 years in the United States Navy, retiring with the rank of captain in 1983. As a naval officer, his assignments included Principal Deputy Director of the State Department's Policy Planning Staff; Senior Professional Staff Member of the Senate Select Committee on Intelligence; and Assistant Director for the Defense Department's Office of Net Assessment. He commanded the USS Buchanan, a guided missile destroyer, and was awarded the Arleigh Burke Fleet Trophy for the Navy's most improved combat unit in the Pacific in 1974.

Secretary Roche has served as a member of the Secretary of Defense's Policy Board and is a member of the Council of Foreign Relations and the International Institute of Strategic Studies. Dr. Roche has been awarded various campaign ribbons and military medals, including the Legion of Merit. He received an M.S. in operations research from the U.S. Naval Postgraduate School and a doctoral degree in business administration from the Harvard Graduate School of Business Administration.

Plenary & Keynote Presentations

PLENARY

Sunday, November 17
3:10 - 4:00pm
Center - Exhibit Hall 1

Supply Chain Management at Cisco Systems
Randy Pond
Senior Vice President of Worldwide Manufacturing Operations and Logistics
Cisco Systems, Inc.
pond@cisco.com



Randy Pond
Randy Pond is the Senior Vice President of Worldwide Manufacturing Operations and Logistics at Cisco Systems. In this role, Pond oversees the day-to-day operations of the company's entire worldwide manufacturing organization, including all product fulfillment, and logistics. Pond joined Cisco in September 1993. In his nine years with the company he has held numerous roles within manufacturing, including his initial role as Director of Operations. In 1994 Pond assumed leadership of Cisco's Supply/Demand group, and later in 1994 was appointed Director of Cisco's worldwide manufacturing operations, responsible for planning, production operations, and distribution and logistics.

He was promoted to Vice President of Manufacturing in 1995, responsible for all aspects of manufacturing operations, including new product introduction, planning, procurement, productions operations, and distribution and logistics. In January 2000, Pond was promoted to SVP of West Coast and Asia operations. He was promoted into his current role in 2001, increasing his responsibilities to his present day role.

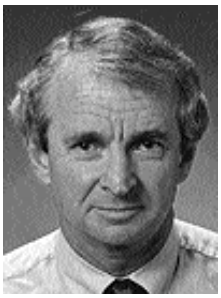
Prior to joining Cisco, Pond held the positions of Vice President Finance, Chief Financial Officer and Vice President of Operations at Crescendo Communications, and VP of Manufacturing and VP of Finance at Versatec, Inc, a wholly owned subsidiary of Xerox Corporation.

IFORS DISTINGUISHED LECTURE

Monday, November 18
3:10pm - 4:00pm
Center – Room J2

Some Aspects of Optimization Methods in Aircrew Scheduling
David M. Ryan
Professor of Operations Research
The University of Auckland
d.ryan@auckland.ac.nz

Besides constructing aircrew tours of duty or pairings with minimal cost, airlines also wish to construct pairings that are robust in that flight schedule disruptions are less likely to propagate delays into the future. In general a minimal cost solution is likely to lack robustness and conversely a solution with maximum robustness (however this might be measured) is likely to be more expensive. Professor Ryan will describe the aircrew scheduling process and in particular the pairings problem. He will review the development of optimization methods based on the set-partitioning model that produce minimal cost solutions. A measure of robustness for each pairing will then be developed and the concept of a linear robustness objective will be discussed. The two objectives of cost and robustness will be treated in a bi-criterion optimization to generate "efficient" pairings that do not allow a simultaneous improvement in cost and robustness. We show that treating the cost objective as a constraint while maximizing robustness leads to very difficult integer programming problems. This situation can be overcome by treating the cost objective as an elastic constraint and penalizing violations of the constraint in the robustness objective. (Some of this research is joint work with Matthias Ehrgott.)



David M. Ryan
David Ryan is Professor of Operations Research at the University of Auckland. Until the end of last year he was Head of the Department of Engineering Science. This year he has been on sabbatical in England, Denmark, Chile and the US. He is responsible for some fundamental and influential ideas in the field of applied combinatorial optimization, such as the set partitioning approach to routing and scheduling, and the constraint branching method for speeding up branch-and-bound searches in certain applications. Professor Ryan's research has significantly influenced OR applications throughout the world, especially with regard to airline crew scheduling problems. His work in this application area resulted in Air New Zealand being selected as a finalist in the 2000 Edelman competition. Professor Ryan has a keen interest in the practical use of OR methods to solve real-world problems and he is an acknowledged master at inspiring students, colleagues and people in industry to practice OR to maximum advantage.

Plenary & Keynote Presentations

Reprise Presentation
EDELMAN COMPETITION 2002 AWARD WINNER

Monday, November 18
3:10pm - 4:00pm
Center – Exhibit Hall 1

A New Era for Crew Recovery at Continental Airlines

Presenters:
Gang Yu, The University of Texas at Austin
yu@uts.cc.utexas.edu
Anna White, Continental Airlines
awhite@coair.com
Coauthors:
Michael Argüello, Gao Song, Sandra M. McCowan, CALEB Technologies Corp.

Airlines face schedule disruptions daily because of unexpected events, including inclement weather, aircraft mechanical problems, and crew unavailability. These disruptions impact the flight schedule, leading to delays and cancellations. As a result, crews may not be in position to service their remaining scheduled flights. Airlines must reassign crews quickly to cover open flights and to return them to their original schedules in a cost-effective manner, while honoring all government regulations, contractual obligations, and quality-of-life requirements. CALEB Technologies developed CrewSolver decision support system for Continental Airlines to generate globally optimal, or near optimal, crew recovery solutions. Since its implementation, the system has dealt successfully with several high-profile events including the December 2000 and March 2001 Nor'easter snowstorms, the June 2001 Houston flood, and most dramatically, the September 11th terrorist attacks. In each case, Continental recovered quickly and obtained overall benefits worth millions of dollars. Continental estimates that in 2001 the CrewSolver system helped it to save approximately US$40 million for major disruptions only.

PLENARY

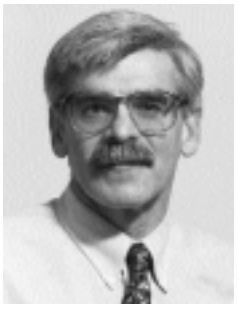
Tuesday, November 19
11:40 am - 12:30pm
Center - Exhibit Hall 1

Restructuring Electricity Markets

Richard P. O'Neill
Chief Economic Advisor of the Office of Markets, Tariffs and Rates
Federal Energy Regulatory Commission
richard.oneill@ferc.gov

For the past 20 years electricity markets have evolved from heavily regulated or government-owned entities to a more competitive structure. The tools and concepts of OR, in particular math programming, have been used to optimize planning, construction and dispatch of a single firm. In the industry restructuring, the tools and concepts are again being used to promote efficiency and competition. Math programming techniques including mixed integer programming, nonlinear programming and duality theory have been employed to clear constrained auction markets and mitigate market power. Since the restructuring needs to expand the frontiers of economics, game theory, auction theory, math programming and electrical engineering, the OR/MS team concepts are alive, well and play an important role.

The problems of the Western U. S. markets and the Enron collapse have resurfaced the debate of the benevolent enlightened central planner versus invisible hand of market capitalism. For some this is a religious debate where ethical and legal boundaries are tested. For others the debate occupies a highly technical middle ground involving efficient market design with market rules. This talk will review the history of restructuring, the techniques used and the research needs to continue the process.



Richard P. O'Neill

Richard P. O'Neill is the Chief Economic Advisor of the Office of Markets, Tariffs and Rates at the Federal Energy Regulatory Commission. From 1988-2000 he was the Chief Economist and Director of the Office of Economic Policy, and from 1986-1988, the Director of the Commission's Office of Pipeline and Producer Regulation. His work has focused on open access, competition, performance-based incentive regulation and market design. From 1978-1986, he directed oil and gas analysis, including the development of software systems, oil and gas resource analysis, energy modeling systems, analysis of natural gas markets, and oil and gas forecasting at the Energy Information Administration.

Prior to 1978, Dr. O'Neill taught and did research in computer science and applied mathematics on the computer science and business faculty of Louisiana State University, and taught and did research in the areas of operations research and statistics on the business school faculty of the University of Maryland. He has a B.S. in chemical engineering and an MBA and a doctorate in operations research (with minors in mathematics, statistics, economics and accounting), all from the University of Maryland.

Dr. O'Neill has worked with several countries, states, the World Bank, energy companies and computer companies in the development of mathematical software, energy modeling, forecasting, regulation, privatization and market design. His published work has appeared in academic and professional journals and books in the areas of applied mathematics, optimization, operations research, management science, computer science, energy, electrical engineering, economics, and law.

Plenary & Keynote Presentations

PHILIP MCCORD MORSE LECTURE

Tuesday, November 19
3:10 – 4:00pm
Center - Exhibit Hall 1

Modeled to Bits: Marketing Decision Models for the Digital, Networked Economy

Gary L. Lilien
Distinguished Research Professor of Management Science
The Pennsylvania State University
g5l@psu.edu

New developments in marketing management support systems have provided the marketer with a growing supply of tools that can enrich decision-making. Professor Lilien will describe the concept of marketing engineering, an approach that applies OR to solving marketing decision problems. Next, he will illustrate how the digital networked economy will induce significant structural changes in (a) how models are developed and deployed, (b) who uses marketing models, and (c) what types of models are developed. Professor Lilien will then summarize developments that he believes will further encourage the adoption of the marketing engineering concept and tools for both teaching about OR-based marketing decision making, and for improving the practice of OR-based marketing decision making. He concludes with several illustrations of the successful application of the marketing engineering concept, including two Edelman Prize winning applications and our most recent analysis of INFORMS' ongoing branding activities.



Gary L. Lilien
Gary L. Lilien is Distinguished Research Professor of Management Science at The Smeal College of Business at Penn State. He is also co-founder and Research Director of the Institute for the Study of Business Markets at Penn State, an organization aimed at fostering research and interchange in non-consumer markets. He holds three degrees in Operations Research from the School of Engineering at Columbia University. Previously, Professor Lilien was a member of the faculty at the Sloan School at MIT. His research interests are in marketing engineering, market segmentation, new product modeling, marketing-mix issues for business products, bargaining and negotiations, modeling the industrial buying process, and innovation diffusion modeling.

Professor Lilien is the author or co-author of 12 books (including Marketing Models with Phil Kotler and Marketing Engineering with Arvind Rangaswamy) and over 80 professional articles. He was Departmental Editor for Marketing for Management Science; is on the editorial board of the International Journal for Research in Marketing and the Journal of Business-to-Business Marketing; is Functional Editor for Marketing for Interfaces, and is Area Editor for Marketing Science. He is former Editor in Chief of Interfaces. He served as President as well as Vice President/Publications for TIMS. He is US Coordinator for the European Marketing Academy.

Professor Lilien is a winner of the Alpha Kappa Psi Award for the outstanding article in the Journal of Marketing and recipient of the Philip McCord Morse Lecturership Award from INFORMS, 2001-2002. He received honorary doctorates from the University of Liege, the University of Ghent, and Aston University. He belongs to INFORMS, the American Marketing Association, the Product Development and Management Association, and the European Marketing Academy. He has served on the NSF advisory panel for the Decision and Management Sciences program. Professor Lilien's consulting clients include AT&T, DuPont, Exelon, Federal Reserve Bank, Hewlett-Packard, IBM, Kodak, Pillsbury, PP&L, Sprint, 3M, and Xerox.



SUNDAY, NOVEMBER 17

Center – Ballroom A4

■ SA01
8:00am - 9:30am
Mechanism Design by Example
Leslie R. Fine,
Information Dynamics Lab, Hewlett Packard Labs
lfine@exch.hpl.hp.com

This will not be a highly technical talk. It will not represent work on the cutting edge of the field. What it WILL do is give a glimpse into the market and strategic forces at work all around us. I will try to give some insight as to the market and game-theoretic forces behind the California power crisis, the Microsoft breakup debate, the PCS spectrum license auctions and other such market phenomena. We'll have fun picking apart some of the very BAD mechanisms all around us, and explaining how they could be improved.

■ SB01
10:00am - 11:30am
Planning Production of Semiconductors
Robert C. Leachman,
University of California at Berkeley
leachman@ieor.berkeley.edu

Challenges and solutions are presented for the optimization of semiconductor production planning. Techniques are described to model multiple priority classes of demands and multiple objectives, binning and substitution, work-in-process, re-entrant capacity consumption by process flows with non-integer flow times, and assignment to non-homogeneous machines with dynamic qualifications.

■ SC01
1:30pm - 3:00pm
Real-time Fleet Management
Michel Gendreau, Université de Montréal
michelg@crt.umontreal.ca

While real-time fleet management problems have been around for many years, the development of new communication and vehicle location technologies as well as the emphasis on just-in-time transportation has put a new emphasis on them. In spite of recent advances in computing power and solution methodologies, these problems remain extremely challenging, because they differ in many ways from static operations research planning problems. In this talk, we describe some of the main challenges that are typically encountered when dealing with such problems and we describe a robust, practical approach to deal with them. Applications of this approach to courier and ambulance dispatching problems will be used to illustrate it.

■ SD01
4:30pm - 6:00pm
Supply Chain Scheduling
Nicholas Hall, Ohio State University
hall.33@osu.edu

The most active topic in manufacturing research during the last 10 years has been supply chain management. The key idea within supply chain management is that decision makers at different parts of a supply chain should coordinate their decisions in order to improve overall system performance. Much of the research in supply chain management, however, has focused on strategic decision making in stochastic environments. Recent reviews of the supply chain management literature point out this limitation. This work refocuses supply chain management research on operational problems that take place in deterministic environments. In particular, we describe three manufacturing environments where the coordination principle of supply chain management can be applied to scheduling decisions. In each of these environments, we identify and evaluate opportunities for improving system performance through coordinated decision-making, and discuss mechanisms by which those opportunities can be realized. Possible future research directions will also be discussed.

MONDAY, NOVEMBER 18

Center – Ballroom A4

■ MA01
8:00am - 9:30am
Modeling Bioterror Response Logistics
Edward H. Kaplan, Yale School of Management
edward.kaplan@yale.edu
Lawrence M. Wein, Stanford University
lwein@stanford.edu

Because deterrence and counter proliferation are largely ineffective at combating biological warfare, our security from a bioterror attack rests primarily on a strong logistical response. For the two most feared biological agents–smallpox and anthrax–we formulate and analyze new models to compare various response strategies. In both cases, key operational features of interventions, such as queues for tracing, vaccinating, distributing antibiotics or providing hospital care, are combined with traditional biological models–a disease transmission model for smallpox and an atmospheric dispersion model for anthrax. The use of probabilistic reasoning within an otherwise deterministic epidemic framework is featured throughout. Policy implications will be highlighted. (This is joint work with David L. Craft, Operations Research Center, MIT).

■ MB01
10:00 - 11:30am
Combinatorial Optimization in Bioinformatics and Computational Biology
Dan Gusfield, University of California, Davis
dmgusfield@ucdavis.edu

The areas of bioinformatics and computational biology have exploded in recent years with a huge growth of interest and activity. There have been many applications of combinatorial optimization in those fields. The most widely applied such method is dynamic programming, which arises in many diverse applications in bioinformatics and computational biology. But applications of graph theory are also common, and there have also been a few applications of network flow, matroid theory and integer programming. In this tutorial I will survey some of these applications. The in-depth examples will come mostly from my own work, for convenience in preparing this tutorial, but I will also mention work of others in order to illustrate the range of applications and techniques that have appeared. The underlying message is that bioinformatics and computational biology is a productive arena for combinatorial optimization.

Tutorials

■ MC01
1:30pm - 3:00pm
Logical Analysis of Data
Peter L. Hammer, RUTCOR, Rutgers University
hammer@rutcor.rutgers.edu

One of the most common forms of data analysis requires the extraction of information from a collection of observation records. Such problems appear frequently in practically every area of human activity (business, industry, science, technology, medicine, etc.). The records appear usually as vectors, having as components real numbers, logical symbols (e.g., yes/no), and "nominal" descriptors (e.g. either "round","green", etc.). An "outcome" is associated to each vector. In most cases the outcome is either binary (e.g., the vector represents a "sick" or "healthy" patient), or numerical (e.g., it shows the level of activity corresponding to the given input values). Numerous approaches are known for handling this type of problems, starting with the classical approach of statistics, and continuing with the newer methodologies of several rapidly developing areas, such as machine learning, neural networks, data mining, etc. The methodology of "Logical Analysis of Data" (LAD) is aimed at analyzing the same type of problems, by using a combination of tools borrowed from combinatorics, optimization, the theory of Boolean functions, etc. LAD was initiated in 1986, with a first paper published in 1988. Since then, numerous studies were dedicated to its mathematical, computational, and applied aspects.

■ MD01
4:30pm - 6:00pm
Value Function Approximation in Dynamic Programming: History and Recent Developments
Ben Van Roy, Stanford University
bvr@stanford.edu

Dynamic programming value function approximation has been a subject of discussion in the operations research literature since the 1950s. However, progress in this area has accelerated significantly over the past two decades, fueled to a large extent by activity in artificial intelligence. In this talk, we will overview algorithms for value function approximation and some of the history behind them. We will also discuss in greater depth recent developments involving a linear programming formulation for value function approximation. The talk will touch on applications in backgammon, finance, scheduling, queueing, and web server allocation.

TUESDAY, NOVEMBER 19

Center – Ballroom A4

■ TA01
8:00am - 9:30am
Control of the Supply Chain: Some Lessons from Traffic Flow Theory
Carlos Daganzo, University of California at Berkeley
daganzo@ce.berkeley.edu

What do gas molecules, automobiles, and factory products have in common? It turns out that their macroscopic motion in one-dimensional space (e.g., over a multi-echelon inventory system) is described by very similar equations. Therefore, fluid/traffic dynamics models and techniques are relevant for supply chain management. This tutorial will show how these techniques can be used for controlling supply chains in new ways.

■ TB01
10:00am - 11:30am
Facility Location: Models, Algorithms, and Applications
Timothy Lowe, University of Iowa
timothy-lowe@uiowa.edu

Researchers from various disciplines (operations research, geography, economics, mathematics, etc.) have contributed to the rather extensive body of knowledge on facility location problems. Various models for determining the location of facilities to provide service to geographically dispersed demands for this service have been developed. Often, these new models are developed in response to a newly discovered need. Model differences include such things as objective function, constraints, distance measure, and problem setting, e.g., on a transport network, in the Euclidean plane, over a discrete set of points, etc. In this tutorial we survey many of these models, and discuss applications as well as solution approaches. Particular emphasis will be given to approaches to large-scale location problems via aggregation.

■ TC01
1:30pm - 3:00pm
Very Large-Scale Neighborhood Search
James Orlin, MIT
jorlin@mit.edu

Most heuristic search algorithms for combinatorial optimization problems rely on small-sized neighborhoods that are searched explicitly. We describe very large-scale neighborhood (VLSN) search algorithms where the neighborhoods are of very large size and are searched implicitly. We also describe applications of VLSN search algorithms to several combinatorial optimization problems.

■ TD01
4:30pm - 6:00pm
Bioinformatics and Management Science: Common Tools and Techniques
Ali Abbas, Stanford University
aliabbas@stanford.edu
Susan Holmes, Stanford University
susan@stat.stanford.edu
William Swope, IBM Research

The idea is to give people with OR/MS backgrounds a quick introduction on how the tools they know well (like dynamic programming, simulation and some information theory) can be applied to bioinformatics. Also talking in a way a management scientist would understand. We plan to talk about the following: 1) introduction to bioinformatics, simulation and protein structure prediction; 2) dynamic programming, information theory, scoring rules and sequence alignment; and 3) bootstrap and the geometry of phylogenetic trees.

Software Demonstrations

SUNDAY, NOVEMBER 17

Center – Ballroom A8

■ SC47
1:30pm – 2:15pm
Brooks-PRI Automation
Simulation with AutoMod
Jay Stacey
jay.stacey@brooks-pri.com

AutoMod, with newly released Composite Systems, allows modelers to easily and quickly construct 3D VR models using and linking existing models. This presentation will highlight the features of AutoMod, illustrate Composite Systems and show some examples. Other topics will include optimization and Excel spreadsheet interfaces.

2:15pm – 3:00pm
Wolfram Research
Mathematica Product Presentation
Anton Rowe
info@wolfram.com

Mathematica is a fully integrated technical computing system that combines fast, high-precision numerical and symbolic computation with data visualization and programming capabilities. In this demonstration, we will cover the basic principles of Mathematica, present the latest features, and illustrate how Mathematica seamlessly connects to environments such as Microsoft Excel, ODBC databases and custom programs.

■ SD47
4:30pm – 5:15pm
Elsevier Science
ScienceDirect: Availability, Contents and Functionality
Gerard L. Wanrooy
g.wanrooy@elsevier.com

ScienceDirect (www.sciencedirect.com) is the world's largest database of peer-reviewed articles. This presentation surveys: (1) how to check your access, (2) what ScienceDirect contains, and (3) what functionality is offered.

5:15 – 6:00pm
Prentice Hall
David Hartvigsen
hartvigsen.1@nd.edu
SimQuick: Process Simulation with Excel

SimQuick is an easy-to-learn, inexpensive computer package for process simulation that runs in the Excel spreadsheet environment. SimQuick is accompanied by a short text with numerous examples and exercises. Students in OM, MS, and supply chain courses can quickly learn to build models for waiting lines, inventory and supply chains, and manufacturing, and do real-world projects on their own.

MONDAY, NOVEMBER 18

Center – Ballroom A8

■ MA47
8:00am - 9:30am
(Presentation will be given 8:00-8:45am and repeated 8:45-9:30am)
River Logic, Inc.
Enterprise Optimizer® 4.1 Guerilla Modeling-Creating Value in Two Weeks or Less
Eric Kelso and Phil Clarke
ekelso@riverlogic.com
pclarke@riverlogic.com
This session is highly recommended for anyone even remotely interested in optimization software! Find out how, with Enterprise Optimizer®, you can build and deliver optimization models quickly using a strong, yet flexible visual modeling metaphor without the need for any programming! Learn how Enterprise Optimizer® differs from all other common approaches, and why the need to capture vital organization knowledge and link business processes to financial results is critically important. A case study is described revealing how a company, by using Enterprise Optimizer®, went from losing $10 million per year to profitability. Emphasis is placed on features and capabilities as well as methodology.

■ MB47
10:00am - 11:30am
(90-minute presentation)
Imagine That, Inc.
Simulation with Extend
Dave Krahl
davek@imaginethatinc.com

The Extend simulation environment supports simulation modelers across a wide spectrum of modeling needs and interests. This presentation will show the features and capabilities of Extend as well as some sample models. Specifically, basic model building, simulation optimization, and embedded Excel spreadsheets will be demonstrated.

■ MC47
1:30pm – 2:15pm
LINDO Systems, Inc.
Innovative Software Tools for Optimization Modeling
Mark Wiley
mwiley@lindo.com

See how easy it is for you to quickly build complex optimization models, effortlessly access data from Excel and databases, and seamlessly embed a solver into your own applications. LINDO Systems will demonstrate the latest enhancements to their popular linear, integer, quadratic, and general nonlinear optimization modeling tools.

2:15 – 3:00pm
Maximal Software, Inc.
Optimization Modeling in Distributed Applications: How New Technologies Allow OR to Provide Web-Based Services
Bjarni Kristjansson
bjarni@maximalsoftware.com

We will demonstrate how optimization and modeling services can be packaged into component libraries based on industry standards such as ActiveX/Com and JavaBeans, allowing seamless integration of optimization into easily maintainable applications. Through new web-based standards, an environment is now created where distributed applications based on components are not only feasible, but also relatively easy to implement. We will look at different scenarios on how innovative technologies such as XML and SOAP are creating new opportunities for solving optimization problems within distributed applications.

Software Demonstrations

■ MD47
4:30pm – 5:15pm
Decisioneering, Inc.
Simulation and Modeling Using Crystal Ball Professional
David Fredericks
dfredericks@decisioneering.com
Crystal Ball software is one of the most recognized software tools for introducing the concepts of simulation and risk analysis to students. This discussion will introduce the fundamentals of uncertainty analysis, Monte Carlo simulation and optimization modeling techniques using Crystal Ball. Practical applications will include financial and portfolio analysis and optimization.

5:15pm – 6:00pm
ILOG, Inc.
ILOG CPLEX 8.0 Technical Overview: New Features and Performance Breakthroughs Introduced with Version 8.0
Irv Lustig
ilustig@ilog.com

Learn about new features, algorithms and capabilities for achieving added performance in LP, QP, MILP and now MIQP models, including: MIP performance enhancements, IP search strategy feature, sifting algorithm, concurrent optimization capabilities, new QP simplex algorithms and new MIQP algorithm.

TUESDAY, NOVEMBER 19

Center – Ballroom A8

■ TA47
8:00am – 8:45am
Real Options Software
Active Project Management using a Real Options Framework
Larry G. Chorn
lchorn@realoptions-software.com

This presentation illustrates the benefits of active management on project value. By categorizing key economic variables into active and passive, management can focus on variables that can improve the investment risk profile. This is illustrated through an example in FlexAble™, the only commercial software that provides the patented, complete Real Options solution.

■ TB47
10:00am – 10:45am
GoldSim Technology Group
An Introduction to GoldSim: Simulation for the Real World
Rick Kossik
rkossik@goldsim.com

GoldSim represents the next generation in general simulation software with the functionality that makes it feasible to simulate complex, real-world systems. Key features that differentiate GoldSim—built from the ground up to accommodate uncertainty and random variability; ability to include disruptive events; top-down hierarchical model interface and cloning of model elements. Example models will show how GoldSim can be used to support strategic planning, portfolio management, program planning, risk management, supply chain management, environmental modeling, and engineered systems modeling.

10:45am – 11:30am
SAS Institute, Inc.
SAS Supply Chain Planning Solutions
Ed Hughes
ed.hughes@sas.com

We'll review some of the latest supply chain planning solutions from SAS. These customized, web-based solutions are built on a solid data access and data warehousing foundation, and utilize SAS' unparalleled analytic excellence to help enterprises identify, adjust, and apply the most profitable strategic and tactical supply chain action plans.

■ TC47
1:30pm – 2:15pm
Frontline Systems, Inc.
New Premium Solver Platform V5.0
Daniel H. Fylstra
dfylstra@frontsys.com

We'll demonstrate the new Premium Solver Platform V5.0, featuring its model diagnosis and automatic differentiation facilities, and its groundbreaking new Interval Global Solver, plus new versions of six Solver Engines. Also featured: our versatile Large-Scale SQP Solver, with superb performance on linear, quadratic, and nonlinear models up to 100,000 variables.

2:15pm – 3:00pm
EDGAR Management Consulting Engineers Inc.
Optimum Transport Scheduling with OR and MS
Peter Caswell
peter@edgar-inc.com

Discussion of transportation computerized management systems, including simulation of vehicle transport through arterial street network with optimal travel time, multiple pickup and delivery, precise time windows, trip consolidation and driver assignment. Utilization of cluster, linear programming and combinatorial algorithms for trip and route development, precise stop timing and management control. Peter Caswell is in the forefront of the computerized transportation scheduling industry.

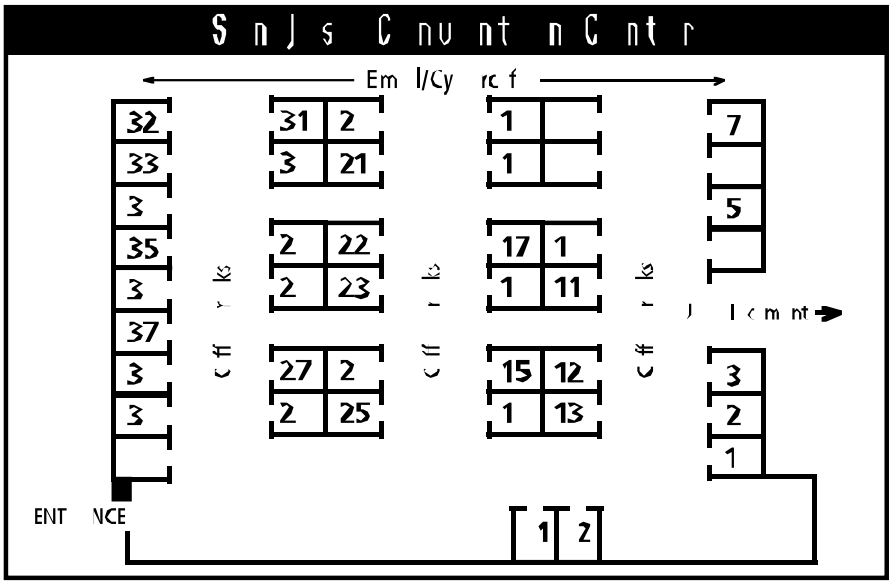
■ TD47
4:30 – 5:15pm
Duxbury/Thomson Learning
Insight 2
Sam Savage
savage@stanford.edu

Sam Savage will demonstrate Insight 2.0, an easy to use yet powerful suite of add-ins for Microsoft Excel performing simulation, decision analysis, forecasting, optimization, queuing and Markov chains. New enhancements include Blitzogram™, interactive histograms, permutation tests, tree flipping, graphical interface for decision analysis, combinatorial optimization and more. Educational versions are available and accompany Savage's Decision Making with Insight (Duxbury 2003©).

Exhibitors

Visit the Exhibit Hall in the Convention Center, Exhibit Level, Exhibit Hall 2, to see innovative software products and the latest technical reference materials from these companies and organizations. All coffee breaks will be held in the Exhibit Hall.

Exhibits Open:
Sunday, Nov. 17, 12noon-5:00pm & 7:30-9:00pm
Monday, Nov. 18, 9:00am-5:00pm
Tuesday, Nov. 19, 9:00am-5:00pm



Aptech Systems, Inc. **Booth # 13**
23804 SE Kent-Kangley Rd.,
Maple Valley, WA 98038
www.aptech.com
The GAUSS Engine, based on the fast and powerful GAUSS Matrix Programming Language, can be used to add the numerical computing power of GAUSS to multi-threaded, multi-user applications written in C, C++ or Java. GAUSS is used in all fields for solving large-scale optimization and data analysis problems.

Blackwell Publishing **Booth # 10**
350 Main St., Malden, MA 02148
www.blackwellpub.com
Blackwell publishes academic journals and general scholarly college and reference texts, with an emphasis on the humanities, social sciences and business.

Brooks-PRI Automation **Booth # 38**
5245 Yeager Rd., Salt Lake City, UT 84116
www.brooks-pri.com www.automod.com
AutoMod v11.0 simulation software with virtual reality (VR) 3D animation allows you to experiment in the virtual world to save time and money in the real world. AutoMod can simulate the most complex material handling operations, ensuring your system will work before it goes online.

Combined Book Display **Booth # 4**
Review titles and special offers from:
EDP Sciences
Edward Elgar Publishing
Taylor and Francis

Decisioneering, Inc. **Booth # 34**
1515 Arapahoe St., Ste. 1311, Denver, CO 80202
www.decisioneering.com
Decisioneering, Inc. is a leading developer of business intelligence software tools that simplify analysis and improve decision-making. Decisioneering's Crystal Ball 2000 software is powerful, easy-to-use risk analysis, optimization and time-series forecasting software. Decisioneering's customers include 90% of the Fortune 500, with a significant presence in various industries such as petroleum, pharmaceuticals, manufacturing and finance.

Duxbury/Thomson Learning **Booths # 36 & 37**
10 Davis Dr., Belmont, CA 94002
www.duxbury.com
Please visit Duxbury's booths at this year's conference to see our latest offerings in quantitative methods. From our exciting list of best selling introductory texts to our provocative list of upper level titles, we have prided ourselves on over 30 years of quality and innovation to quantitative methods.

Edgar Inc. **Booth # 11**
332 Pine St., Ste. 202, San Francisco, CA 94104
www.edgar-inc.com
Edgar Inc. provides software products and services applying statistical and operations research solutions to transportation and logistics industries.

Elsevier Science **Booth # 22**
P.O. Box 1991, 1000 BZ Amsterdam,
The Netherlands
www.sciencedirect.com
Elsevier Science journals in OR/MS and related areas are available on ScienceDirect®, the world's largest database of scientific articles. Gain access to 1500 peer reviewed journals (over 2.5 million articles), abstract services (over 40 million abstracts), and facilities for search and personalization.

EURO/INFORMS Istanbul 2003 **Booth # 5**
www.istanbul2003.org
Istanbul, the city where East meets West, is the site of the Joint International Meeting to be held July 6-10, 2003. Conference theme is "New Opportunities for Operations Research." Stop by the booth to learn more about the program and special meeting events.

Exhibitors

Frontline Systems, Inc. **Booth # 19**
P.O. Box 4288, Incline Village, NV 89450
www.frontsys.com
Frontline Systems developed the Solvers in Microsoft Excel and Lotus 1-2-3. Our Premium Solvers for Excel are compatible upgrades offering greater capacity, speed and ease-of-use. Our solver DLL products are callable by custom VB/C++ applications. Both offer powerful linear, integer and nonlinear optimization, genetic algorithms, global optimization and non-smooth optimization.

GAMS Development Corp. **Booth # 2**
1217 Potomac St. NW, Washington, DC 20007
www.gams.com
The General Algebraic Modeling System (GAMS) is a high-level modeling system for mathematical programming problems. It consists of a language compiler and a stable of integrated high-performance solvers. GAMS is tailored for complex, large scale modeling applications, and allows you to build large maintainable models that can be adapted quickly to new situations.

GoldSim Technology Group **Booth # 1**
18300 NE Union Hill Rd., Ste. 200,
Redmond, WA 98052
www.goldsim.com
GoldSim represents the next generation in general simulation software with the functionality to simulate complex, real-world systems. With the ability to dynamically link with external programs, databases and spreadsheets, GoldSim is used to support strategic planning, portfolio management, risk management, supply chain management, and environmental modeling.

ILOG, Inc. **Booth # 28**
1080 Linda Vista Ave., Mountain View, CA 94043
www.ilog.com
With proven optimization technology and services, ILOG enables competitive advantage, performance and reliability. In addition to CPLEX, ILOG offers a comprehensive suite of optimization prototyping, modeling, solving and embedding technologies. ILOG's commitment to R&D, technical support and customer service ensures ILOG customers leading edge technology and protection of investment.

Imagine That, Inc. **Booths # 26 & 27**
6830 Via Del Oro, Ste. 230, San Jose, CA 95119
www.imaginethatinc.com
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Planner

SUNDAY	MONDAY	TUESDAY	WEDNESDAY
SA 8:00 - 9:30	**MA** 8:00 - 9:30	**TA** 8:00 - 9:30	**WA** 8:00 - 9:30
SB 10:00 – 11:30	**MB** 10:00 – 11:30	**TB** 10:00 – 11:30	**WB** 10:00 – 11:30
Plenary – Omega Rho 11:40 – 12:30 James G. Roche C – Exhibit Hall 1	**Welcome & Awards** 11:40 – 12:30 C – Exhibit Hall 1	**Plenary** 11:40 – 12:30 Richard O'Neill C – Exhibit Hall 1	
SC 1:30 – 3:00	**MC** 1:30 – 3:00	**TC** 1:30 – 3:00	
Plenary 3:10 - 4:00 Randy Pond C – Exhibit Hall 1	**Keynotes** 3:10 - 4:00 David Ryan C – Room J2 Edelman Reprise C – Exhibit Hall 1	**Plenary** 3:10 - 4:00 Gary Lilien C – Exhibit Hall 1	
SD 4:30 – 6:00	**MD** 4:30 – 6:00	**TD** 4:30 – 6:00	

How to Navigate the INFORMS Technical Sessions

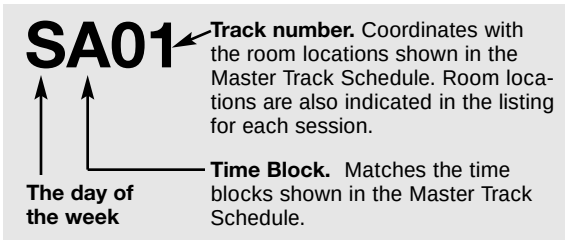
There are three primary resources to help you understand and navigate the INFORMS Technical Sessions:

- This technical session listing (pages 37-190), which provides the most detailed information. The listing is presented chronologically by day/time, showing each session and the papers/abstracts/authors within each session.
- The "Master Track Schedule" on pages 214-215. This is an overview of the tracks (general topic areas) and when/where they are scheduled.
- The "Floor Plans" on pages 212-213 show you where technical session tracks are located.

Quick Reference

Don't miss the "Quick Reference" (a separate flier you received in your registration packet). It includes the Master Track Schedule and floor plans, providing a quick, portable summary of the meeting.

The Session Codes



Time Blocks

A – 8:00-9:30am
B – 10:00-11:30am
C – 1:30-3:00pm
D – 4:30-6:00pm

Plenaries, keynotes and lunch breaks are interspersed among the technical session time blocks.

Room Locations/Tracks

These are shown with the name (or initial) of the building, followed by the room name. For example:

Center-Ballroom A4
Fairmont-Cupertino
Hilton-San Carlos II

Mailing Addresses

Postal mailing addresses for the authors and session chairs who provided them are available at:
http://www.informs.org/Conf/SanJose02
and click "search the program." Search under the person's last name.

Sunday 8:00 - 9:30am

■ SA01

Tutorial: Mechanism Design by Example

Center - Ballroom A4
Invited Session

1 — Mechanism Design by Example

Leslie R. Fine, Hewlett Packard Labs, Scientist, Information Dynamics Lab, Palo Alto, CA, 94304, USA, lfine@exch.hpl.hp.com.

This will not be a highly technical talk. It will not represent work on the cutting edge of the field. What it WILL do is give a glimpse into the market and strategic forces at work all around us. I will try to give some insight as to the market and game-theoretic forces behind the California power crisis, the Microsoft breakup debate, the PCS spectrum license auctions, and other such market phenomena. We'll have some fun picking apart some of the very BAD mechanisms all around us, and explaining how they could be improved.

■ SA02

Fairmont-Cupertino

Marketing Science Applications for the Automobile Industry

Sponsor: College on Marketing Section
Sponsored Session

Chair: Jorge Silva-Risso, J.D. Powers and Associates, Agoura Hills, CA, 91301, USA, jorge.silva-risso@powerinfonet.com

1 — A Game-Theoretic Study on a Non-Competitive Bidding Process Between an Automaker and Its Franchised Dealers
Wei Fan, J D Power & Associates, Troy, MI, Jie Cheng

Remarketing managers of major automakers are cutting operation costs by selling the off-lease vehicles directly to franchised dealers through the Internet. A non-competitive bidding system was used by automakers in order to receive a fair market value for the vehicles, and at the same time prevent the relationship with franchised dealers from deteriorating. This paper studies the issues involved in such a system using a game-theoretic methodology. Both, theoretical results and empirical validations will be presented.

2 — Tracking the Elusive Lessee
Michael Jay, J D Power & Associates, Westlake Village, CA , 91361, michael.jay@jpda.com., Jie Cheng, Brigette Lo

This presentation will describe how modeling techniques, in particular clustering based on behavioral and demographic variables, logistic regression utilizing customer segments and other behavioral data were instrumental in developing direct marketing campaigns to retain the automobile lessees' next automotive purchase. The Loyalty Scoring methodology will be explained.

3 — Modeling Promotions Effects on Consumers' Choice of Brand and Acquisition Type for Automobiles
Jorge Silva-Risso, J. D. Powers and Associates, Agoura Hills, CA, 91301, USA, jorge.silva-risso@powerinfonet.com, Irina Ionova

We model the consumer car acquisition decision with a Nested Logit where the choice of financing terms, program type (e.g., cash rebate, subsidized APR, rebate-APR subsidy combination, etc .), acquisition type (purchase vs. lease) are nested within a vehicle choice model. We calibrate the model on sales transaction data

■ SA03

Fairmont-Fairfield

Case: Electricity Reform — Lessons Learned from California

Cluster: Practice Track
Invited Session

Chair: Shishir Muhkerjee, Palo Alto Utilities

1 — Electricity Restructuring in California: Lessons Learned and Future of Deregulation
Shishir Muhkerjee, Palo Alto Utilities

The restructuring of the electricity industry in California, initiated on March 31, 1998, was expected to usher in competition among electricity service providers and reduce electricity rates for all customers. But within three years the initial optimism has been marred by a real energy crisis followed by a financial crisis so

that the survival of the deregulated industry is in question. Faced by a real crisis with no end in sight, Federal Energy regulatory Commission (FERC) had to change its policy from market-based rates to what can be best described as cost-based market mitigation plan for the Western region. FERC is moving decidedly in the direction of deregulation, but the future of deregulation in the USA is uncertain, as some of the states have slowed down the pace. The focus in this case study will be on lessons leaned from the California, national and international experience and key policy issues related to the redesign of the market structure and the role of transmission planning in developing a workably competitive market.

2 — Electric Industry Restructuring in Europe-Status and Plans
Sudhir Virmani, Electrotek Concepts Inc, Cupertino, CA

The European Commission (EC) Directive EC 96/92 on the Internal Electricity Market (IEM) began the liberalization of the electricity market in the European Union with England and Wales having liberalized their market earlier. Since many of the Eastern European and South East European countries are seeking membership of the EU, they have also started this process in 1996-2000. In this presentation, we will review the requirements in Directive EC 96/92 and review how the process has taken place within the EU member countries. We will also review the experience in the England and Wales which has recently changed it original pool structure to the New Electricity Trading Arrangement (NETA). The approaches being taken in other European countries such as CENTREL (Poland, Hungary, Czech Republic, Slovakia), Romania, Bulgaria, Bosnia and Herzegovina etc will also be described. The approach taken in Europe will be compared with some of the liberalized markets in the US such as PJM, Texas especially with regard to transmission pricing, ancillary services and energy trading.

■ SA04

Hilton-San Carlos II

OR in Sports

Contributed Session

Chair: Maciek A. Nowak, Georgia Institute of Technology, Atlanta, GA, 30324, US, maciek@umich.edu

1 — The Distribution of the Sum of Seed Numbers of Teams Advancing in Single-Elimination Tournaments Without Byes
David J. Lovell, University of Maryland, Assistant Professor, College Park, MD, 20742, USA, lovell@eng.umd .edu., Seth Young

A method is presented for computing the distribution of the sum of seed numbers of teams advancing in single-elimination sports tournaments without byes. This allows gambling on athletic events without the outcomes of individual games having a direct effect. The results are related to the classic theory of integer partitions from number theory and combinatorics.

2 — A Technique for the Assignment of Swimmers to Meet Events
Maciek A. Nowak, Georgia Institute of Technology, Atlanta , GA, 30324, US, maciek@umich.edu., Stephen M. Pollock, Marina A. Epelman

We present a model to aid a swim team coach in preparing an assignment of swimmers to events at a meet. Swimmers are restricted in the number of events they can compete in by meet rules and physical limitations. We use previously observed times to assign swimmers in order to maximize points.

3 — Signifance of Information System in Sports & Physical Education.
Aman S. Sisodia, J N V University, Jodhpur, 342001, India , aman_sisodia@rediffmail.com., Sunil Sharma, Milind K. Sharma

In the absence of proper information system architecture, even in the era of informationalism and technological advancement, in the field of sports and physical education today's sportsmen are not being benefitted unlike others in different streams. In view of this it is endeavored in this paper to propose an appropriate information infrastructure and further study its significance in sports and physical education.

4 — Hey Coach, Is My Daughter Playing Too Much Tennis?
Sanjeev Bordoloi, College of William & Mary, Asst. Professor, Williamsburg, VA, 23187, US, skbord@business .wm.edu.

Selecting tournaments to play or skip has become a science in professional tennis. Today, the most successful player is not the one with the best game, but the one that is best managed. This paper is intended to help managers/coaches of tennis players in developing an optimum playing schedule for their "wards" so that the targeted objective is met. The objective may be either ranking points accumulated or prize money earned, over a longer-term time horizon.

■ SA05

Fairmont-Sacramento

Technology and Organization

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Steve Sawyer, Pennsylvania State University, University Park, PA, 16802, USA, sawyer@ist.psu.edu

1 — Formalizing Theoretical Insights from Ethnographic Evidence: Revisiting Barley's Study of CT-Scanning Implementations
Nelson Repenning, MIT, Cambridge, MA, 02139, USA, nelsonr@mit.edu.

In this paper we offer an approach for theorizing about the recursive interactions between action and social structure occasioned by the introduction of new technology. Our method integrates three elements from social and organization theory: a focus on activities, attention to accumulations of knowledge by individuals in those activities, and the recursive relationship among activities and accumulations. We apply this lens to Barley's study of two hospitals implementing a CT scanning technology and through the development and analysis of a simulation model and show how the relative balance of expertise between technologists and doctors interacts with the feedbacks governing the conduct of the scanning activity to determine which patterns of interaction are realized.

2 — Process Innovation and Technological Regimes: Conflict, Contradiction and Closure within Industrial Organizations
Steven Peter Vallas, Georgia Institute of Technology, Atlanta, GA, 30332-0345, USA, steven.vallas@hts.gatech .edu.

This paper explores the impact of programmable technologies on the structure of industrial work. The findings demonstrate that multiple organizational logics empirically combine to shape the outcome of technological change. Organizational research will need to address the role of closure and contradiction if technological change is to be properly understood.

3 — Institutional Perspectives on Information Technology and Organizational Change
Steve Sawyer, Pennsylvania State University, University Park, PA, 16802, USA, sawyer@ist.psu.edu., Rob Kling

Discourses about the emerging forms, and uses, of information and communication technologies (ICT), increased workforce mobility, and ongoing changes to work governance, suggest that contemporary structures of, and links among, work, workers and organizations are quite fluid. We show how a multi-level institutional perspective provides a more robust analytic framework.

■ SA06

Fairmont-Atherton

College on Organization Science: Firm Emergence

Sponsor: College on Organization Science Section
Sponsored Session

1 — When Do Employees Become Entrepreneurs?
Thomas Hellman, Stanford University

2 — Liquidity Events and the Geographic Distribution of Entrepreneurial Activity
Olav Sorenson, UCLA, Toby Stuart

3 — Law firms as entrepreneurial pollinators in Silicon Valley
Mark Suchman, University of Wisconsin

No abstracts supplied.

■ SA07

Fairmont-Piedmont

Information Based Extended Product Development I

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Nitin Joglekar, Boston University, Boston, MA, 02459, USA, joglekar@bu.edu

1 — The Innovator's Non-Dilemma: The Case of Next-Generation Lithography
Melissa Appleyard, University of Virginia, Charlottesville, VA, 22903, USA, appleyard@virginia.edu., Alexander Liddle

Previous studies have emphasized how entrants might displace incumbents who focus too narrowly on satisfying the needs of present customers rather than pursuing innovation that will ensure future market leadership. This paper distinguishes between this "dilemma" and cases where incumbents spearhead leading-edge innovation requiring an unprecedented level of interfirm cooperation.

2 — Experimentation, Technological Change and R&D Performance: Evidence from Global Automotive Development
Stefan Thomke, Harvard Business School, Boston, MA, 02163 , USA, sthomke@hbs.edu.

In many fields, the economics of experimentation are being radically affected by new technologies. Indeed, these technologies seem to be affecting everything, from the development process itself, including its performance and structure. I will present empirical evidence for some of these changes from an empirical study on global automotive development.

3 — Economics of Integrating Software-Based Product Development: A Transaction Cost Perspective
Nitin Joglekar, Boston University, Boston, MA, 02459, USA , joglekar@bu.edu., Paulo Gomes, Stephen Rosenthal

We explore how firms organize system-level design tasks during software-based product development. A framework for measuring project coordination costs and ëin-house' technical integration as surrogates for transaction costs is presented. We use data from 65 design tasks to test our framework against operational constraints that drive the sourcing decision.

4 — Adding Value in Product Development by Creating Information and Reducing Risk
Tyson Browning, Lockheed Martin Aeronautics Company, tyson.browning@lmco.com.

This paper proposes that making progress and adding customer value in product development equate with producing useful information that reduces performance risk. The paper also contributes a methodology—the risk value method—that integrates current approaches such as technical performance measure tracking charts and risk reduction profiles

■ SA08

Center-Ballroom A2

Managing Business Processes - From Specification to Implementation

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Ying Tat Leung, IBM T.J. Watson Research Center, Yorktown Heights, NY, 10598, USA, , ytl@us.ibm.com

1 — Analysis of Business Processes
Manjunath Kamath, Oklahoma State University, mkamath@okstate.edu., Eswar Sivaraman

We review key techniques available for evaluating both qualitative (e.g. workflow correctness) and quantitative (e.g. average response time) performance measures. We also examine the requirements of business process models and their computer representations in order to integrate business process modeling and analysis within a single software environment to support design/redesign efforts.

2 — Operational Specification: A Technique for Business Process Integration and Analysis
Nathan S. Caswell, IBM T. J. Watson Research Center, Yorktown Heights, NY, Anil Nigam

OpS (Operational Specification) is a formal yet intuitive technique for constructing operational modeling of a business. It relies on factorization of operational knowledge into Information , Function and Flow components. OpS has been used in a variety of engagements both within and outside of IBM. We will provide a concise introduction to OpS, present some salient differences with other approaches, and discuss the experience from its use in a variety of situations across business segments.

3 — Decision Model and System Management using Business Decision Markup Language and Web services
Ying Huang, IBM T.J. Watson Research Center, Yorktown Heights, NY, 10598, USA, yxh@us.ibm.com., Ying Tat Leung

In recent years, a large variety of model-based supply chain management systems have been deployed to support various decision processes. It becomes critical to properly integrate and manage these systems and processes along with the rest of enterprise systems. We will discuss how Business Decision Markup Language (BDML) can facilitate such integration and management. Together with Web services, BDML is designed for the management of OR modeling assets (papers) and services (algorithms).

4 — IT Level Models for Business Process Integration Solutions
Ying Huang, IBM T.J. Watson Research Center, Yorktown Heights, NY, 10598, USA, yxh@us.ibm.com., Santhosh Kumaran

As reflected from various integration efforts, companies discover a clear gap between business process models and those of IT solutions. The former is used mainly by business analysts whereas the latter is by IT professionals. The proposed IT metamodels are designed to bridge this gap to facilitate the integration efforts. The basic concept is an application of a template pattern that ensures reusability and permit composition of individual IT artifacts to form sophisticated and reusable integration solutions. We will provide an architecture and example to illustrate the approach.

■ SA09

Center-Ballroom A3

Storage Services Management Models in e-Business

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Kyle D. Chen, Almaden Research Center, Research Staff Member, San Jose, CA, 95120-6099, U.S.A., kylechen@almaden.ibm.com

1 — Effective Service Level Agreement Designs for Storage Service Providers and Data Centers
Kyle D. Chen, Almaden Research Center, Research Staff Member, San Jose, CA, 95120-6099, U.S.A., kylechen@almaden.ibm.com.

We present a framework of dynamic storage resource sharing and provisioning to allow effective designs of Service Level Agreements between the customers and the Storage Service Providers & Data Centers. Particularly, we demonstrate an optimization model that can assist in making decisions on committing how much storage resources to customers.

2 — Optimization Model for Storage Service based on Quality of Service (QoS)
T. Paul Lee, IBM

In our storage service optimization model, the quality measure is the sojourn times of individual I/O requests. The provider tries not to over-commit its service capacity, while the customer can verify the guaranteed quality of service. The service guarantee is quantified as rebates to customers, depending on the actual QoS.

3 — Managing Network Attached Storage Systems Employing Statistical Procedures
Lance Russell, IBM

This paper presents an analysis of the impact of web-based workloads upon network-attached storage (NAS). Actual loads and how these translate into NFS operations per file are analyzed. A statistical model that configures the assignment of files to partitions is constructed. The model's response to variable workloads is reviewed.

■ SA10

Center-Ballroom A7

Optimization Models for Scheduling and Bin Packing

Cluster: Scheduling
Invited Session

Chair: Marc Posner, Ohio State University, Columbus, OH, 43210, USA, posner.1@osu.edu

1 — Scheduling in Reentrant Flow Shops with a Transporter
George Steiner, McMaster University, Hamilton, ON, MGD-415, Canada, steiner@mcmaster.ca., Jeff Xue

We study the problem of finding the optimal transporter move cycle and part processing sequence to minimize the cycle time or makespan in a bufferless reentrant flow shop with a single transporter. We show that the problem is strongly NP-hard with m>=3 machines and present polynomial solutions for 2-machine configurations.

2 — A New Algorithm for On-line Bin Packing
Hans Kellerer, University of Graz, Graz, Austria, kellerer@email.kfunigraz.ac.at.

The one-dimensional on-line bin packing problem is considered. We will present a new algorithm with asymptotic performance ratio 19/12. This improves the best algorithm so far, Harmonic++, by Seiden. Our algorithm is based on an innovative batching of the bins.

3 — How Useful are Preemptive Schedules?
Peter Brucker, University of Osnabrueck, Osnabrueck, D 49069, Germany, peter.brucker@mathematik.uni-osnabrueck .de., Johann Hurink, Silvia Heitmann

In machine scheduling jobs may be processed with and without preemptions. The possibility to preempt jobs usually leads to better performance values. We identify classes of single and parallel machine scheduling problems for which preemptions do not improve the optimal objective value.

4 — A Priori Evaluation of Solution Procedures for Optimization Problems
Nicholas Hall, Ohio State University, Columbus, OH, 43210-1144, USA, hall.33@osu.edu., Marc Posner

We develop strategies for preselecting solution approaches using problem data. These strategies are demonstrated for the 0-1 Knapsack Problem, where we compare Branch and Bound, Dynamic Programming, and dominance rules. The relative success of these approaches is predicted from the input data characteristics. This methodology generates more efficient solution procedures.

■ SA11

Center-Room C1

Project Management under Uncertainty

Contributed Session

Chair: Marc Rose, MCR Federal, Inc, Washington, DC, 20024, USA, mrose@mcri.com

1 — Applications of Semidefinite Optimization in Stochastic Project Scheduling
Karthik Natarajan, Singapore MIT Alliance, Singapore, Singapore, karthik@mit.edu., Dimitris J. Bertsimas, Teo P. Chung

We propose a SDP approach to find tight upper bounds on the expected project tardiness in a stochastic project scheduling environment, given only limited moment information of the individual activities. We show that this technique is as good as a formulation used by Birge and Maddox to solve the problem with the additional capability of handling cross moment information.

2 — An Approach to Integrate Concepts of Evolutionary Acquisition and Project Management
Unver Cinar, Sabanci University, Orhanli,Istanbul, 81474, Turkey, unver@sabanciuniv.edu.

We offer an approach to reduce uncertainty in the management of projects that are amenable to evolutionary acquisition. Evolutionary acquisition is used for projects where final requirements, hence, alternative solutions can not be specified in advance, creating problems in the generation of time, resource and cost estimates.

3 — Cost Risk Analysis — Back Allocation to the Cost Elements
Marc Rose, MCR Federal, Inc, Washington, DC, 20024, USA, mrose@mcri.com.

Addressing issues of using the risk adjusted cost of a program. Common practice is to allocate the costs to the elements using the "mode" of the distributions as the scaling factor. This briefing will demonstrate why this method leads to invalid results and propose an alternate methodology.

4 — Crashing Stochastic Activities in Projects by a Generalized Newsboy Model
Dan Trietsch, University of Auckland, Auckland, NZ, New Zealand, d.trietsch@auckland.ac.nz.

15 to ten years ago, three independent sets of authors generalized the newsboy model to purchasing several project items with stochastic lead times (all items must arrive to avoid project delay). These results may have been influential in the popularization of project buffers and feeding buffers. I present a similar model for optimal crashing of stochastic project activities. This can involve changing the variance along with the mean, which requires a further extension of the newsboy model.

■ SA12

Fairmont-Regency 1

Methodologies for Efficiency in Health Care

Sponsor: Health Applications Section
Sponsored Session

Chair: Timothy Butler, Wayne State University, Associate Professor, Detroit, MI, 48202, USA, timothy.butler@wayne.edu

1 — Optimal Locations for Traumatic Brain Injury Treatment Units
Murray J. Côté, University of Florida, Assistant Professor, Gainesville, FL, 32610-0195, USA, mjcote@ufl .edu., Siddhartha Syam, W. Bruce Vogel, Diane C. Cowper

We present an optimization model for locating traumatic brain injury (TBI) treatment units. The model allocates TBI treatment units to existing Veterans Affairs Medical Centers while minimizing the sum of patient travel costs and treatment costs. Initial results are based on veterans diagnosed with TBI in south Georgia and Florida.

2 — An Efficiency Measure of Cancer Treatment
Thomas Chirikos, H.Lee Moffitt Cancer Center & Research Institute, University of South Florida, Professor and Member-in-Residence, Tampa, FL, 33612, USA, chirikos@moffitt.usf.edu.

This analysis tests whether cost-outcome ratios differ across subgroups of incident cancer cases and then uses the results to measure the efficiency with which cancer care is delivered. Data obtained from claims and Registry files on breast, lung, and colon patients diagnosed at one center are used to measure cumulative costs and quality-adjusted survival time over a 4-year period. These variables are treated endogenously in a two-equation regression model specified to gauge inefficiency.

3 — Returns to Scale in DEA Programming- An Examination of Michigan Hospitals
Timothy Butler, Wayne State University, Associate Professor, Detroit, MI, 48202, USA, timothy.butler@wayne .edu., Ling Li

Banker, Charnes, and Cooper (BCC) introduced the capability of using DEA for assessing increasing, decreasing, and constant returns to scale. This analysis would appear to make an important contribution to the health care field because of the regulatory environment within which the industry exists and competition of hospitals for additional services and capacity. This research applies the returns to scale analysis of BCC to Michigan Hospitals to determine the discriminatory power.

■ SA13

Center-Room D

Heuristic Programming Applications

Contributed Session

Chair: Robert Russell, Univ. of Tulsa, Professor, Tulsa, OK, USA, rrussell@utulsa.edu

1 — Some Aspects of Using Artificial Intelligence in the CAPP Systems for EDM Technology
Dragan M. Eric, CAD/CAM Engineer, Cacak, 32000, YUGOSLAVIA, ericmdragan@yahoo.com., Savko R. Jekic

In this paper there has been given a presentation of the concept of the expert system role in designing of Computer Aided Process Planning (CAPP) systems for the Electrical Discharge Machining technology. The role of this CAPP system with knowledge base and inference engine, would be, first of all, to define all neceesary elements for EDM technology.

2 — Artificial Neural Network Based Fault Diagnosis of Power Transformers
Narendra K. Patel, MBM Engineering College, JODHPUR-342001, JODHPUR, 342001, INDIA, nkpatel@datainfosys.net., Raj K. Khubchandani

Currently there is no foolproof and systematic method to assess the fault in the transformer depending on the dissolved gas content. Only sound technical knowledge, proven competence and experience of an expert can tell the type of fault that is likely to develop in the transformer. A new method based on ANN has been developed to diagnose the incipient fault in the transformer. Suitable preventive measures can then be taken to remove the fault and protect the transformer.

3 — An Evaluation of Solution Methods for Solving the Purchasing-Routing Problem
Robert Russell, Univ. of Tulsa, Professor, Tulsa, OK, USA , rrussell@utulsa.edu.

We compare the effectiveness of tabu search, set partitioning, and direct model optimization via an IP solver. Computational results are presented for generating optimal and near optimal solutions to real world problems.

■ SA14

Center-Room E

Computational Techniques for Variational and Equilibrium Problems

Sponsor: Optimization Section-Linear Programming and Complementarity
Sponsored Session

Chair: Paul Tseng, University of Washington, Seattle, WA, 98195-4350, USA, tseng@math.washington.edu

1 — A Weighted Analytic Center Cutting Surface Algorithm for Eigenvalue Optimization with Linear Constraints.
Mohammad Oskoorouchi, McGill University, Montreal, QC, H3A 1G5, oskoorom@management.mcgill.ca., Jean-Louis Goffin

Minimizing the maximum eigenvalue of an affine combination of symmetric matrices, over a bounded polytop arises in many applications. We transform the eigenvalue optimization problem to a convex feasibility problem and propose a nonsmooth technique based on an analytic center cutting surface method to solve the problem. Numerical results will be presented.

2 — Solving Network Equilibrium Problems in Static and Dynamic Environments
Michael Yee, MIT, Cambridge, MA, 02139, myee@mit.edu., Georgia Perakis

We consider the user-optimization network problem. This arises in a variety of applications and may be viewed as a variational inequality problem over simplex constraints. We propose an active set method and examine its convergence theoretically as well as computationally. Finally, we extend our approach to a dynamic setting.

3 — A Trust Region Approach to Nonlinear Bilevel Programming: Implementation and Numerical Results
Benoit Colson, Facultés Universitaires N-D de la Paix, B-5000 Namur, Belgium, bc@math.fundp.ac.be., Patrice Marcotte, Gilles Savard

We apply a trust region approach to nonlinear bilevel programs where the trust model consists in a linear-quadratic bilevel program that is solved for a global optimum. We discuss the implementation and performance of the algorithm on test problems, some of them taken from the literature.

■ SA15

Center-Room B4

Network Modeling and Optimization

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Richard Barr, Southern Methodist Univ, Chair, EMIS Dept., Dallas, TX, 75275, USA, Barr@engr.smu.edu

1 — Extensible Optimization Toolkit for Military Planning Systems
Gordon Bradley, Naval Postgraduate School, GBradley@monterey.nps.navy.mil., Arnold Buss

The Extensible Optimization Toolkit is a collection of loosely coupled components for the rapid construction of custom military planning systems. The components are overlays on geo-referenced maps and images. One component supports the construction and optimization of network and graph models. Other components include terrain analysis and Monte Carlo simulation.

2 — Supply Chain Supernetworks and Environmental Criteria
Anna Nagurney, University of Massachusetts, Amherst, MA, 01003, nagurney@gbfin.umass.edu., Fuminori Toyasaki

In this paper, we develop a framework for the modeling and analysis of supply chain networks with electronic commerce in which the decision-makers are faced with environmental criteria. We model the statics and the dynamics and present an algorithm for the determination of the equilibrium prices, product shipments, and emissions generated.

3 — Financial Networks with Electronic Transactions: Modeling, Analysis, and Computation
Anna Nagurney, University of Massachusetts, Amherst, MA, 01003, nagurney@gbfin.umass.edu., Ke Ke

We develop an integrated framework for the study of financial networks with electronic transactions and with different tiers of decision-makers. We formulate the governing equilibrium conditions and also address the disequilibrium dynamics. Qualitative properties are presented as well as a numerical scheme for the determination of the equilibrium price and financial flow pattern .

4 — Outfitting and Pre-positioning Theater Ballistic Missile Defense AEGIS Battle Groups to Meet an Exigent Threat of Attack
Gerald Brown, Naval Postgraduate School, Monterey, CA, 93943, USA, gbrown@nps.navy.mil., Kevin Wood

We distribute interceptors among TBMD AEGIS battle groups (BGs), and preposition each BG to optimally defend against a worst-case set of attacks. Command-and-control assigns interception of each attack to one BG. There is no deception or gaming; the attacker and defender have perfect intelligence. Stochastic interceptions allow shot-to-shot dependence.

■ SA16

Center-Room C4

Multicriteria Decision Making

Contributed Session

Chair: Serpil Sayin, Koc University, Istanbul, 80910, Turkey, ssayin@ku.edu.tr

1 — A New Approach for Multicriteria Optimization
Fernanda M. Raupp, LNCC, Rio de Janeiro, 22470-040, Brazil, fernanda@lncc.br., Wilfredo Sosa

We present a new approach for multicriteria optimization problems , where the objective and the constraints are linear. From an equivalent equilibrium problem, we give new characterizations for weakly efficient solutions. Thus we are able to apply the analytic center cutting plane algorithm to find weakly efficient solutions approximately.

2 — Effectiveness Analysis of Deriving Priority Vectors from Pairwise Judgment Matrices
Eng U. Choo, Simon Fraser University, Burnaby, BC, V5A1S6 , Canada, choo@sfu.ca., Guneet Bajwa, William C. Wedley

We evaluate six preference estimating methods from pairwise comparison matrices under four effectiveness measures. The results of simulation experiment, with priority vectors that represent scenarios ofWe evaluate six preference estimating methods from pairwise comparison matrices under four effectiveness measures. The results of simulation experiment, with priority vectors that represent scenarios of "no sure winner" and "two equal winners", suggest that the geometric mean method and the normalized column mean method are the best methods .

3 — Robust Optimization and Multiobjective Optimization: Cross Utilization of Solution Methods
Serpil Sayin, Koc University, Istanbul, 80910, Turkey, ssayin@ku.edu.tr., Panos Kouvelis

In this paper, the relationships between robust optimization and multiple objective optimization are studied. The equivalence between certain types of robustness and efficiency is demonstrated. Cross utilization of solution methods across the two separate fields is discussed with respect to discrete optimization. The bicriteria case is studied in detail.

4 — MCDM and Performance Measurement Using a Decision Model
Celik Parkan, Long Island University, Professor, Huntington, NY, 11548, USA, cparkan@liu.edu.

We introduce a decision model that can be used for multi-criteria decision-making (MCDM), performance measurement, as well as decision-making under partial probability information. Two particular configurations of the model lead respectively to data envelopment analysis (DEA) and the operational competitiveness rating (OCRA) procedure. The model's application is illustrated by an example.

5 — Comparison of Methods for Preference Estimation in the Analytic Hierarchy Process
Jack Elzinga, University of Florida, Gainesville, FL, 32611, US, elzinga@ise.ufl.edu.

We simulate how in the AHP a decisionmaker's errors in pairwise preferences are manifested in determining overall preferences by analyzing the performance of four popular methods for determining overall preferences from a set of noisy pairwise preferences. Three of the methods give remarkably similar results while one (the least squares method) performs best for low levels of decisionmaker uncertainty but worst at high levels.

■ SA17

Center-Room B1

Forecast-Facilitated Manufacturing and Supply Chain Operations

Cluster: Flexible Manufacturing Systems
Invited Session

Chair: John Liu, University of Wisconsin-Milwaukee, Milwaukee, WI, 53201, USA, jjl@uwm.edu

1 — Price Fluctuations, Information Sharing, and Supply Chain Performance
Srinagesh Gavirneni, SmartOps, Austin, TX, 78750, USA, gsnagesh@yahoo.com.

We show that in presence of information sharing, supply chain performance can be improved by supplier's offering fluctuating prices. After establishing structure of optimal policies and developing solution procedures, we perform an extensive computational study to determine the extent (averaging 5.0%, maximum 16.3%) of the improvements in the supply chain.

2 — Optimal Mixed Strategy in Promotion-Production Scheduling
Hisashi Kurata, University of Wisconsin-Milwaukee, Milwaukee, WI, 53201, USA, hkurata@uwm.edu., John Liu

In a promotion-production system, retailer selects promotion schedules (e.g., HiLo), which will incur certain demand patterns. The supplier will then select production policy (e.g., MTO vs. MTS). In a nonzero-sum game setting, we examine optimal strategy for scheduling promotions at retailer, and optimal production strategy for production at supplier.

3 — Collaborative Inventory Management — Capacity and Flexibility Considerations
Yossi Aviv, Washington University, Saint Louis, MO, 63130 , USA, AVIV@olin.wustl.edu.

We consider inter-relation between capacity planning and forecasting, by examining the value of collaborative forecasting in resource-constrained production environment, where capacity can be changed periodically, or a variety of products share the same capacity. This work adds new dimension to our previous research on the value of collaborative forecasting processes.

4 — Demand Forecast Sharing in Supply Chains with Consideration of Forecasting Costs
Xiaohang Yue, University of Texas-Dallas, xyue@utdallas .edu.

Forecast accuracy affects supply chain profits. A more accurate demand forecast contributes to higher revenue or lower inventory costs. However, forecast accuracy is potentially dependent on the investments made in forecasting process. In this study, we will evaluate the benefit and cost of forecast information sharing within a supply chain.

5 — Forecasts and Planned Order Release in MRP
Layth Alwan, University of Wisconsin-Milwaukee, alwan@uwm.edu., Dong-Qing Yao

We examine the impact of forecast to order releasing in an MRP environment. The main input information to MRP is MPS (master production schedule), which is derived from some form of forecast , such as EWMA and MA. Assuming AR(1) demand, we evaluate the performance of MRP under different forecasting methods.

■ SA18

Center-Room J2

Industry and Integer Programming

Cluster: Applications of Optimization Theory
Invited Session

Chair: Diego Klabjan, University of Illinois at Urbana-Champaign, Assistant Professor, Urbana, IL, 61801-2906, USA, klabjan@uiuc.edu

1 — The Optimal Design of Regions for Liver Transplantation
Andrew J. Schaefer, University of Pittsburgh, Department of Industrial Engineering, Pittsburgh, PA, 15261, USA, schaefer@ie.pitt.edu., Nan Kong, Steven Shechter, James Stahl

There is a serious and growing shortage of livers for transplantation. We consider the problem of designing regions to maximize total quality-adjusted liver transplantations. We also consider equity in access to livers. We provide computational results that compare our proposed solutions to the current set of regions under various assumptions.

2 — Flight Instructor Scheduling
Glenn Baily, Operations Research, Atlanta, GA, USA, Milind Sohoni, Jiefeng Xu, Mike McCleery, Helen Carter

Airline flight training scheduling departments are responsible for scheduling the pilot training in order to meet several standards and regulations. In this presentation we propose an optimization strategy that includes a set covering model and a TABU search method to build month long flight instructor work schedules.

3 — Integrated Airline Planning
Diego Klabjan, University of Illinois at Urbana-Champaign , Assistant Professor, Urbana, IL, 61801-2906, USA, klabjan@uiuc.edu.

Airlines solve the fleet assignment, the aircraft routing, and the crew scheduling problem separately in this order. We present a model that integrates these three problems. We propose solution methodologies to solve the model and we give preliminary computational experiments.

4 — Modeling Techniques for Large-scale Problems in Transportation and Logistics
Amy Mainville-Cohn, MIT, Cambridge, MA, USA, Cynthia Barnhart

Transportation and logistics problems are often difficult to solve. We can sometimes address these difficulties by formulating models based on composite variable integer variables. We discuss a number of different application areas where this approach has been successful, and identify common characteristics of these models for use in other applications.

■ SA19

Fairmont-Regency 2

AIDS Modeling

Cluster: Health Care
Invited Session

Chair: Greg Zaric, Ivey School of Business, Assistant Professor, London, ON, N6A 3K7, , Canada, gzaric@ivey.uwo.ca

1 — Dynamic Resource Allocation for Epidemic Control
Margaret Brandeau, Stanford University, Stanford, CA, 94305, USA, brandeau@stanford.edu., Greg Zaric

We develop a dynamic resource allocation model in which a limited budget for epidemic control is allocated over multiple time periods to interventions affecting multiple populations. We show that allowing for some reallocation of resources over the time horizon of the problem can lead to significant increases in health benefits.

2 — Public Health Consequences of Screening Patients for Adherence to Highly Active Antiretroviral Therapy
Edward H. Kaplan, Yale School of Management, Beach Professor of Management Sciences, New Haven, CT, 06520-8200, USA, edward.kaplan@yale.edu., Eric Tchetgen, Gerald Friedland

Improvements in HIV antiretroviral therapy (ART) have been accompanied by increasing recognition of the importance of adherence to treatment regiments for maximizing patient benefits while minimizing the emergence of drug-resistant virus. Whether clinicians should screen patients for adherence and only administer therapy to those believed likely to adhere has not been resolved. We extend previously developed mathematical models of ART to include screening for adherence.

3 — The Cost Effectiveness of Improved Adherence to HAART
Greg Zaric, Ivey School of Business, Assistant Professor, London, ON, N6A 3K7, Canada, gzaric@ivey.uwo.ca.

Highly Active Antiretroviral Therapy (HAART) can lead to improved survival and quality of life among individuals with HIV. Resistant strains of HIV can develop if adherence is poor. The health benefits of HAART may be lower among individuals with resistant strains, and resistant strains of HIV may be transmitted to others. We develop a dynamic compartmental model to investigate the cost effectiveness of strategies to improve adherence to HAART.

■ SA20

Fairmont-Hillsborough

Multi-Unit Auctions

Cluster: Auctions
Invited Session

Chair: Michael Rothkopf, Rutgers University, Piscataway, NJ, 08854, USA, rothkopf@rutcor.rutgers.edu

1 — Recent Developments in Simultaneous Auctions: Clock Auctions
David Salant, NERA, Incorporated, dsalantsprint@earthlink .net., Samuel Dinkin

Over the past several years, simultaneous multiple round (SMR) auctions have become increasingly popular for auctioning off multiple which are substitutes and/or complements. In what follows we discuss a number of ways in which the SMR format has been modified, and especially clock auctions.

2 — Truthful Bidding in Multi-Unit Uniform-Price Auctions
Richard Engelbrecht-Wiggans, University of Illinois, Champaign, IL, 61820, USA, eplus17@uiuc.edu., Indranil Chakraborty

Equilibrium theory predicts considerably more demand reduction than observed in field experiments; we show that bidding close to truthful is an equilibrium to a slightly modified model of auctions and very nearly an equilibrium more generally.

3 — Need for Speed: Demand Estimation Using Auction Data
Octavian Carare, University of Texas - Dallas, octavian .carare@verizon.net.

We compute demand for PC processors using Internet multi-object, discriminatory auctions data. The predictions of three models of bidding and a suitable econometric procedure are used to compute the distribution of the bidders' marginal valuations, which in turn are used to evaluate the impact of processor characteristics on demand.

4 — Optimal Quota Allocation in Multi-Unit Auctions
Mahmut Parlar, McMaster University, Hamilton, L8S 4M4, Canada, parlar@mcmaster.ca., Fee-Seng Chou

To purchase a vehicle in Singapore, one must participate in an auction and bid for a certificate of entitlement. This paper uses results from order statistics and develops a mathematical optimization model that maximizes the auction holder's monthly expected revenue while smoothing the month-to-month fluctuations in the COE quota premiums.

■ SA21

Fairmont-Glen Ellen

Personal and Business Financial Planning

Contributed Session

Chair: Matthew J. Sobel, Department of Operations, Case Western Reserve University, Cleveland, OH, 44106, USA, mjs13@po.cwru.edu

1 — A Model For Health Care Reimbursement Account Decisions
Donald N. Stengel, California State University, Fresno, Fresno, CA, 93740-8001, U.S.A., don_stengel@csufresno.edu .

Health Care Reimbursement Account (HCRA) programs provide employees the opportunity to pay for medical/dental expenses using pretax contributions from employment income. However, excess contributions are lost and the benefit varies considerably with income tax status. This paper will present a decision model for deciding on the prearranged contribution level.

2 — Optimal Long-term Care Financial Decisions towards Improved Retirement Planning
Lepeng Li, Rensselaer Polytechnic Institute, Troy, NY, 12180, U.S., lil@rpi.edu., Aparna Gupta

The level of risks related with costs and need for long-term care (LTC) in advanced years of life require making these an integral part of retirement planning. On basis of a stochastic health model, we obtain optimal decisions by developing a trade-off between LTC costs and LTC insurance premiums and coverage.

3 — Pre-IPO Operational and Financial Decisions
Volodymyr Babich, Case Western Reserve University, Cleveland, OH, 44106, USA, vob2@po.cwru.edu., Matthew J. Sobel

We model financial and operational decisions of a firm which maximizes the expected discounted proceeds of an Initial Public Offering. We imbed the decision process in a Markov Decision Process, prove that there is an optimal threshold stopping rule for the IPO, and we relate optimal financial and operational decisions.

4 — Methodologies for Managing and Measuring Operational Risk
Fotios C. Harmantzis, Stevens Institute of Technology, Assistant Professor, Hoboken, NJ, 07030, USA, fharmant@stevens-tech.edu.

Today's turbulent financial markets, growing regulatory environments, and increasing complex financial systems have led risk managers to realize the importance of managing Operational Risk. Unlike Market and Credit Risk, there is a relative lack of understanding of Operational Risk. We will discuss several approaches and methodologies around quantification and modeling of Operational Risk, focusing on the Loss Distribution Approach (LDA), the Extreme Value Theory (EVT) and the Actuarial Approach.

5 — Portfolio Optimization Risk Measures: Variance versus Target Semivariance
Anita Brogan, University of North Carolina at Chapel Hill , student, Chapel Hill, NC, 27514, USA, ajbrogan@unc.edu., Shaler Stidham, Jr.

Suppose your portfolio advisor uses mean-variance analysis to create stock portfolios, but your preferences are in line with a lower-partial-moment risk measure such as target semivariance. How much extra risk will your portfolio carry? What if your advisor suggests spreading your capital evenly among a number of stocks? Our empirical studies using CRSP monthly stock data show that both relative differences are large enough to warrant concern, and they increase with portfolio size.

■ SA22

Fairmont-Paseo

OR/MS in Forestry I

Sponsor: Energy/Natural Resources/Environment Section - Forestry
Sponsored Session

Chair: Darek Nalle, University of Nevada, Research assistant professor, Reno, NV, 89557, USA, nalle@cabnr.unr.edu

1 — Meeting Chance-constrained Targets in Random Linear Systems
Michael Bevers, USDA Forest Service, Rocky Mountain Research Station, Operations Research Analyst, Fort Collins, CO, 80526, USA, mbevers@fs.fed.us., Laurel Travis

We describe a most-limiting sample path approximation for solving chance-constrained mathematical programming models with linear relationships. Simultaneous and multistage decision models are formulated for an individual-based, birth-death-movement species conservation problem combined with integer decision variables to schedule habitat restoration efforts by year and location.

2 — Weighing Alternative Conservation Objectives in Reserve Site Selection
Jeff Arthur, Oregon State University, Professor, Corvallis, OR, 97331, USA, arthur@stat.orst.edu., Jeffrey Camm, Robert Haight, Claire Montgomery, Steve Polasky

An optimization model for the probabilistic reserve selection problem is presented that combines two conservation objectives—maximizing the number of species represented, and protection of endangered species—as well as cost considerations. Use of the model is illustrated with data describing 403 species of terrestrial vertebrates in western Oregon.

3 — Economic and Ecological Tradeoffs from Forest Certification
Darek Nalle, University of Nevada, Research assistant professor, Reno, NV, 89557, USA, nalle@cabnr.unr.edu., Jeff Arthur, Nathan Schumaker

Forest certification applied at the landscape level may have different effects on regional economics and populations of species. We estimate impacts from maximum opening sizes, adjacency structures, and green-up times on timber harvest value and a set of mature forest dependent species.

4 — Exploring the Value of a Spatial Fire Threat Index
Dave Calkin, U.S. Forest Service, Missoula, MT, USA, calkin@forestry.umt.edu.

Currently, there is a significant emphasis on understanding how spatial patterns affect the size and intensity of wildfires. This research explores the effects of fire in terms of wildfire size and intensity for two activity scheduling problems on a 15 ,000 acre East Cascade late-succesional reserve (LSR).

■ SA23

Center-Room L

Air Traffic Disruption Mitigation

Sponsor: Transportation Science Section
Sponsored Session

Chair: Mike Ball, Robert H. Smith School of Business, College Park, MD, 20742, USA, MBall@rhsmith.umd.edu

1 — Optimization Models to Recover Aircraft Schedules and Minimize Passenger Disruptions
Stephane Bratu, MIT, Cambridge, MA, 01239, Cynthia Barnhart

We present two optimization models to minimize numbers of disrupted passengers and total passenger delay. In our models, aircraft schedules are recovered by postponing flight departures and canceling flight legs. We demonstrate through computational experiments, using passenger and flight information from a major U.S. airline, that our models allow real time decision making, while incorporating passenger considerations in the recovery process.

2 — A Parametric Analysis of Air Traffic Flow Control with Weather Uncertainty
Lisa Grignon, University of Washington, Seattle, WA, 98195, USA, grignon@u.washington.edu., Zelda Zabinsky, Joyce Yen, Aslaug Haraldsdottir

We consider the ground-hold problem when anticipating changing airport capacities largely due to weather uncertainties. We propose a stochastic program which maximizes the utility of the system of flights while minimizing the cost of ground and air delay and conduct a parametric analysis on the different objective function components.

3 — Routing of Aircraft with Uncertain Weather Probabilities
Arnab Nilim, University of California, Berkeley, Laurent EL Ghaoui, Vu Duong

We address the routing strategy of a single aircraft subjected to convective weather where the transition probabilities of the weather process are unknown, but bounded within a convex set. We propose and algorithm for dynamic routing using the Markov decision process and stochastic dynamic programming where the solution is robust with respect to the estimation errors of the storm probabilities. Our algorithm adds the robustness of the system without adding considerable computation cost.

■ SA24

Hilton-Pacific

IT Education

Contributed Session

Chair: Patrick E. Patterson, Iowa State University, Ames, 50011, USA, ppatters@iastate.edu

1 — The Missing Link between a Student and a Real Programmer
Fletcher Johnson, San Jose State University, San Jose, CA , 95132, USA, johnson_f@cob.sjsu.edu.

In this session, Mr. Johnson (over 20 years commercial programming experience) will present a basic overview of programming standards and why students must not only understand, but also apply them in any course that requires programming. He will also explain how Instructors can easily learn and apply these concepts.

2 — Quality of Education in the United States
Roger L. Salstrom, San Jose State University, San Jose, CA, 95192-0070, USA, salstrom_r@cob.sjsu.edu.

This paper analyzes the current state of education in the United States. A common complaint among university professors is the quality of students has been decreasing. Data will be analyzed to determine if that generalization is true, and to compare the United States to other countries.

3 — An Active Learning Environment for IT Across the Curriculum
Patrick E. Patterson, Iowa State University, Ames, 50011, USA, ppatters@iastate.edu.

We have begun integrating information technology concepts into our industrial engineering curriculum through the development of an interconnected network of learning modules for our core courses. These modules provide a problem solving backbone that better integrates our course content, enhances information technology materials, and employs new learning and assessment strategies.

4 — Demonstrating Sampling Using Excel
David Doane, Oakland University, Professor, Rochester, MI , 48309, USA, doane@oakland.edu.

This computer demonstration will suggest ways of using Excel to illustrate (1) sampling methods (simple, systematic, cluster); (2) confidence intervals; (3) the Central Limit Theorem; and (4) sampling from common distributions. These spreadsheets are drawn from LearningStats, a collection of teaching materials for introductory statistics now under development. No VB macros are used. Downloadable spreadsheets will be available on the internet.

■ SA25

Center-Room F2

Job Placement - The Industry Job Search: A Panel Discussion

Cluster: Job Placement
Invited Session

Chair: Russell Meller, Virginia Tech, Blacksburg, VA 24061, rmeller@vt.edu

1 — The Industry Job Search: A Panel Discussion
Panelists: Kerem Bulbul, University of California; Dinah Cheng, IBM Storage Technology Division; Anand Iyer, i2 Technologies; Russell Meller, Virginia Tech.

The panel will discuss the industry interview process and do's and don'ts associated with the job search. In addition to comments by current or former industrial recruiters, time will be provided for questions and answers.

■ SA26

Hilton-San Carlos I

Pricing, Information and Risk in Service Operations

Cluster: Service Operations
Invited Session

Chair: Mor Armony, Stern NYU, New York, NY, 10012-1118, USA, marmony@stern.nyu.edu

1 — Pricing Computing Utilities
Giuseppe Paleologo, gappy@us.ibm.com., Samer Takriti

"E-sourcing" promises to deliver information services that are standardized, shared, and scalable. This vision is based on a business model that resembles in some respects that of traditional utilities. Based on experience with pilot programs, we offer a view of research issues relevant to pricing this class of services.

2 — An Overview of Operations Risk Techniques in Financial Services
Michael Pinedo, NYU, New York, NY, USA, mpinedo@stern.nyu.edu.

In this talk we discuss the theoretical models, the practical applications, and the management of operations risk in finance. We discuss the implications of the reports of the Basel committee . We focus on statistical models and extreme value theory as well as on probabilistic models and their use in the finance world.

3 — Pricing Service Systems with Shared Resources
Assaf Zeevi, Columbia University, New York, NY, 10027, USA, assaf.zeevi@columbia.edu., Costis Maglaras

We consider the objective of pricing services in the context of systems endowed with processing resources that can be shared between the users. Under elastic demand, the optimal operating mode for the system is shown to be close to ``heavy-traffic." Simplified pricing rules follow.

4 — Customer Contact Centers with a Call Back Option and Announced Waiting-Time Information
Mor Armony, Stern NYU, New York, NY, 10012-1118, USA, marmony@stern.nyu.edu., Costis Maglaras

Motivated by customer contact centers, we consider a canonical model of systems that offer both real-time and postponed service with a delay guarantee. Customers are informed of anticipated delays and select their preferred option. We propose a scheduling policy and a delay estimation scheme based on asymptotic analysis .

■ SA27

Center-Room C2

Inventory and Resource Flexibility in Supply Chains

Cluster: Reverse Supply Chain
Invited Session

Chair: Hui Zhao, Purdue University, West Lafayette, IN, 47907-1287, USA, zhaoh@ecn.purdue.edu

1 — Return Policies for Unsold Dealer Inventory Based on Forward and Reverse Supply Chain Operators
Sara Lonn, Caterpillar Inc, Logistics College Graduate Trainee, Edelstein, IL, 61526, USA, sal@mtco.com., Julie Ann Stuart

Because resources focus on forward distribution, return policies are often short-term solutions. One improvement is evaluating forward supply chain operations when making returns decisions. A case study with an exclusive supplier, Caterpillar Inc. shows policies for low-value unsold independent dealer inventory returns increase service levels and profit by eliminating backorders.

2 — Resource Flexibility with Responsive Pricing
Nils Rudi, University of Rochester, Rochester, NY, 14627, USA, rudi@simon.rochester.edu., Jiri Chod

Flexibility enables firms to better respond to volatile market conditions. We consider a situation where a single resource can be used to satisfy demands for two distinct products. By responsive pricing, the firm gains additional flexibility since resources are not only allocated based on demands but rather the demands themselves can be influenced.

3 — The Multi-Location Capacitated Transshipment Problem
Deniz Ozdemir, INSEAD, Fontainebleau, 77305, France, deniz.ozdemir@insead.edu., Enver Yucesan, Yale T. Herer

We consider coordination among stocking locations through replenishment strategies that take explicitly into consideration transshipments under capacity constraints. We incorporate the two types of capacity constraints to the standard model: (a) the supplier has limited capacity. (b) stocking locations allocate only a certain proportion of their inventory for transshipment.

4 — Managing Service Parts Logistics:Inventory Sharing/Rationing in Decentralized Distribution Networks
Hui Zhao, Purdue University, West Lafayette, IN, 47907-1287, USA, zhaoh@ecn.purdue.edu., Jennifer K. Ryan, Vinayak Deshpande

We consider an inventory sharing and rationing problem in a continuous review decentralized dealer network, i.e., a network in which the dealers are independent of the manufacturer. The three key features of our model are: multiple demand classes for each dealer, inventory sharing among dealers, and decentralized decision making.

■ SA28

Center-Ballroom A1

Supply Chain Procurement and Coordination

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Julia Miyaoka, Stanford University, Los Altos, CA, USA, jmiyaoka@stanford.edu

1 — Competition Incentives for Suppliers
Cheryl Druehl, Stanford University, Stanford, CA, USA, cdruehl@stanford.edu., Stefanos Zenios

We use competition between two suppliers to incent them to provide capacity for a retailer instead of sharing inventory costs along the supply chain. Modeling the suppliers as queues, we show coordination is achieved for identical cost suppliers. For non-identical suppliers, we examine two possible policies: 1) use both suppliers in proportion with their capacities, and 2) use the lower cost supplier up to some order level, after that use both suppliers.

2 — Optimal Procurement Strategies For Online Spot Markets
Ralf Seifert, IMD-International Institute for Management Development, Professor, Lausanne, VD, 1007, Switzerland, seifert@imd.ch., Ulrich W. Thonemann, Warren H. Hausman

We analyze dual procurement via traditional forward contracts and spot markets. Spot markets offer products at negligible lead time, but at a volatile and, in expectation, higher price. We present models that determine the optimal order split and conduct sensitivity analysis based on closed-form results.

3 — Selling to the Newsvendor Under Endogenous Retail Pricing
Gal Raz, Stanford University, stanford, CA, 94305-5015, USA, galraz@stanford.edu., Evan Porteus

This paper investigates the possible price setting supply chain contracts for the case of endogenous retail pricing. The paper examines the effect of these price-setting contracts on the optimal behavior of the retailer and the manufacturer in comparison to the case of the integrated firm, and studies the effect of asymmetric information on the solution under these contracts.

4 — The Impact of Forecast Updating in a Decentralized Supply Chain
Julia Miyaoka, Stanford University, Los Altos, CA, USA, jmiyaoka@stanford.edu., Warren H. Hausman

We study the impact of forecast updating of end-item demand in a decentralized two-stage supply chain with a single selling season . We find that while forecast updating can offer significant increases in expected profits to the downstream stage, it may decrease the expected profits of the upstream stage such that the net result for the decentralized supply chain is a decrease in expected profits. In contrast, forecast updating always increases expected profits for the centralized supply chain.

■ SA29

Center-Ballroom A5

Customer and Supplier Management

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Laurens Debo, GSIA- Carnegie-Mellon University, Assistant Professor in, Operations Management and Manufacturing, Pittsburgh, 15213, US, laurdebo@andrew.cmu.edu

1 — The Dynamics of Supplier Delivery Performance with Order Cancellation and Correlation
Justin Ren, The Wharton School, University of Pennsylvania, zhren@wharton.upenn.edu., Morris A. Cohen, Teck-Hua Ho, Christian Terwiesch

We study order fulfillment process of suppliers in a make-to-order environment. We identify drivers of order placement/change/cancellation and order lead time. A structural logit-embedded proportional hazard model is proposed, and is estimated through a novel maximum likelihood method. Data were collected with a major US semiconductor manufacturer. Results show forecast changes and cancellations have negative impact on delivery performance. Thus information sharing is not always beneficial.

2 — Strategic Behaviour in Queues with 'Expert' Servers
Laurens Debo, GSIA- Carnegie-Mellon University, Assistant Professor in Operations Management and Manufacturing, Pittsburgh, 15213, US, laurdebo@andrew.cmu.edu., Beril Toktay, Luk Van Wassenhove

We consider a situation in which a server is an expert and recommends the amount of service that is appropriate for the customer. The server may have an incentive to recommend more treatment than is necessary, in order to increase future revenues . The customer can refuse the expert's recommendation and search, at a certain cost, an outside expertise. We develop a queuing model and analyse the equilibrium strategies of customers and expert.

3 — Supply Level Choice and Sales-force Incentives
David Huff, David Eccles School of Business, Visiting Assistant Professor of Operations Management, Salt Lake City, UT, 84112, USA, mgtdh@business.utah.edu., Phillip Lederer, Sanjog Misra, Nils Rudi

We examine the interactions between inventory level choice and sales-force compensation in a make-to-stock, newsvendor environment. The effects of sales-agent and firm-owner efforts on supply level choice and sales-force incentives are endogenozied in three variations of a double-sided moral hazard principal-agent model. The properties that define the trade-offs are examined.

■ SA30

Center-Ballroom A6

Supply Chain Performance

Contributed Session

Chair: William G. Sullivan, Virginia Polytechnic Institute and State University, Blacksburg, VA, 24061, USA, bills@vt.edu

1 — Selection of Performance Measures in Supply Chain Management
Joungho Lee, Department of Business Administration, Hong-ik University, Seoul, 121-791, Republic of KOREA, leejoungho@hanmail.net., Choonho Ryu

Choosing appropriate performance measures in supply chain management is difficult due to the conflict between measures or the linkage of measures and strategies. This study aims to investigate the construct of the performance measures in supply chain management and to develop a framework for the selection of them.

2 — A Multiple Criteria Decision Support System for the Tactical Supply Chain Management
Beate Karina Scheubrein, University of Hohenheim (510A), Stuttgart, 70593, Germany, bscheubrein@uni-hohenheim.de.

The management of the supply chain can be considered as a series of decisions under multiple objectives. An analysis of the available systems and approaches in literature shows that there are numerous approaches for strategic, long-term and for operational, short-term decision support but there seems to be a

3 — Model Predictive Control Methods in Supply Chain Management Problems
Esen Mestan, Koc University, Dept. of Industrial Eng., Istanbul, 80910, Turkey, emestan@ku.edu.tr., Metin Turkay, Yaman Arkun

Model predictive control provides a planning and scheduling framework under dynamic conditions. An important feature of model predictive control methods is integration of forecasting and optimization models for supply chain systems. The application of model predictive control methods will be illustrated on a multi-product supply chain management problem.

4 — The New Ways of Technological Structures Optimization
Evgeniy V. Konoplyanchenko, Author, Sumy, 40021, Ukraine, mech@sau.sumy.ua.

Changing an organization of moving the products during constantly brings about one and same resultsChanging an organization of moving the products during constantly brings about one and same results: changes a total idle time values of equipment, changes duration of production cycle, and changes a total wait time of items that brings about work-in process change. The analysis of time structures of technological processes has allowed choosing typical structures, which are appropriate to various kinds of specialization of manufacture. The interrelation of time, reliability and cost parameters is considered and the ways of optimization of time technological chains are specified.

5 — An Activity-Based Costing and Theory of Constraints Model for Product-Mix Decisions
Ayse P. Gurses, University of Wisconsin-Madison, Madison, WI, 53706-1572, USA, apgurses@students.wisc.edu., William G. Sullivan

We use the Activity-Based Costing (ABC) approach together with the Theory of Constraints (TOC) philosophy in determining the optimal product-mix and bottlenecks of a company. We propose a new product-mix decision model that uses ABC information. This new model is used with the TOC philosophy in order to improve the financial performance of a company. Two case studies are included herein to illustrate the use of the model in different manufacturing environments.

■ SA31

Center-Room J3

Statistical Methods within Computational Optimization Frameworks

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Victoria C. P. Chen, University of Texas, Arlington, Arlington, TX, 76019, USA, vchen@uta.edu

1 — Improving the Stochastic Decomposition Algorithm by Using an Efficient Sampling Technique
Vicente Rico-Ramirez, Instituto Tecnologico de Celaya, Department of Chemical Engineering, Celaya, 38010, Mexico , vicente@iqcelaya.itc.mx., Urmila Diwekar

This work proposes an improvement to the stochastic decomposition algorithm for stochastic linear programming problems by using the HSS technique. It is shown that the variance and the number of samples required for convergence are reduced when using such a technique instead of Monte Carlo or importance sampling techniques.

2 — Electricity Capacity Expansion Using the BONUS Algorithm
Kemal Sahin, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, khsahin@andrew.cmu.edu., Urmila Diwekar

Demand uncertainties can result in electricity shortages and blackouts, even in developing countries, as has been seen recently. This work presents a nonlinear capacity expansion problem solved using the BONUS algorithm.

3 — A Computational Study of Algorithms and Stopping Rules for Statistical Approaches to Stochastic Programming
Suvrajeet Sen, University of Arizona, Tucson, AZ, 85721-0020, USA, sen@sie.arizona.edu., Lei Zhao, Julia L. Higle

This study presents a comparative study of statistically motivated algorithms for stochastic programming problems. The algorithms we investigate include both rudimentary as well as sophisticated methods such as the regularized version of Stochastic Decomposition. Statistically motivated stopping rules will also be discussed.

4 — Flexible Implementation of Multivariate Adaptive Regression Splines in Solving Continuous-State Stochastic Dynamic Programming
Julia C. C. Tsai, Purdue University, West Lafayette, IN, 47907-1310, jctsai@mgmt.purdue.edu.

The implementation of multivariate adaptive regression splines (MARS) in the OA/MARS stochastic dynamic programming (SDP) method requires specification of a difficult-to-select MARS parameter. An approach that automatically selects this parameter enables the flexibility of customized modeling in each SDP time period. Results are demonstrated on a wastewater treatment applications.

■ SA32

Center-Room J4

IT Investments and Productivity

Contributed Session

Chair: Effy Oz, Penn State University, Malvern, PA, 19355, United States, effyoz@psu.edu

1 — IT Investment and Firm Performance
Radhika Santhanam, University of Kentucky, Associate Professor, Lexingon, KY, 40506-0034, USA, santhan@uky .edu., Ed Hartono

Considerable research has been conducted to gauge the economic value accruing to a firm from its investments in information technology (IT) related resources. Recently, the resource-based theory has been proposed as a method to address this issue. We extend and test the usefulness of this approach. Our results indicate that this theory-based approach provides a useful and unifying foundation to test the effects of IT investments on a firm's economic value.

2 — Risk Prevention for Capitalism: the Urgent Need for Correct Information
Pedro R. Kanof, Johns Hopkins University, Washington, DC, 20007, U.S.A., pkanof@aol.com.

Capitalism was the result of the development of cheap energy. Information technology helped control the application of this energy. Despite this control, equal

opportunity for investors did not exist. History shows close association between information technology auditors and accountings oftentimes result in conflicts of interest, for which I propose solutions.

3 — Estimating Storage Costs for Computer Network Design
Kent Webb, San Jose State University, Los Altos, CA, 94022, USA, webb_k@cob.sjsu.edu.

The price of storage has fallen dramatically, but the data intensive applications of new computer networks have resulted in a higher proportion of system cost allocated to storage. This paper compares and combines statistical and technical analysis to provide a framework for estimating future storage costs.

4 — Developing Information Technology Strategies for Global Organizations: A process-driven approach:
Indranil Bardhan, The University of Texas at Dallas, Professor, Richardson, TX, 75083-0688, USA, bardhan@utdallas.edu.

We discuss the role of information technology strategies in global companies. Key issues include alignment of IT with business strategies, how IT supports business process changes and identifying potential synergies during mergers or acquisitions. We discuss the role of guiding principles and process architectures in developing a global IT strategies.

■ SA33

Hilton-University

Approximate Dynamic Programming I

Sponsor: Optimization Section-Dynamic Programming
Sponsored Session

Chair: Daniela Pucci de Farias, IBM Almaden Research Center, Postdoctoral Research Scientist, San, Jose, CA, USA, pucci@mit.edu

1 — Adaptive Dynamic Programming: Research Needs and Opportunities
Paul Werbos, werbos@nsf.gov

Adaptive approximate dynamic programming (ADP) has been called by many names in the various communities that have developed, extended and used it – neurodynamic programming, reinforcement learning, adaptive critics, etc. Many researchers in neural networks believe that improving the capabilities of ADP is the key to understanding intelligence in the mammalian brain. A recent NSF-sponsored workshop brought together current research housed in operations research, neural networks, AI, fuzzy logic and control theory relevant to this goal. This talk will discuss how these strands fit together, and what will be needed to scale up further. NSF already seeks more proposals in these areas, but expanded efforts may be achievable.

2 — Exploration Versus Exploitation in a Marketing Setting
Dimitris J. Bertsimas, Sloan School, MIT, Professor of Operations Research, Cambridge, MA, 02139, USA, dbertsim@MIT.EDU., Adam Mersereau

We consider the problem of optimally selecting which marketing messages to send to which customers in order to maximize responses. We develop an approximate dynamic programming approach to balance the tradeoff between gathering information (exploration) and taking advantage of available knowledge (exploitation) within a model of marketer-customer interactions.

3 — Linear Programming Support Vector Machines for Value Function Approximation
Tom Dietterich, Oregon State University, Professor, Corvallis, OR, 97331, USA, tgd@cs.orst.edu., Xin Wang

Value function approximation is the task of approximating the cost-to-go function for large Markov decision problems. Our method is based on sampling the states and state transitions, solving the sampled problem via value iteration, and then fitting a linear support vector machine to the sample in the hope of generalizing to all remaining states in the MDP. Experiments in a difficult, synthetic maze problem show that our method gives excellent performance.

4 — Strategic Sequential Bidding in Auctions using Dynamic Programming
Jonathan Bredin, Colorado College, Assistant Professor, Colorado Springs, CO, 80903, USA, jbredin@coloradocollege .edu., Gerald Tesauro

We develop a general real-time dynamic-programming framework to derive bidding strategies for a broad class of auctions characterized by sequential bidding and continuous clearing. We use a belief function, combined with a forecast of how beliefs change, as a state-transition model. Our algorithm, GDX, optimizes cumulative long-term discounted profitability, whereas most previous strategies optimize immediate profits. We observe superior performance from GDX over any previous strategy.

■ SA34

Hilton-Plaza

Computational Modeling Environment

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Ross Shachter, Stanford University, Stanford, CA, 94305-4026, USA, shachter@stanford.edu

1 — Data Mining at Microsoft
David Heckerman, Microsoft Research, Redmond, WA, 98052-6399, USA, heckerma@microsoft.com.

I will discuss data mining tools developed over the last decade at Microsoft Research. Some of these tools appear in SQL Server 2000 and Commerce Server 2002. Others will ship in future Microsoft products. The tools include dependency networks — a close cousin of the Bayesian network — and mixture models. I will illustrate the use of these tools on various business applications.

2 — Leveraging Inference and Decision Making to Enhance Communication and Collaboration
Eric Horvitz, Microsoft Research, Redmond, WA, 98052-6399 , USA

Several projects employ learning and inference in messaging and collaboration applications. Priorities alerts users about incoming email and routes messages based on automated assignment of urgency. Notification Platform alerts and routes heterogeneous sources of information. Coordinate infers the presence and availability of people in support of collaboration and communication.

3 — Using Decision Models To Automate And Individualize Interactive Patient Decision Support
George Scott, Stanford, Stanford, CA, 94305-5479, USA, gcscott@stanford.edu., Ross Shachter

Patient-oriented decision support aids have a promising role in health care, by customizing generic decision models with individuals' utilities and probabilities. We propose an interactive approach for eliciting parameter values efficiently by ordering the assessment of values according to the expected net benefit of elicitation.

■ SA35

Hilton-Almaden II

Statistical Methods for Process Improvement and Optimization

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Paul Zantek, University of Maryland, College Park, MD, 20742, USA, pzantek@rhsmith.umd.edu

1 — Interactive Multi-criteria Optimization for Multiple Response Product and Process Design
Murat Koksalan, Purdue University, West Lafayette, IN, 47907-1310, USA, koksalanm@mgmt.purdue.edu., Robert Plante

We consider process design problems, which address issues associated with the assessment of optimum levels for process inputs that influence multiple process performance measures. We propose a method for combining all prior process optimization schemes into one procedure that interacts with and relies on the preferences of a decision maker.

2 — Identifying Root Causes of Manufacturing Variation Using Blind Source Separation
Ho-Young Lee, Texas A&M University, College Station, TX, 77843-3131, USA, shururu@yahoo.com., Daniel Apley

In modern manufacturing processes, large quantities of multivariate measurement data are routinely available through automated in-process sensing. This talk argues that blind source separation, a technique that was originally developed for sensor array signal processing applications, provides an effective tool for identifying major root causes of manufacturing variation based on in-process measurement data.

3 — Process Capability Indices and Loss Function
Amit Mitra, Auburn University, Auburn, AL, 36849-5240, USA, mitra@business.auburn.edu.

Several process capability indices abound in the literature. Some of these incorporate process variability, while others incorporate process variability and deviation of the process mean from the mid-specification value or a target value. In this paper we consider an appropriate loss function and its relationship to capability indices.

4 — Diagnosis of Variation Sources Using Linear Replicated Models
Yu Ding, Texas A&M University, College Station, TX, 77843-3131, USA, yuding@iemail.tamu.edu., Shiyu Zhou, Yong Chen

This paper deals with the identification of variation sources in process for product dimensional variation. The relationship between product variability and process

variation sources is characterized by a linear replicated model. Then, six variance estimators are summarized and compared. The guidelines of selection of variance estimator are given.

■ SA36

Center-Room F1

Stochastic Modeling in Military Applications I

Sponsor: Applied Probability Society
Sponsored Session

Chair: Jeffrey Kharoufeh, Air Force Institute of Technology, Wright-Patterson AFB, OH, 45433-7765, USA, jkharouf@afit.edu

1 — A Stochastic Decision Model for Cooperative Path-Planning for Autonomous Vehicles
Matt Flint, University of Cincinnati, Cincinnati, OH, 45221-0030, USA, Emmanuel Fernandez, Marios Polycarpou

We develop a stochastic decision process model for a cooperative path planning system for multiple autonomous vehicles. The proposed approach allows the vehicles to cooperate to find near-optimal search paths over a given environment, in the presence of uncertainty, and constraints on movement and computational power.

2 — Threshold-based Policies for a Distributed Multi-agent Architecture
Natarajan Gautam, Pennsylvania State University, University Park, PA, 16802, USA, ngautam@psu.edu.

We consider adaptive control mechanisms for optimally utilizing resources in Cougaar (Cognitive Agent Architecture). Cougaar is a java-based architecture developed by DARPA for large-scale distributed agent-based military logistics applications. The performance of adaptive control policies are evaluated using stochastic models such as multi-class Markovian fluid queues.

3 — Transient Analysis of a Sortie Generation Process Using Cumulant Functions
Tim Matis, New Mexico State University, Las Cruces, NM, 88003-8001, USA, tmatis@nmsu.edu.

A queueing network model is used to represent an aircraft sortie generation process. Key summary measures of the state distribution are obtained via cumulant-based analysis procedures over a finite time horizon. Targeted modifications to existing operations are shown to reduce the cycle time and increase the number of generated sorties.

4 — Stochastic Modeling for Aircraft Prognostics
Steven Cox, Air Force Institute of Technology, Wright Patterson AFB, OH, 45433-7765, USA, Steven.Cox@afit.edu., Jeffrey Kharoufeh

Effective prognostics systems must have the ability to predict the time-to- failure distribution of a component, given the current state of the component. We discuss stochastic models for estimation of the failure time distribution for aircraft components with small samples of failure time data. Initial results will be presented.

■ SA37

Center-Room J1

Pricing in Communication Networks

Sponsor: Applied Probability Society
Sponsored Session

Chair: Mark Lewis, University of Michigan, Ann Arbor, MI, 48109-2117, USA, melewis@engin.umich.edu

1 — Network Pricing with Stochastic Demand and Multiple QoS Classes
Jussi Keppo, University of Michigan, Ann Arbor, Assistant Professor, Ann Arbor, MI, 48109-2117, USA, keppo@umich .edu., Sofiane Rinaz, Gaurav Shah

We consider QoS pricing in a simple telecommunications network. The network uncertainties come from point-to-point demand processes that are driven by Brownian motions. Our model gives an analytical QoS pricing formula in terms of perfect quality prices and the parameters of the point-to-point demand processes.

2 — Provisioning Bandwidth for Real-Time Services
Robert Hampshire, Princeton University, Princeton, NJ, 08544, USA, rhampshi@princeton.edu., William Massey, Debasis Mitra, Qiong Wang

We develop a dynamic network provisioning methodology that minimally satisfies the QoS (blocking probability) requirements for the customers of real-time bandwidth services. Our method is sufficiently general and captures time varying trends in the demand for services as well as different bandwidth requests for the multiple classes of customers. This allows a network provider to be effiicient in reserving excess bandwidth for forward contracts.

3 — Uniform Pricing in a Single Server Service Facility
Serhan Ziya, Georgia Institute of Technology, Atlanta, GA , 30332-0205, USA, ziya@isye.gatech.edu., Hayriye Ayhan, Robert Foley

We consider a service facility which can be modeled as a G/GI/1/m system where m is possibly infinite. Arriving customers are accepted if they are willing to pay the price charged by the service provider and there is room in the waiting area. Under a reasonable assumption on the price elasticity of demand function, we derive optimal price expressions that maximize service provider's long run average rate of revenue. We also provide some structural results on the relationships between the optimal prices, customers' willingness-to-pay and system parameters (e.g. waiting space capacity, service rate).

4 — Pricing Control Policies for a Queueing System with Periodically Varying Parameters
Seunghwan Yoon, University of Michigan, Ann Arbor, MI, 48109-2117, USA, syoon@engin.umich.edu., Mark Lewis

We consider dynamic pricing in a queueing system with the arrival and service rates assumed to be measurable, periodic functions of time. At each fixed time we show that optimal pricing policies are similar to the stationary analogue. We then develop heuristics via a pointwise stationary approximation.

■ SA38

Center-Room N

OR, Transportation, and Drugs

Contributed Session

Chair: Dr. Rajan Batta, State University of New York-Buffalo, Professor and Department, Chair, Buffalo, NY, 14260, USA, batta@eng.buffalo.edu

1 — An In-Vehicle Alcohol Sensor-Sensitivity to Ambient Interferences
Siamak (Sia) A Ardekani, U of Texas at Arlington, Arlington, TX, 76019-0308, USA, Ardekani@uta.edu.

A fuel cell sensor has been developed for detection of alcohol vapors inside the passenger compartment of vehicles. The sensor may be used to deter drunk driving. Tests are conducted to assess the sensitivity of the sensor to various interferences including temperature, humidity, air current, and presence of perfume scents.

2 — A Constrained Transportation Model for Optimizing Crackdowns on Illicit Drug Market
Feng Gao, SUNY at Buffalo, Buffalo, NY, 14260, fenggao@buffalo.edu., Dr. Rajan Batta, Christopher M. Rump

We formulate a constrained transportation model of the geographic displacement of crime. Using this underlying model, we consider the optimal allocation of police enforcement efforts. We attack this allocation problem via simulated annealing, calling CPLEX at each iteration to solve the underlying displacement model. We illustrate the results using data from the Buffalo Police Department.

■ SA39

Center-Room K

Vehicle Routing and Scheduling

Sponsor: Transportation Science Section
Sponsored Session

Chair: Amelia Regan, University of California, Irvine, CA, 92697, USA, aregan@uci.edu

1 — Two Formulations for the Capacitated Vehicle Routing Problem on Trees
Bala G. Chandran, University of Maryland, College Park, MD, 20742-1815, bchandra2002@rhsmith.umd.edu., S. Raghavan

We propose two new integer programming formulations that exploit the underlying tree structure of the network. One formulation relies on a depth first ordering of the nodes, while the other indexes the arcs and nodes of the network by vehicle. The strength of the two formulations and extensive computational experiments are discussed.

2 — A Tabu Search Heuristic for the Selective Vehicle Routing Problem
Hao Tang, Pennsylvania State University, University Park, PA, 16802, hxt141@psu.edu., Elise Miller-Hooks

In this research we address the Selective Vehicle Routing Problem (SVRP). In the SVRP, only a subset of nodes will be visited for which a specified reward is received and vehicle tours are constrained by a limit on tour length. We propose a tabu search heuristic embedded in an adaptive memory procedure that outperforms other heuristics in the literature that address this problem.

3 — The Selective Traveling Salesperson Problem with Stochastic Service Times
Hao Tang, Pennsylvania State University, University Park, PA, 16802, hxt141@psu.edu., Elise Miller-Hooks

We examine algorithmic approaches to a stochastic Selective Traveling Salesperson Problem (STSP) where customer service times are known a priori only probabilistically. In the STSP, only a subset of nodes will be directly visited for which a specified reward is received and the solution tour is constrained by a limit on tour length. Exact and heuristic procedures are proposed and results of computational experiments will be discussed.

4 — Time Window Discretization Methods for Vehicle Routing with Time Windows
Amelia Regan, University of California, Irvine, CA, 92697 , USA, aregan@uci.edu., Srinivas Nandiraju, Xiubin Wang

In this research we examine a class of time-window discretization methods for vehicle routing with time windows. We develop several upper and lower bounding methods and examine their convergence to optimal or near solutions.

■ SA40

Center-Room G

Industrial Applications of Operational Modeling and Simulation for Semiconductor Manufacturing

Sponsor: College on Simulation Section
Sponsored Session

Chair: John W. Fowler, Arizona State University, Associate Professor, Tempe, AZ, USA, john.fowler@asu.edu

1 — Operational Modeling and Simulation at AMD
Nipa Patel, AMD, Austin, TX, 78741, USA, nipa.patel@amd .com., Edwin Cervantes

The presentation will cover use of modeling and simulation at AMD . The methodologies used for strategic and tactical capacity analysis, AMHS analysis, capital planning, and tool level analysis will be discussed. Case studies in these areas will also be presented.

2 — Operational Modeling and Simulation at Infineon
Alexander Schoemig, Infineon Technologies AG, Supply Chain Manager, Munich, D, 81730, GERMANY, alexander .schoemig@infineon.com., Angela Klinger

In this presentation we give an overview of operational modeling and simulation activities within Infineon Technology's logic frontend sites in the past four years. We discuss pitfalls and problems encountered, as well as some case studies and possible future applications.

3 — Operational Modeling and Simulation at Intel
Mani Janakiram, Intel Corporation, Chandler, AZ, USA, mani.janakiram@intel.com.

The use of operational modeling and simulation tools and techniques at Intel has greatly increased over the last several years. In this presentation we will discuss the use of these tools and some of the challenges associated with their use.

4 — Operational Modeling and Simulation at Texas Instruments
Kishore Potti, Texas Instruments, Industrial Engineering Manager, Dallas, Tx, 75243, USA, k-potti1@ti.com., amit gupta

The use of operational modeling and simulation tools and techniques at Texas Instruments has greatly increased over the last 2 years.In this presentation we will discuss the use of these tools both for strategic and tactical fab initiatives .A hierarchy of modeling comlexity from a simulation modeling standpoint will be outlined.The impact on fab decisions at DMOS5 wafer fab in TI through these various tools will be highlighted

■ SA41

Center-Room M

Location Analysis I

Sponsor: Section on Location Analysis
Sponsored Session

Chair: Zvi Drezner, California State University-Fullerton, Fullerton, CA, 92834, USA, zdrezner@fullerton.edu

1 — Hub Location Problems
James Campbell, University of Missouri-St. Louis, St. Louis, MO, 63121-4499, USA, campbell@umsl.edu., Andreas Ernst, Mohan Krishnamoorthy

Many transportation and telecommunications systems are organized with hub facilities that concentrate flows. Location of these hub facilities can be a key determinant of network cost and performance. This presentation includes new research on some hub location problems, including testing with several real-world data sets.

2 — Voronoi Heuristics for the Network Location Problems
Atsuo Suzuki, Nanzan University, Aichi, 489-0863, Japan, atsuo@ms.nanzan-u.ac.p.

We present new heuristics algorithms to solve location problems on a network. The algorithms use the network Voronoi diagram algorithm. Using this, we can construct new heuristics for p-center and p-median type problems when the demand is distributed on the nodes and the edges of the network.

3 — Employee Positioning and Workload Allocation
H. A. Eiselt, University of New Brunswick, Fredericton, NB, E3B 5A3, Canada, haeiselt@unb.ca., Vladimir Marianov

Employees and recurrent tasks are mapped into an ability space. The task is to hire new personnel (and retrain existing workers) and allocate tasks to all employees, so as to minimize the imbalance and boredom associated with the workloads. The presentation also addresses measuring problems and the choice of objectives.

4 — The Gradual Covering Decay Location Problem on Networks
Oded Berman, University of Toronto, Toronto, ON, M5S 3E6, Canada, berman@rotman.utoronto.ca., Dmitry Krass, Zvi Drezner

Define three new notions of "coverage distances": within a lower distance a demand point is fully covered; beyond a larger distance it is not covered at all. For a distance between these two values coverage gradually decreases. A location problem incorporating this notion is introduced and its properties examined.

■ SA42

Fairmont-Belvedere

Consumer's Preference Modeling

Contributed Session

Chair: Kuang C. Wei, Ford Motor Co., Sr. Technical Specialist, Dearborn, MI, 48124, USA, kwei@ford.com

1 — Estimating Discrete-Choice Models of Product Differentiation in Durable-Goods Markets
Lan Wang, Ford Motor Company, Technical Specialist, Dearborn, MI, 48124, USA, lwang17@ford.com., Suzhou Huang

We propose a discrete-choice model of product differentiation for durable-goods markets that explicitly accommodates a used-goods market, transaction costs, and concurrent leasing and selling. It assumes that a consumer in a durable-goods market simultaneously chooses a brand and its associated consumption pattern in time. We exhibit subtleties in empirical demand estimations, and show that ignoring the durable aspect of the market leads to severe errors with Monte Carlo simulations.

2 — Optimal Preannouncement for Radical Innovation
Yongchuan Bao, Marshall School of Business, University of Southern California, Los Angeles, CA, 90007, USA, yongchuan.bao@marshall.usc.edu., Herbert Dawid, Allen M. Weiss

New product preannouncement has received increasing attention from both academia and industry. However, most research on product preannouncements has focused on existing markets, where customer preferences are assumed to be either known or not relevant. In contrast, we focus on preannouncements in markets where customer preferences are unknown, as would be the case with new-to-the-world products. Our analysis is thereby focused on how preannouncements might affect customer preferences in these situations and how this might determine their preannoucement strategy.

3 — Consumer Perception on Thermal Comfort via an Internet-based Ethnographic Approach
Kuang C. Wei, Ford Motor Co., Sr. Technical Specialist, Dearborn, MI, 48124, USA, kwei@ford.com., Irv T. Salmeen, Frank Fusco, Andrew Wong, H. Russell Bernard, Gery Ryan, Steve Borgatti

This paper discusses an industrial marketing research and product development process that uses an internet-based ethnographic approach to analyze consumers' perception of thermal comfort inside an automobile, to identify what consumers care about in a cultural context, and to integrate the findings into system development to meet consumers' comfort needs.

4 — Incorporating Future Price Expectations into Consumers' Purchase Decisions
Qin Zhang, St. Louis, MO, 63130, USA, zhangq@Olin.wustl .edu., P.B. Seetharaman, Chakravarthi Narasimhan

We incorporate future price expectations in a joint model of three household decisions. Households are assumed to form expectations by following Bayesian learning schemes. Our estimation results on two categories indicate a significant effect of the expectations on category purchase decisions and the effects are heterogeneous across different household groups.

■ SA43

Center-Room H

Revenue Management and Pricing

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: Montgomery Blair, PROS Revenue Management, mblair@pros-rm.com

1 — Optimal Dynamic Airline Seat Allocation
Chris Anderson, Ivey School of Business, Professor, Ontario, Canada, canderson@ivey.ca.

An adaptive model is developed for the dynamic allocation of discounted seats. In setting booking limits; the model incorporates historical bookings, censored demands, the number of current bookings and the timing of those bookings as the flight approaches departure. Optimal seat allocations are made via dynamic programming. DP formulations that are linear with fare classes will be discussed in both leg and origin-destination formulations.

2 — A Stochastic Approximation Approach to Airline Network Revenue Management Problem
Vikash Singh, Department of Industrial & Management Systems Engineering, Tampa, FL, 33620, USA, vvsingh@eng .usf.edu., Abhijit Gosavi, Tapas K. Das

Over the last 25 years, airline revenue management systems have progressed from simple single-leg control, through segment control, and finally to the origin-destination control or network control. Our recent work models a single leg seat inventory control problem as an SMDP and solves it using a reinforcement learning approach. In this paper we extend our approach to relatively large network problems.

3 — Capacity Allocation Under Competition
Guillermo Gallego, Columbia University, Professor, New York, NY, USA, ggallego@ieor.columbia.edu., Srinivas Krishnamoorthy, Robert Phillips

Consider a two-period game. Two providers with different capacities compete to sell to a single consumer with uncertain demand. Prices are fixed. Each provider determines how much of his capacity to forward sell. We characterize optimal strategies and identify the conditions for existence of a pure strategy Nash equilibirum.

4 — Pricing Policies for Excess Productive Capacity
Joseph Hall, Tuck School at Dartmouth, Asst. Professor, Hanover, NH, 03755, USA, joseph.m.hall@dartmouth.edu., Praveen Kopalle, David Pyke

We study a manufacturer who faces two types of customers that are distinguished by whether they enter into long or short term relationships with the manufacturer. One problem faced by such a manufacturer is determining the optimal mix of long and short term customers. Part of this decision process involves determining optimal job acceptance and pricing policies for both types of customers. We use a queueing formulation to study these issues.

■ SA44

Center-Room B2

Panel: Issues in Entrepreneurship Education

Cluster: Entrepreneurship
Invited Session

Chair: Burton V. Dean, San Jose State University, San Jose, CA, 95192, USA, bvdean@aol.com

1 — Panel: Issues in Entrepreneurship Education
Burton V. Dean, San Jose State University, San Jose, CA, 95192, USA, bvdean@aol.com.,Panelists: Kathleen Allen, University of Southern California; Tom Byers, Stanford University, Mark Fruin, San Jose State University, A. William Musgrave, The Enterprise Network.

This panel explores issues in entrepreneurship education, including the nature of the entrepreneurship body of knowledge, the balance between theory and practice in an inherently applied field, regional differences in entrepreneurship education, and programs in entrepreneurship centers at Stanford University, University of Southern California, and San Jose State University.

■ SA45

Center-Room B3

Telecomm Capacity & Expansion

Contributed Session

Tiina Heikkinen, University of Crete, Rethymnon, GR, 74100, Greece, heikkinen@econ.soc.uoc.gr.

1 — Global Expansion Strategy for Telecommunications Service Providers
Steven R. Powell, CIS Department, California State Polytechnic University, Pomona, Pomona, CA, 91768, USA, srpowell@csupomona.edu.

Expanding globally can enable a telecommunications service provider (TSP) to increase its growth and profitability while decreasing its risk. This paper examines the key factors in a TSP's decision how and where to expand overseas and describes a framework for formulating and implementing the company's global expansion strategy.

2 — Global Telecommunications Policy: The Impact of Liberalization
Carlos J. Navarrete, CIS Department, California State Polytechnic University, Pomona, Pomona, CA, 91768, USA, cjnavarrete@csupomona.edu.

Nations have been liberalizing their telecommunications markets, opening them to increasing competition. This paper compares the telecommunication industries of eight developing countries, four of which have undertaken liberalization policies and four which have not.

3 — An Agent-Based Model of Bandwidth Allocation in a Dynamic Network
Tiina Heikkinen, University of Crete, Rethymnon, GR, 74100, Greece, heikkinen@econ.soc.uoc.gr.

This paper studies dynamic resource allocation in a decentralized communication network under congestion extrenalities. An ad-hoc wireless network is an example of such self-organizing network. A dynamic noncooperative bandwidth auction-type game is presented with efficient outcomes. The role of dynamic pricing for the efficient sharing of bandwidth is discussed.

■ SA46

Center-Room C3

Standards and Interfaces in Mathematical Programming

Sponsor: Optimization Section-Integer Programming
Sponsored Session

Chair: Ted Ralphs, Lehigh University, Bethlehem, PA, 18015, USA, tkralphs@lehigh.edu

1 — Collaborative Research and the COIN-OR resource
Leonardo Lopes, Northwestern University, Evanston, IL, 60208, USA, leo@iems.nwu.edu.

When research projects involve the interests of many partners, it becomes necessary to explicitly address additional communication, time, and resource problems. Our XML standard for optimization illustrates how COIN-OR can help address those problems, provide visibility, and facilitate access to talent and knowledge across different specialties.

2 — Simple Interface for Stochastic Programming (SISP)
Alan King, IBM Research, Research Staff Member, Yorktown Hts., NY, 10590, USA, kingaj@us.ibm.com., Christian Condevaux-Lanloy

We propose a general approach to link a stochastic programming enabler to an Algebraic Modeling Language: SISP, the Simplified Interface for Stochastic Programming, to mediate a simple interface between Algebraic Modeling Languages and solvers that use the Stochastic Mathematical Programming System (SMPS) format.

3 — The COIN-OR Open Solver Interface: Design Issues for a Portable Solver API
Matthew Saltzman, Clemson University, Clemson, SC, 29634-0975, USA, mjs@clemson.edu.

The Open Solver Interface (OSI) component of COIN-OR provides a uniform application program interface to several different commercial and non-commercial LP solver libraries. This presentation describes features of the OSI and design issues for providing access to a useful standard feature set for embedded solvers.

■ SA47

Center-Ballroom A8

Nicholson Student Paper Prize Competition, I

Prize Session

Chair: Jayashankar Swaminathan, Kenan-Flagler Business School, Univ. of North Carolina, Chapel Hill, NC 27599-3490, msj@unc.edu

1 — Nicholson Student Prize Competition
This session features selected finalists in the Nicholson Student Paper Prize Competition. It represents an opportunity for faculty, professionals and other students to see some of the best research being performed by students. All are welcome.

Sunday 10:00 - 11:30am

■ SB01

Center -Ballroom A4

Tutorial: Planning Production of Semiconductors

Invited Session

1 — Planning Production of Semiconductors
Robert C. Leachman, University of California at Berkeley, Director, Berkeley, CA, 94720, USA, leachman@ieor .berkeley.edu.

Challenges and solutions are presented for the optimization of semiconductor production planning. Techniques are described to model multiple priority classes of demands and multiple objectives, binning and substitution, work-in-process, re-entrant capacity consumption by process flows with non-integer flow times , and assignment to non-homogeneous machines with dynamic qualifications.

■ SB02

Fairmont-Cupertino

Case: Operations Management at Hewlett-Packard

Cluster: Practice Track
Invited Session

Chair: Gianpaolo Callioni, Hewlett-Packard, Palo Alto, CA, 94304, USA, gianpaolo_callioni@hp.com

1 — Operations Management in Action: Modeling Strategic Decisions at Hewlett-Packard
Gianpaolo Callioni, Hewlett-Packard, Palo Alto, CA, 94304 , USA, gianpaolo_callioni@hp.com.

The Strategic Planning and Modeling group of Hewlett-Packard Company is an internal research and consulting group that has helped the company and its business partners for more than twelve years. We will cover how the group is structured in terms of internal roles and links to academia and discuss how this structure enables efficient knowledge brokering across businesses . We will present some of recent work in areas such as forecasting and planning process redesign, and supply chain consolidation.

■ SB03

Fairmont-Fairfield

Coordinating Pricing and Inventory Decisions in the Supply Chain

Cluster: Practice Track
Invited Session

Chair: Rina Schneur, Verizon, rina.schneur@verizon.com

1 — Coordinating Pricing and Inventory Decisions in the Supply Chain
David Simchi-Levi, MIT, Professor, Cambridge, MA, 02139, USA, dslevi@mit.edu.

Traditional inventory models focus on effective replenishment strategies and typically assume that commodity's price is exongenously determined. In recent years, however, a number of industries have used innovative pricing strategies to manage their inventory effectively. In this talk, we analyze various supply chain models that deal with coordination of production, distribution and pricing decisions.

■ SB04

Hilton-San Carlos II

Data-Based Forecasting

Contributed Session

Chair: Namwoon Kim, Hong Kong Polytechnic University, Hong Kong, Hong Kong, bunam@polyu.edu.hk

1 — Perceived Usefulness of Forecasting Formats
Dilek Onkal-Atay, Bilkent University, ANKARA, 06533, TURKEY, onkal@bilkent.edu.tr., Fergus Bolger

This paper explores the forecast providers' and forecast users' perceived usefulness of various forecasting formats. Through a role-switching exercise, participants make and use predictions via point, interval, and directional probability forecasting formats. They are asked to rate the usefulness of these formats both before and after performance feedback.

2 — Judgmental Versus Quantitative Forecasting in Practice: Understanding User Differences and Benefits
Nada R. Sanders, Wright State University, Dublin, 43017, USA, nadia.sanders@wright.edu., Karl B. Manrodt

We profile differences between firms identified as primary users of either judgmental or quantitative forecasting methods to develop a greater understanding for the dominance of judgmental forecasting in practice. Using survey data we find statistically significant differences between these categories of firms for a range of variables, including forecast error rates.

3 — A Comparison of Cross-validation Methods for Small Sample-based Prediction
Namwoon Kim, Hong Kong Polytechnic University, Hong Kong, Hong Kong, bunam@polyu.edu.hk.

In the context of small sample-based research, investigators often encounter feasibility problem(s) in cross-validation endeavors. The problem(s), in general, can be traced to two criteria: (1) methodological (i.e., arising due to inefficient or limited portfolio of cross-validation methods); and (2) data-related (i.e., originating due to availability-constraints on pertinent sample units). In this paper, we address the former source of problem as the main contingency when the latitude on the latter problem source is exogenous to the investigator.

■ SB05

Fairmont-Sacramento

Knowledge, Learning and the Role of Technology

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Paul Carlile, MIT, Cambridge, MA, 02142-1347, USA, carlile@mit.edu

1 — On the LAM: Libraries, Archives and Museums in the Creation and Maintenance of Knowledge Communities
Margaret Hedstrom, University of Michigan, Ann Arbor, MI, 48109-1092, USA, hedstromg@umich.edu., John King

We examine libraries, archives, and museums as sites for accumulation, selection, and interpretation of collections that play a fundamental role in managing the social construction of practical and abstract knowledge. The institutionalization of such collections provides stability, comprehensiveness, and access needed by societies and economies dependent on knowledge-intensive skills.

2 — Managing Knowledge in a Product Development Process: What to Do and When
Laura Black, MIT, Cambridge, MA, 02142-1347, USA, lblack@mit.edu., Paul Carlile

The gap between fully developed design knowledge and manufacturing knowledge can be significant in the early stage of product development. We use a combination of qualitative data and simulation analyses to explore the characteristics of cross-boundary activities in managing the gap generated by temporal and functional specialization.

3 — On-the-job Learning in the Engineering Workplace
Julie Gainsburg, Stanford University, Stanford, CA, 94305-3096, USA, jgains@stanford.edu., Diane Bailey, Lesley Sept

We examine how structural engineers and hardware engineers gain new knowledge at work. The models of knowledge acquisition we derive from field observations highlight the importance of differences across disciplines, including the role of senior engineers and the larger community of practice, the nature of knowledge, and the organization of work.

■ SB06

Fairmont-Atherton

College on Organization Science: Firm Growth

Sponsor: College on Organization Science Section
Sponsored Session

1 — Strategy Through a Demand Based Lens
Ron Adner, INSEAD, Peter Zemsky

2 — Directions of Growth: A Test of Social Contagion , Positioning, and Resource Arguments
Nicolaj Siggelkow, Wharton, Christophe Van den Bulte

3 — Are more resources always better for growth?
Joe Porac, Tim Pollock, Yuri Mishina

■ SB07

Fairmont-Piedmont

Managing Intra-Firm and External Interactions in New Product Development

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Kamalini Ramdas, University of Virginia, Charlottesville, VA, 22906, USA, ramdask@darden.virginia.edu

1 — Adjusting Project Management Contracts to Uncertainty and Complexity
Christoph Loch, INSEAD, Professor, Fontainebleau, 77305, France, christoph.loch@insead.edu., Christof von Branconi

Contracts are a key instrument of project governance, defining responsibilities and sharing risks. However, contracts have frequently led to spectacularly destructive behavior of the parties in complex and uncertain projects. We outline what elements must be specified in order to cover important project management aspects, and we show how uncertainty and complexity influence how power and risk can be shared, in order to enable the parties to collaborate even through contingencies.

2 — The Virtual Customer
Ely Dahan, UCLA Anderson School, Asst. Professor of Marketing, Los Angeles, CA, 90095-1481, USA, edahan@ucla .edu., John Hauser

New communication and information technologies are adding dramatic new capabilities for rapid and inexpensive customer input to all stages of the product development (PD) process. In this talk we review web-based methods of customer input as examples of the improved Internet capabilities of communication, conceptualization, and computation. We describe User Design, Web-based Conjoint, Virtual Concept Testing, and Securities Trading of Concepts. For each method we give examples of user-interfaces, initial applications, and initial (internal) validation tests. We critique the applicability of the methods for use in the various stages of PD.

3 — Contracting, Architectural Knowledge and Warranty Costs: Evidence from the Automotive Industry
Sharon Novak, Northwestern University, Evanston, IL, 60208-2001, USA, novak@kellogg.nwu.edu., Sridhar Tayur

We examine the trend toward module outsourcing in the context of its incentive effects on investment in parts development by looking at seat subsystems. We present original data to support our findings of the relationship between system characteristics, supplier effort and warranty cost.

4 — Assessing Modularity and Supplier Integration in Automotive Product Development
Young Ro, University of Michigan, Ann Arbor, MI, 48109-2117, USA, yro@umich.edu., Jeffrey Liker, Jean-Francois Couturier, Sebastian Fixson

Modularity, systems integration, how much responsibility to outsource, and how to manage it are major questions in the auto industry today. This presentation will explore the trend towards the adoption of modularity and systems integration vehicle design and production, and describe its effects on Supplier/OEM relationships. Barriers to the acceptance of modularity in the auto industry will also be examined.

■ SB08

Center-Ballroom A2

Internet Auctions

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Robert F. Easley, University of Notre Dame

1 — Consumer Heterogeneity in Online Auctions: Longitudinal and Learning Effects
Ravi Bapna, University of Connecticut, Storrs, CT, 06269, USA, rbapna@business.uconn.edu., Alok Gupta, Paulo Goes, Yiwei Jin

Much of the traditional auction theory, as well as some recent work in online auctions, focuses on how the auctioneer's (bid-taker) expected revenue depends upon the bidding rules. We contend that it is equally important to understand how bids are made, what bidding strategies are adopted and why.

2 — About How Much Can You Sell This For, More or Less? An Empirical Investigation of Price Stability in Online Auctions
Charles Wood, University of Notre Dame

Variance analysis empirical techniques are used to explore the stability of prices for items sold in online auctions. Different factors (e.g., reputation scores, pictures, sale timing, condition, and book value) are examined to determine to variance around average price that rare coins trade for in Internet auctions.

3 — A Comparison of Auction-based Markets and Bilateral Network Exchanges
Ming Fan, University of Washington

This research will use a game theoretical approach in modeling the strategic interactions of electronic markets, buyers, and suppliers. Buyers and suppliers can either conduct bilateral trade or participate in a central market. We analyze different competitive equilibriums and their respective conditions.

■ SB09

Center-Ballroom A3

Diagnosis and Resolution of e-Business Problems

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Steve Buckley, IBM, sbuckley@us.ibm.com

1 — Impact Analysis of e-Business Metrics and Policies
Kaan Katircioglu, IBM, Yorktown Heights, NY, USA, William Grey, Sugato Bagchi, Dailun Shi

Quantifying the value proposition of major software and solutions that have a high degree of implementation complexity has always been challenging. Classical ROI analysis often fails to make a compelling argument for companies considering investments in such solutions. We will present a framework that addresses this concern in the Supply Chain Management (SCM) solution space. This framework relates key low-level operational performance drivers to high-level financial metrics. It helps companies understand the benefits of complex SCM solutions more deeply and more broadly. We demonstrate this framework and a set of associated analytic tools in the context of a case study of the personal computer manufacturing industry.

2 — The Active Management Approach to e-Business Management
Opher Etzion, IBM

Business processes can go wrong because due to process problems or problems in the IT infrastructure (applications, resources). The active management approach includes several parts: knowledge modeling, detection points discovery, run-time detection of interesting situation within contexts, notification to subscribers using visualization means, and proactive reasoning to find the best possible alternative to resolve the problem.

3 — Process Warehousing: Is It The Last Missing Puzzle in e-Business Process Management?
Josef Schiefer, IBM, Yorktown Heights, NY, USA

As efficiency, accuracy, transparency and flexibility of e-business processes have become fundamental for process reengineering programs, paying attention to accurate and comprehensive process analysis is the basis for reengineering decision making. A process warehouse opens a wide area of applications (discovery of workflow bottlenecks, evaluation of education programs, assessment of innovation initiatives, rating of business partners etc.) and enables organizations to analyze comprehensive information on e-business processes.

4 — Expert e-Business Troubleshooting
Steve Buckley, IBM, sbuckley@us.ibm.com., Doug Fiesel, Shubir Kapoor

We have developed an expert system called SEAS to diagnose e-business problems and recommend solutions. It shows customers the relationship between their business problems and the IT solutions available. It gives salespeople a wide range of knowledge that would be difficult to acquire through training. It also estimates ROI.

■ SB10

Center-Ballroom A7

Scheduling in Modern Manufacturing Systems

Cluster: Scheduling
Invited Session

Chair: Nicholas Hall, Ohio State University, Columbus, OH, 43210-1144, USA, hall.33@osu.edu

1 — A Real-time Scheduling Framework
Zhi-Long Chen, University of Maryland, College Park, MD, 20742, USA, zchen@rhsmith.umd.edu.

We propose a column generation based algorithmic framework for real-time scheduling and routing problems. The key idea of the approach is to take advantage of columns already generated and modify them in a real-time fashion to respond to new information. Computational results will be reported.

2 — Scheduling a Manufacturing Supply Chain With Intermediate Inventory Holding Costs
Kerem Bulbul, University of California, Berkeley, CA, 94720-1777, USA, bulbul@ieor.berkeley.edu., Phil Kaminsky, Candace Yano

We consider a serial manufacturing supply chain with relatively expensive intermediates, and delays between processing stages. We model this as a flow shop scheduling problem with intermediate holding, earliness and tardiness costs, and develop scheduling heuristics to minimize total cost. We computationally demonstrate the effectiveness of these heuristics.

3 — The Importance of Empty Vehicle Travel in a Circular Flow Path AGV Layout
Ardavan Asef-Vaziri, Nicholas Hall, Ronny George

We consider the design of an optimal material flow path between manufacturing cells in an AGV system, to minimize total cost of loaded and empty travel. We

demonstrate significant improvement over approaches that ignore empty vehicle travel cost. Extensions to multiple stations per cell and stationary material handlers are considered.

4 — Minimizing the Flow Time with Parallel Machines in a Preemptive Environment
Michael Pinedo, NYU, New York, NY, USA, mpinedo@stern.nyu.edu.

We consider the model with identical machines in parallel and the total completion time as objective to be minimized. Preemptions are allowed. Lawler(1982) asked whether this problem is NP-Hard or not. We present a polynomial time algorithm and show that the more general problem with unrelated machines is strongly NP-Hard.

■ SB11

Center-Room C1

Project Scheduling

Contributed Session

Chair: Gunduz Ulusoy, Sabanci University, ISTANBUL, TURKEY, gunduz@sabanciuniv.edu

1 — A New Algorithm for Constructing Activities on Arcs (AOA) Networks
Yuval Cohen, The Open University of Israel, Hod-HaSharon, 45502, Israel, yuval_c_2000@yahoo.com.

Activities on Arcs (AOA) networks conform with a "from-to" matrix structure used in linear programming (LP). Activities on Nodes (AON) representation do not have this structure. The presented method enables systematic construction of AOA network from a list of precedence constraints. Thus, LP forumulations for networks could be systematically generated.

2 — Payment Models for the Multi-mode Resource Constrained Project Scheduling Problem with Discounted Cash Flows
Gunduz Ulusoy, Sabanci University, ISTANBUL, TURKEY, gunduz@sabanciuniv.edu., Funda S. Serifoglu

Four payment models are considered for the project scheduling problem under scarce resources Lump sum payment at the terminal event, payments at prespecified event nodes, payments at prespecified time points and progress payments. The models are investigated at the hand of an example problem. Several sensitivity analyses are performed.

3 — An Econometric Model of Cost Accumulation Progress Curves
Hsu Kun-jung, Tainan, 709, ROC, hsu@mail.leader.edu.tw.

Scheduling and budgeting are two major topics in project management. Accumulated progress curve (also name S-Curve) is the main concept to describe the distribution of the project cash flow. The paper developed an econometric model—use non-sample information technique to approach the problem of cost accumulation progress curves. Finally, case study of construction project in Taiwan is proceeded.

■ SB12

Fairmont-Regency 1

An Overview of OR Methodologies in Health Care

Sponsor: Health Applications Section
Sponsored Session

Chair: John Blake, Dalhousie University, Assistant Professor, Halifax, NS, B3J 2X4, CANADA, john.blake@dal.ca

1 — Reminiscences about OR/MS in Health Care Delivery
William Pierskalla, University of California-Los Angeles, Los Angeles, CA, 90095-1481, USA, william.pierskalla@anderson.ucla.edu.

In the lead issue of Operations Research (Vol. 50 No. 1, 2002), Dr. Charles Flagle wrote a most interesting article about the beginnings of OR/MS in health care delivery. This talk will pick up on some of the threads that have lead further from the point where he left off.

2 — OR in Health Care: Are we Making any Progress?
Seth Bonder, Ann Arbor, MI, 48105, USA, sbonder@comcast.net.

OR approaches have been used to address health care delivery problems for many years. Yet the system remains in a crisis with ever increasing costs and concerns regarding the quality of services provided. In this paper I question whether we are addressing the important ones that have enterprise wide interactions and impacts.

■ SB13

Center-Room D

Heuristic Programming Methods I

Contributed Session

Chair: Sheldon H. Jacobson, University of Illinois, Urbana, IL, 61801, USA, shj@uiuc.edu

1 — Finite-time Performance Analysis of the Static Simulated Annealing Algorithm
Sheldon H. Jacobson, University of Illinois, Urbana, IL, 61801, USA, shj@uiuc.edu., Jeffrey Orosz

The set of beta-acceptable solutions are introduced to assess the finite-time performance of static (fixed temperature) simulated annealing (S2A) algorithms, where beta is a value greater than or equal to the globally optimal objective function value. Computational results with the traveling salesman problem are reported to illustrate the results presented.

2 — Heuristics for the Supervised Classification Problem
Jan Adem, Katholieke Universiteit Leuven, Leuven, 3000, Belgium, jan.adem@econ.kuleuven.ac.be.

Mathematical programming is a nonparametric approach to supervised classification. However, mathematical programming formulations that minimize the number of misclassifications on the design dataset suffer from computational difficulties. We present heuristics for finding classifiers with a small number of misclassifications on the design dataset.

3 — Monkey Search: A New Metaheuristic Approach
Onur Seref, University of Florida, Gainesville, FL, 32611-6595, USA, seref@ufl.edu., Elif Akcali

We develop a new meta-heuristic called Monkey Search (MS), in which a search agent explores a forest of solution trees climbing up and down or leaping between the trees and searches for the global optimum solution. We study the computational performance of MS for a parallel machine scheduling problem.

■ SB14

Center-Room E

Conic LP and Application

Sponsor: Optimization Section-Linear Programming and Complementarity
Sponsored Session

Chair: Yinyu Ye, Stanford University, Stanford, CA, 94305-4026, yinyu-ye@stanford.edu

1 — Detecting Infeasibility in Interior-Point Methods for Optimization
Michael Todd, Cornell University, Ithaca, NY, 14853, USA, miketodd@cs.cornell.edu.

Interior-point methods are efficient algorithms for solving linear programming problems and certain convex extensions. Infeasible-interior-point methods focus exclusively on attaining feasibility and optimality, but are surprisingly successful in detecting infeasibility. We show that, on infeasible problems, they can be viewed as implicitly searchin for an infeasibility certificate.

2 — A D-Induced Duality and Its Applications
Jan Brinkhuis, Erasmus University, Rotterdam, The Netherlands, brinkhuis@few.eur.nl., Shuzhong Zhang

This paper attempts to extend the notion of duality for convex cones, based on a pre-described conic ordering and a fixed bilinear mapping. This is an extension of the standard definition of dual cones, in the sense that the {\em nonnegativity}of the inner-product in the standard definition is replaced by any pre-specified conic ordering, defined by the convex cone ${\cal D}$, and the inner-product itself is replaced by a general multi-dimensional bilinear mapping. This new type of duality is termed the {\em ${\cal D}$-induced duality} in the paper. Basic properties of the extended duality, including the extended bi-polar theorem, are proven. Examples are given to show the applications of the new results.

3 — Approximate the 2-Catalog Segmentation Problem Using Demidefinite Programming Relaxations
Dachuan Xu, Chinese Academy of Sciences, Beijing, 100080, P.R. China, xudc@lsec.cc.ac.cn., Yinyu Ye, Jiawei Zhang

We consider the 2-Catalog Segmentation problem (2-CSP) introduced by Kleinberg, Papadimitriou and Raghavan. In this problem, we are given a ground set I of n items, a family $\{ S_1, S_2, \cdots, S_m \}$ of subsets of I and an integer $1\le k\le n$. The objective is to find subsets $A_1, A_2 \subset I$ such that $|A_1|=|A_2| = k$ and $\sum_{i=1}^{m} \max \{|S_i \cap A_1|, |S_i \cap A_2| \}$ is maximized. We develop 'better-than-$\frac{1}{2}$' approximation algorithms for 2-CSP on a range of k in this paper. In particular, we obtain a ratio of 0.67 for 2-CSP when $k=\frac{n}{2}$, which improves the previously known best result

■ SB15

Center-Room B4

Optimization of Telecommunications Networks

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Richard Barr, Southern Methodist Univ, Chair, EMIS Dept., Dallas, TX, 75275, USA, Barr@engr.smu.edu

1 — Capacity Expansion of Fiber Optic Networks with WDM Systems: Problem Formulation and Comparative Analysis
Manuel Laguna, University of Colorado, Boulder, CO, 80309-0419, USA, laguna@colorado.edu., BelÈn Meli·n, Jose Moreno-Perez

In this paper we provide an arc-path formulation for the problem of locating and sizing Wavelength Division Multiplexing (WDM) and Optical Cross-Connect (OXC) equipment in a fiber optic network. The problem is heuristically solved by limiting the number of paths for each demand and applying CPLEX to the resulting formulation.

2 — Incremental Demand Rerouting in Telecommunications Networks
Eli Olinick, EMIS Department, Assistant Professor, Dallas , TX, 75275-0123, USA, olinick@engr.smu.edu., Qibin Cai

Network managers are reluctant to make wholesale changes to an established and reliable routing assignment; a complete modification to obtain an optimal assignment is viewed as highly risky. We consider the problem of making incremental changes to a given routing assignment to free up capacity to accommodate new point-to-point demands.

3 — A Genetic Algorithm with Optimized Crossover for OSPF Routing in the Internet
Mauricio G.C. Resende, AT&T Research, Florham Park, NJ, 07932, USA, mgcr@research.att.com., Luciana S. Buriol, Mikkel Thorup, Celso C. Ribeiro

Data packet routing can have a major impact on IP network utilization. In the OSPF protocol, traffic is routed along shortest paths to the destination IP address. We describe a genetic algorithm with optimized crossover that, given a set of projected demands, determines OSPF weights that minimize network congestion.

■ SB16

Center-Room C4

Integer Programming I

Cluster: Discrete Optimization
Invited Session

Chair: Jon Lee, IBM, Yorktown Heights, NY, 10598, USA, jonlee@us.ibm.com

1 — Computation of Hilbert Bases of Polyhedral Cones
Raymond Hemmecke, University of California, Davis, CA, 95616, USA, raymond@hemmecke.de.

In this talk we present a novel project-and-lift approach to computing the minimal Hilbert basis of the semigroup of non-negative integer solutions to a homogeneous system of linear equations. The lifting is done via a completion algorithm. A similar approach can be used to compute only the extremal rays of the cone. Some combinatorial applications and computational experience are presented.

2 — An Exponential Lower Bound on the Complexity of Some Classes of Branch-and-cut Methods
Sanjeeb Dash, Princeton University, Princeton, NJ, 08544, USA, sanjeebd@princeton.edu.

I present exponential lower bounds on the complexity of a large class of branch-and-cut methods for integer programming. These bounds are obtained via bounds on the length of branch-and-cut proofs generated by such methods. These results extend Pudlak's (1997) work demonstrating similar bounds for Gomory-Chvatal cutting-plane proofs. In particular, I will show that any branch-and-cut algorithm which use Gomory-Chvatal cuts, simple disjunctive cuts, lift-and-project cuts and branching on variables to solve 0-1 integer programs will take exponential time in the worst case. I will also discuss the application of Pudlak's techniques to other approaches to integer programming.

3 — Using Optimization to Construct Domino Portraits
Robert Bosch, Oberlin College, Oberlin, OH, 44074, USA, bobb@cs.oberlin.edu.

We will describe how integer programming can be used to construct a "best possible approximation" of a target image (e.g. Vermeer's "Girl With a Pearl Earring") out of s complete sets of double nine dominoes.

■ SB17

Center-Room B1

Other FMS Issues

Cluster: Flexible Manufacturing Systems
Invited Session

Chair: Kathy Stecke, University of Texas at Dallas, Richardson, TX, 75083-0688, USA, KStecke@utdallas.edu

1 — Setting WIP Levels in a High-variety, Low-volume Environment
Mandyam Srinivasan, University of Tennessee, Knoxville, TN, 37996, USA, msrini@utk.edu., Steven Ebbing, Alan Swearingen

We present a methodology for setting WIP levels in a high-variety , low-volume, manufacturing plant. The methodology iteratively determines WIP levels for different products to meet required throughputs, using a spreadsheet-based closed queueing network model. The spreadsheet implementation allows plant supervisors to rapidly analyze alternate scenarios.

2 — Analysis of FMSs with Information Delays
Ashok Kumar, Grand Valley State University, Grand Rapids, MI, 49504-6495, USA, kumara@gvsu.edu., Kathy Stecke, Rahul Caprihan

Information delays occur in FMSs as a result of the time taken in processing and converting systems information into control strategies. These delays affect system performance adversely, especially for due-date based measures. We develop static and dynamic formulations of FMSs operating under such delays and present theoretical and empirical results.

3 — Production Optimization in a Real Flexible Manufacturing System
Malgorzata Sterna, Poznan University of Technology, Poznan, 60-965, Poland, malgorzata.sterna@cs.put.poznan .pl., Jacek Blazewicz, Erwin Pesch

The research concerns a scheduling tool for a flexible manufacturing system located at Poznan University of Technology. It contains two CNC machines, a measurement center, three stores, and a robot with linear routing. A taboo search method has been proposed for this FMS, modeled as a mixed-shop system.

■ SB18

Center-Room J2

Integer Programming and Scheduling

Cluster: Applications of Optimization Theory
Invited Session

Chair: J. Cole Smith, University of Arizona, Tucson, AZ, 85721, USA, cole@sie.arizona.edu

1 — Improved Mixed-Integer Programming Formulations for the SDST Flexible Flowline Problem
Mary E. Kurz, Clemson University, Clemson, SC, 29634-0920 , USA, mkurz@clemson.edu., J. Cole Smith

Since traditional MIP formulations for the flexible flow line problem with sequence-dependent setup times have been found to be intractable, most research has focused instead on approximate solution methodologies. We revisit this problem via tighter MIP formulations in an effort to obtain a practically implementable exact solution algorithm.

2 — An Integer Programming Approach to Single Machine Scheduling with Multi-phase Jobs
J. Cole Smith, University of Arizona, Tucson, AZ, 85721, USA, cole@sie.arizona.edu., Hanif Sherali

Define a multi-phase job as one that must undergo several processing tasks on a machine, in between which the job must be removed from the machine for an exact time duration. We prescribe an MIP approach to minimize the makespan of this scheduling problem utilizing special traits of multi-phase jobs.

■ SB19

Fairmont-Regency 2

Health Applications I

Contributed Session

Chair: Catalina Stefanescu, London Business School, Assistant Professor, London, NW, 1 4SA, UK, cstefanescu@london.edu

1 — Optimal Timing of Living-Donor Liver Transplants: A Markov Decision Process Model Approach
Oguzhan Alagoz, University of Pittsburgh, Deparment of Industrial Engineering, Pittsburgh, PA, 15261, USA, oga1@pitt.edu., Lisa M. Maillart, Andrew J. Schaefer

We study the problem of optimally timing liver transplantation with a living donor and a given objective, such as the patient's expected quality-adjusted life years, is to be maximized. We formulate a Markov decision process in which the state of the process is described by patient health and organ quality.

2 — Modelling Daily Flow Patterns of Individuals to Characterize Disease Spread
Jeanine M. Smallwood, University of Arizona, Tucson, AZ, 85721, USA, jsmw@math.arizona.edu., Pitu B. Mirchandani, Mac Hyman

The effect of an individual's travels throughout a day on the spread of disease is examined using a deterministic SIR model . We determine which spatial and demographic characteristics most contribute to the disease spread and whether

the progession of the disease can be slowed by appropriate vaccination of people belonging to a specific location/socioeconomic group.

3 — Cox Model Versus Generalized Logrank Test for Time-to-Event Data with Ties
Catalina Stefanescu, London Business School, Assistant Professor, London, NW, 1 4SA, UK, cstefanescu@london.edu., Devan Mehrotra

The Cox proportional hazards model is the standard tool for relative risk estimation and inference for survival studies. The generalized logrank (GLR) approach has been proposed as a more efficient alternative to the Cox model when the number of subjects is small and there are no ties in the data. However, ties will result if continuous data are grouped by rounding to the nearest day, week, etc. We investigate the use of bootstrap techniques to improve the efficiency of relative risk estimators and the accuracy of confidence intervals within the GLR framework in the presence of ties. Results from a simulation study are used to compare Efron's tie handling approximation for the Cox model with bootstrap and non-bootstrap versions of GLRE, a GLR-based extension of Efron's method.

4 — Modeling Liver Allocation Through Discrete Event Simulation
Jennifer Kreke, University of Pittsburgh, Graduate Student, Pittsburgh, PA, 15261, United States, jekst11@pitt.edu., Steven Shechter, Andrew J. Schaefer, Cindy L. Bryce, Mark S. Roberts, Derek C. Angus

We describe a discrete event simulation model of the national liver allocation system. The model consists of patient and organ generators, a patient survival module, and a disease progression module. We discuss the model's extensions on previous modeling attempts and our ability to compare multiple liver allocation policies.

■ SB20

Fairmont-Hillsborough

New Models for Combinatorial Auctions

Cluster: Auctions
Invited Session

Chair: Gnana Anandalingam, University of Maryland, College Park, MD, 20742, USA, ganand@rhsmith.umd.edu

1 — Endogenous Bidding in Iterative Combinatorial Auctions
R. H. Kwon, University of Toronto, Ontario, Canada, Gnana Anandalingam, L. H. Ungar

Most combinatorial auction mechanisms require that bidders know the set of packages and their valuations, both being non-trivial tasks. We present an efficient single-item pricing mechanism, which allows for endogenous bid determination whereby bidders can dynamically discover packages as the auction proceeds. A network resource allocation example illustrates our mechanism.

2 — Multi-factor Bidding Strategies in Electronic Markets: A Seller's Perspective
Ram Narasimhan, Michigan State University, East Lansing, MI, 48824, USA, narasimh@msu.edu., Srinivas Talluri, Santosh Mahapatra

We propose a set of multi-factor multi-period models for effective bidding from a seller's perspective. The model captures attribute preference weights of the buyer without significant demand on information, and proposes an innovative approach for setting target bid levels for unselected bidders in order to maximize their likelihood of winning.

3 — CABOB: A Fast Optimal Algorithm for Combinatorial Auctions
Tuomas Sandholm, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, Andrew Gilpin, Subash Suri, David Levine

We present CABOB, a sophisticated search algorithm for determining winners in a combinatorial auction. It uses decomposition techniques, upper and lower bounding, elaborate and dynamically chosen bid ordering heuristics, and host of structural observations. Experiments show that the algorithm is always faster than CPLEX, and drastically faster for specific structures.

4 — Restricted Preference Combinational Auctions: An Ordered Bidding Scheme
Robert Day, University of Maryland, College Park, MD, 20742, USA, S. Raghavan

Since combinational auctions allow bidders to bid on any combinations of goods the bid data can be of exponential size. We describe an ordered bidding scheme that provides bidders with a compact method for assigning values to any possible subset. We describe a network model for the problem, special cases, and computational experience solving the winner determination problem.

■ SB21

Fairmont-Glen Ellen

Empirical Analysis of Financial Data

Contributed Session

Chair: Uri Ben Zion, Ben Gurion University, Beer Sheva, Israel, benzionu@bgumail,bgu.ac.il

1 — The Impact of Monthly Effect On Spot Gold Price Returns
Edward K. Chu, California State University, Dominguez Hills, Carson, CA, 90747, U.S.A., echu@soma.csudh.edu.

Average monthly spot gold price returns from January, 1975 to December, 2000 were analyzed for monthly effect. Results of this study supported the null hypothesis that spot gold price returns did not exhibit monthly effect.

2 — Disclosure of R&D Activities
Uri BenZion, BenGurion University, BenGurion University, ISRAEL, benzionu@bgumail.bgu.ac.il., Haim Falk, Dan Weiss

This paper investigates specific disclosure of R&D activities and provides evidence on its relations with uncertainty of stock returns. The research focuses on the pharmaceutical industry, and explores the impact of firms' disclosure policy during 1988-2000. Strong correlation are found between disclosure levels and the standard deviation of stock returns controlled for various risk variables.

3 — Information Technology, and Cost and Profit Efficiencies of Financial Intermediaries: A Global Comparison of Commercial Banks and Insurance Companies
Hong-Jen Lin, State University of New York, University at Buffalo, Flushing, NY, 11354, USA, apborodin@yahoo.com.

In the last decade, information technology (IT) and globalization of financial institutions have reshaped the landscape of financial markets. IT contributes to the efficiency of the financial intermediaries while globalization enhances the integration and harmonization of regularity in international markets. Due to the serious competition of financial intermediaries across different nations at different levels of economic growth, a global comparison of efficiency demonstrates the strengths and weaknesses of each country's financial institutions.

■ SB22

Fairmont-Paseo

OR/MS in Forestry - Spatial Harvesting and Planning Issues

Sponsor: Energy/Natural Resources/Environment Section - Forestry
Sponsored Session

Chair: Robert Haight, USDA Forest Service, North Central Research Station, St. Paul, MN, , 55108, USA, rhaight@fs.fed.us

1 — Methods for Generating Forest Parcelization Maps
Susan King, USDA Forest Service, Operations Research Analyst, Newtown Square, PA, 19073, USA, sking01@fs.fed .us., Brett J. Butler

A major threat to working forests in the U.S. is parcelization—large, single-ownership tracts of forests being subdivided. We used geostatistics to explore the causes of this phenomenon and as a technique for generating maps that will facilitate land-use planning and the development of forest policies.

2 — Modeling Average and Maximum Area Restrictions in Harvest Scheduling
Alan Murray, The Ohio State University, Associate Professor, Columbus, OH, 43210, USA, murray.308@osu.edu., Marcos Goycoolea, Andres Weintraub

Constraints are typically structured and imposed in harvest scheduling optimization models to limit the maximum area of disturbance associated with harvesting. However, there is also a need for explicitly regulating average area size as well. This paper develops a model for addressing average and maximum area conditions in harvest scheduling.

3 — Biased Selection Simulated Annealing Algorithm for Spatially Explicit Harvest Scheduling Models
Sonney George, Penn State School of Forestry, University Park, PA, 16802, USA, sgp113@psu.edu., Marc McDill

A modified simulated annealing algorithm is presented that uses a biasing mechanism. To compare the two versions, optimal SA parameters are systematically estimated using a procedure proposed by George and McDill (2002). The performance of the new algorithm is compared with the original, random algorithm using designed experiments.

4 — Forest Management Planning for the PA Bureau of Forestry Using LP
Marc McDill, Penn State School of Forestry, University Park, PA, 16802, USA, mem14@psu.edu., Shawn Lehman

We discuss our experience using LP models to develop management plans for Pennsylvania's state forests. Management goals include identifying sustainable timber harvest levels, balancing age-class distributions, and maintaining areas of old forest. Key issues include ensuring on-the-ground feasibility and obtaining buy-in from field foresters, forest industry, and environmental organizations.

■ SB23

Center-Room L

Air Traffic Delay Analysis

Sponsor: Transportation Science Section
Sponsored Session

Chair: Mike Ball, Robert H. Smith School of Business, College Park, MD, 20742, USA, MBall@rhsmith.umd.edu

1 — Estimating Sources of Temporal Deviations from Flight Plans
Natasha Yakovchuk, Rensselaer Polytechnic Institute, PhD student, Troy, NY, 12180, USA, yakovn2@rpi.edu., Thomas R. Willemain

Least absolute deviations (LAD) estimation is a robust alternative to least squares analysis of two-way tables. It can be used to estimate four sources of temporal deviations from flight plans: system, origin, destination and en route effects. We apply the method to daily FAA data on deviations for flights among 31 major airports.

2 — Avoidable Delay in the National Airspace System Due to Uncertainty in Convective Weather Forecasts.
Avijt Mukherjee, University of California at Berkeley, Berkeley, CA, 94720, avijt@uclink.berkeley.edu., Jim Evans, Mark Hansen

In our research we have estimated the "avoidable" delay in the National Airspace System (NAS), caused by uncertainty in convective weather forecasts. The term "avoidable" stands for the amount delay that can be avoided with improved information about enroute weather, i.e. more precise and/or frequent forecasts.

3 — Predicting Airspace Congestion Using Approximate Queueing Models
Bala G. Chandran, University of Maryland, College Park, MD, 20742-1815, bchandra2002@rhsmith.umd.edu., David J. Lovell, Mike Ball

We present an approximate method for the analysis of queueing delays in highly dynamic networks with schedule-based stochastic arrivals and time-varying service times. This methodology is applied to the problem of estimating airspace congestion. We compare our approach to a much more detailed simulation on several sample networks.

■ SB24

Hilton-Pacific

Experiential Learning

Contributed Session

Chair: Palaniappa Krishnan, University of Delaware, Director,Operations Research Program, Newark, DE, 19717, United States, baba@udel.edu

1 — OR/MS "R" US TOO!
Muhammad F. Anwar, University of Memphis, Memphis, 38152, USA, manwar@memphis.edu., Mohammad M. Amini, Michael J. Racer

The focus of OR/MS education has largely been on undergraduate education. Recently games and methods were developed to teach OR/MS concepts to high school students, and further taken to first and second grade students. The results were very promising , and children showed a lot of interest and learned the concepts.

2 — Streaming Media in Asynchronous Learning
Ronald W. Lodewyck, California State University, Stanislaus, Turlock, CA, 95382, USA, RONL@TOTO.CSUSTAN .EDU.

Web-based streaming media adds a valuable dimension to asynchronous student learning of complex technical subject matter . Several new information technologies will be discussed and demonstrated which make production of instructor presentations practical and affordable.

3 — The E-Learning-Project "Virtual OR/MS"
Ralph Scheubrein, University of Hohenheim (510A), Stuttgart, 70593, Germany, rscheubrein@uni-hohenheim.de.

In a cooperation of several German universities and funded by the German Ministry of Education and Research the project "Virtual OR/MS' aims to build an e-learning environment which should support both distance learning and classroom teaching in OR/MS. While the final stage of the project with the full content is not reached until December 2003, already now several modules are available. This talk will present the basic design decisions concerning both technical and pedagogical issues.

4 — Supply or Demand: Simulating High School Student Course Transitions
Simon Rodan, San Jose State University, Woodside, CA, 94062, USA, rodan_s@cob.sjsu.edu., Daniel A. McFarland

Students' moves between tracks in high school may be based on a school's course offerings, or on their estimation of the arduousness of different track levels. We use simulation to investigate both mechanisms, measuring success against the empirically observed transition matrices in two different schools .

5 — Operations Research Program at University of Delaware — A Novel Approach
Palaniappa Krishnan, University of Delaware, Director ,Operations Research Program, Newark, DE, 19717, United States, baba@udel.edu., Rhonda Aull-Hyde

Since 1996, the Operations Research Program at University of Delaware has been geared to the financial industry. Our students, besides taking OR and Statistics courses, also participate in the formal internship program called as CORP-Corporate Operations Research Program. The details of the CORP program will be presented.

■ SB25

Center-Room F2

Job Placement - The Academic Job Search: A Panel Discussion

Cluster: Job Placement
Invited Session

Chair: Russell Meller, Virginia Tech, Blacksburg, VA 24061, rmeller@vt.edu

1 — The Academic Job Search: A Panel Discussion
Panelists: Lawrence Robinson, Cornell University; Zelda Zabinsky, University of Washington; Russell Meller, Virginia Tech.

The panel will discuss the academic interview process and do's and don'ts associated with the job search. In addition to comments by current or former search chairs, time will be provided for questions and answers.

■ SB26

Hilton-San Carlos I

Topics in Service Level Management

Cluster: Service Operations
Invited Session

Chair: Pranab Majumder, Duke University, Assistant Professor of Operations, Durham, NC, 27707, USA, majumder@mail.duke.edu

1 — The Influence of Customer Service Personnel Attributes in an Online Environment
Craig Froehle, University of Cincinnati, Cincinnati, OH, 45221-0130, USA, craig.froehle@uc.edu., Aleda Roth

In technology-mediated settings, customer service representatives are physically separated from the customers they serve. In such an environment, do individual characteristics still influence the customer's perceptions of the service encounter? We test select service rep attributes shown to be important in face-to-face contexts using a variety of communication media.

2 — Managing Response Time and Service Quality in a Call Allocation Problem
Francis de Vericourt, Duke University, Assistant Professor, Durham, NC, USA, fdv1@duke.edu., Yong-Pin Zhou

We analyze a call routing problem in which different CSR's show different service speeds and quality levels. There may be certain CSR's who handle calls very quickly but the customers they serve are more likely to re-call. Other CSR's may provide longer but better answers. The manager has then to make this tradeoff when deciding to which agent an arriving call should be sent in order to minimize the average waiting time.

3 — Scheduling Multiple Types of Time-shared Aircraft Subject to Crew Duty-Time Restrictions
Wei Yang, Carnegie Mellon University, PhD Student, Pittsburgh, PA, 15213, USA, weiy@andrew.cmu.edu., Itir Karaesmen, Pinar Keskinocak, Sridhar Tayur

We discuss an application where multiple types of time-shared aircraft have to be scheduled to satisfy customers' flight requests. Aircrafts are paired with crews and an aircraft is available to serve trips only when the crew is available. We provide MIP formulations for the problem and discuss the performance of different solution methods on several real life instances.

4 — Managing Response Time and Service Quality in a Call Allocation Problem
Francis de Vericourt, Fuqua School of Business, Duke University, Assistant Professor, Durham, NC, 27708, US, fdv1@mail.duke.edu., Yong-Pin Zhou

We analyze a call routing problem in which different CSR's show different service speeds and quality levels. There may be certain CSR's who handle calls very quickly but the customers they serve are more likely to re-call. Other CSR's may provide longer but better answers. The manager has then to make this tradeoff

when deciding to which agent an arriving call should be sent in order to minimize the average waiting time.

5 — The Effect of Personnel Policies on Service Levels
Pranab Majumder, Duke University, Assistant Professor of Operations, Durham, NC, 27707, USA, majumder@mail.duke.edu., Harry Groenevelt

We model a service organization as a closed network in which employees spend time at different nodes. The rate at which employees serve customers depends upon the node at which the employee currently resides. Thus, a two-nodes like training and service can change it's rate of training and retention to indirectly change service levels for customers of the firm.

■ SB27

Center-Room C2

Optimizing the Value Chain in Reverse Logistics

Cluster: Reverse Supply Chain
Invited Session

Chair: Pitipong Veerakamolmal, BIS Buy & Supply, USA, pitipong@us.ibm.com

1 — Reverse Logistics Economic Supply Optimization
Larry Leibovich, IBM Corporation, leibo@us.ibm.com., Kevin O'Connor, J. P. Fasano, Pitipong Veerakamolmal

This paper discusses the implementation of IBM Watson Implosion Technology (Supply Chain Planning with Mathematical Optimization) solution to help in the decision making process whether to sell machines as machines or to harvest for parts. Using the planning tool, companies will be able to establish service parts in reverse logistics.

2 — Reverse Supply Chain Planning: Forecasting
Kevin O'Connor, IBM Corporation, tko@us.ibm.com., Larry Leibovich

This paper presents a forecasting methodology to consolidate the supply of end-of-lease inventory and the demand of machine for sales or (re)lease. The implementation improved supply/demand data visibility and enhanced collaboration across IBM business units around the world, which helped increase turns in the IBM Global Asset Recovery Services inventory.

3 — New Metrics and Scheduling Policies for Reverse Production Facilities
Julie Ann Stuart, Purdue University, West Lafayette, IN, 47907-1287, USA, stuart@purdue.edu., Vivi Christina

We present two new metrics for a reverse production facility with staging, manual disassembly operations and bulk recycling. We define five scheduling rules and evaluate their performance with discrete-event simulation. Our results illustrate how scheduling can reduce the staging inventory in a reverse production facility .

■ SB28

Center-Ballroom A1

Supply Chain Coordination II

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Ozlem Yuksel, Stanford University, Ph.D. Candidate, Stanford, CA, 94305-4026, USA, oyuksel@stanford.edu

1 — Supply Chain Coordination and Assortment Planning
Goker Aydin, Stanford University, Ph.D. Candidate, Stanford, CA, 94305, USA, goker@stanford.edu., Warren H. Hausman

We consider the assortment planning and inventory management problem of a single-retailer, single-manufacturer supply chain practicing delayed differentiation. The decentralized supply chain offers less variety than the centralized one. We seek perfect coordination mechanisms that will induce the decentralized chain to offer supply-chain-optimal level of variety.

2 — Secondary Markets for Product Diversion with Potential Manufacturer's Intervention
Barchi Peleg, Stanford Global Supply Chain Forum, Director of Research, Stanford, CA, 94305-4026, USA, barchi@stanford.edu., Hau Lee

We investigate how a secondary market used by resellers to reach new market segments for disposing of their excess inventories impacts the manufacturer whose goods the resellers hold, and the supply chain performance in the primary market. We allow the manufacturer to intervene in the secondary market, and study when it will be in her best interest to take such an action and the expected impacts of the manufacturer's intervention on the supply chain.

3 — Collaborative Planning and Risk Sharing in a Decentralized Supply Chain
Mark Wilkinson, Stanford University, Ph.D. Candidate, Stanford, CA, 94305-4026, USA, mawilkin@stanford.edu., Warren H. Hausman

We examine a decentralized supply chain where the manufacturer (OEM) hosts an information hub to enable collaborative planning with its contract manufacturers and component suppliers. We explore how the channel may employ risk sharing and incentives to promote optimal production decisions by suppliers that face long manufacturing lead times.

4 — Risk Sharing for Customized Components
Ozlem Yuksel, Stanford University, Ph.D. Candidate, Stanford, CA, 94305-4026, USA, oyuksel@stanford.edu., Hau Lee

We analyze the supply chain interfaces between an original equipment manufacturer (OEM) and its strategic component suppliers. We explore ways for the OEM to coordinate its supply chain by sharing the inventory risk for its custom components.

■ SB29

Center-Ballroom A5

Pricing in Production and Service Value Chains

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Hyun-soo Ahn, University of California, Berkeley, CA, USA, ahn@ieor.berkeley.edu

1 — Oligopolies and Pricing in the Supply Chain
Amit Pazgal, Washington University, Saint Louis, MO, 63130, USA, pazgal@olin.wustl.edu., Gilles Reinhardt

We characterize a manufacturer's optimal pricing mechanisms for several competitive retailer market scenarios and show which of these can be implemented by a straightforward (legal) mechanism. The results are generalized to the case of competing supply chains, several manufacturers and retailers and for price as well as quantity competition.

2 — Pricing and Production Decisions under Demand Interactions
Mehmet Gumus, University of California, Berkeley, ANKARA, 06450, TURKEY, mgumus@uclink.berkeley.edu., Hyun-soo Ahn, Phil Kaminsky

We consider a joint production and pricing problem where demand realized at each period is influenced by the current price as well as prices at previous periods. We formulate a mathematical program for the general case, characterize the property of an optimal policy in special cases, and propose algorithms to obtain solutions. A numerical study demonstrates that the additional profit resulting from considering demand interactions can be significant.

3 — The Impact of Mail in Rebate in a Two-stage Supply Chain
Ekaterina Lesnaia, MIT OR Center, lesnaia@mit.edu., David Simchi-Levi

We consider a single supplier and a single retailer where the supplier offers a rebate to the end customer. We analyze the impact of the rebate on the retailer pricing policy as well as the manufacturer expected profit.

4 — The Magazine Problem: Duopoly Competition in a Subscription Based Industry
Hyun-soo Ahn, University of California, Berkeley, CA, USA, ahn@ieor.berkeley.edu., Tava Lennon Olsen

We consider a duopoly model where a firm generates a portion of revenue from subscriptions. We formulate the model as a finite horizon Markov game, characterize the structure of an equilibrium , and discuss the effect of inventory levels, subscription prices , and promotional tools on the firm's profit.

■ SB30

Center-Ballroom A6

Postponement and Customization

Contributed Session

Chair: Joong Y. Son, University of California, Riverside, Riverside, CA, 92521, USA, joong.son@ucr.edu

1 — Deferred Delivery in a Decentralized Supply Chain
Joong Y. Son, University of California, Riverside, Riverside, CA, 92521, USA, joong.son@ucr.edu.

This paper analyzes a stock out situation with deferred delivery in a decentralized supply chain. We propose a coordination policy , which involves price discount and deferred delivery as coordination mechanisms. We further demonstrate effectiveness of our scheme and identify settings under which our coordination policy is most beneficial for stakeholders.

2 — Supply Chain Strategies to Cope with the Challenge of Increasing Customization
Che-Ping Su, Dupree College of Management, Georgia Tech, Atlanta, GA, 30332-0520, USA, gte063k@prism.gatech.edu., Yih-Long Chang

The tradeoffs between Make-to-Order (MTO) and the Delayed-Differentiation (DD) strategies are studied. We find that shorter delivery lead-time requirement, higher process time uncertainty, and more irregular demand make the DD strategy more attractive. On the other hand, technology constraints and cost considerations are two main reasons for adopting the MTO strategy .

3 — Mass Customization and the Values of Postponing Software Defined Product Differentiation
Ting Shen, Stanford University, Stanford, CA, 94305, USA, tingshen@stanford.edu., Edison Tse

Mass customization will pose two challenges: 1. The complexity of supply chain and manufacturing. 2. The difficulty to forecast demand. In this paper, we consider products that have features defined by software.A comprehensive analysis of the values from an IT enabled postponement strategy is provided.

4 — A New Model of Shortage Estimation and Prior Sales Allocation for Seasonal Item of Apparel products
De Bi Cao, Tokyo Institute of Technology, Tokyo, 152-8552 , Japan, cdb@me.titech.ac.jp., Rong Xia, Tadayuki Mashui

Japanese apparel products are widely classified into TEIBAN (standard) items and KISETU (seasonal) items. Globalization led the lead time of Japanese apparel supply chain be longer, so that offset the reduction of lead time bring by quick response program . Therefore, most KISETU items have limited (two) opportunities of decision making to the KISETU items as what did in a decade ago. Usually, a decision of new product production is made based on sensuous of MD (merchandiser) who refers sales quantity of similar SKU (stock keeping unit).

5 — A Postponement Model For Demand Management
Wu Zhengping, Purdue University, W. Lafayette, IN, 47907, USA, wuz@purdue.edu., Ananth Iyer, Vinayak Deshpande

In this paper we analyze demand postponement as a strategy to handle potential demand surges. Under demand postponement, a fraction of the demands in a period are postponed in order to permit capacity to be procured to satisfy demands later. The basic idea is that by preempting stockouts through demand postponement, we can reduce overall stockout costs. We analytically solve the problem and discuss some managerial issues .

■ SB31

Center-Room J3

Boolean Methods for Data Analysis

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Endre Boros, RUTCOR, Rutgers University, Professor of Operations Research, Piscataway, NJ, 08854, USA, boros@rutcor.rutgers.edu

1 — Logical Analysis of Proteomic Data
Peter L. Hammer, RUTCOR, Rutgers University, Professor of Operations Research, Piscataway, NJ, 08854, USA, hammer@rutcor.rutgers.edu., Gabriela Alexe, Sorin Alexe, Michael Reiss

Logical Analysis of Data (LAD)is a method for building classification models, based on combinatorics,optimization and logic.The basic steps of LAD will be illustrated on a proteomic dataset(http://clinicalproteomics.steem.com)containing intensity levels of 15,154 peptides defined by their mass/charge ratios in serum for 162 ovarian cancer and 91 control cases. LAD identified a support set of 7 peptides,developed a classification model,and estimated its specificity and sensitivity at 100%.

2 — Model Construction in Data Analysis by Quadratic Set Covering
Gabriel Tavares, RUTCOR, Rutgers University, Piscataway, NJ, 08854, USA, gtavares@rutcor.rutgers.edu., Peter L. Hammer

The problem of constructing "models" (i.e. collections of positive/negative patterns covering every positive/negative observation in a dataset) which maximize the total overlap between positive and negative patterns, is central for the Logical Analysis of Data. We formulate the problem as quadratic set covering, and present an efficient algorithm, computational results and applications to real-life biomedical problems.

3 — Justifiable Classifiers
Endre Boros, RUTCOR, Rutgers University, Professor of Operations Research, Piscataway, NJ, 08854, USA, boros@rutcor.rutgers.edu.

We introduce the notion of "justifiability" of a classifier learned from past examples. In most situations the prime concern is the "correctness", a measure primarily evaluated only on future examples. As an "orthogonal" notion, "justifibaility" models how well can future classifications be defended, based only on the trainig set. A consistent theory of justifiability leads to a narrowing of the learning process, but it does not decrease the generalization power of the derived classifiers.

■ SB32

Center-Room J4

Software Architecture and Info, Security

Contributed Session

Chair: Huseyin Cavusoglu, University of Texas at Dallas, richardson, Tx, 75083, USA, huseyin@utdallas.edu

1 — Real-time Data Propagation for Data Warehouses with ETLets
Schiefer Josef, IBM Watson Research Center, Hawthorne, NY , 10532, US, josef.schiefer@us.ibm.com.

In this paper we present an architecture of an ETL environment for real-time data warehouses, which supports a continual near real-time data propagation. The architecture takes full advantage of existing J2EE (Java 2 Platform, Enterprise Edition) technology and enables the implementation of a distributed, scalable, near real-time ETL environment.

2 — Automatic Control of Inter-organizational Business Processes using XML
Misuk Lee, Seoul National University, Seoul, KR, 151-742, S. Korea, leems@kr.ibm.com., Yeongho Kim, Suk-ho Kang

This paper proposes a new approach to manage inter-organizational business processes (IBP). With the approach, business processes can be represented in XML and controlled on the basis of message exchanges. We have developed a method of transforming an IBP into an XML process model (X-IBP), extracting process control logic from the model, and representing the logic in XSL (eXtensible Stylesheet Language), XS-PCL. With X-IBP and XS-PCL, an IBP is automatically and easily executed on the Internet.

3 — Designing the Optimal Information Security Architecture
Huseyin Cavusoglu, University of Texas at Dallas, richardson, Tx, 75083, USA, huseyin@utdallas.edu., Srinivasan Raghunathan, Birendra Mishra

Information security has emerged as an important issue. An assessment of the value of technologies is crucial for firms to design the optimal architecture. Such assessments are also useful to security developers in their design efforts. In this research, we provide guidelines for optimal security architecture using a game-theoretic model.

4 — The Insider Threat to Information Systems
Victor Spahic, USAF, WPAFB, OH, 45433, USA, victor.spahic@afit.edu.

The growing reliance on information technology has dramatically increased our vulnerability to a cyber attack. Additionally, the insider threat is a significant risk to both corporations and government entities. This paper discusses theories to reduce the insider threat and includes discussion of multivariate statistical models used to profile the threat.

■ SB33

Hilton-University

Approximate Dynamic Programming II

Sponsor: Optimization Section-Dynamic Programming
Sponsored Session

Chair: Daniela Pucci de Farias, IBM Almaden Research Center, Postdoctoral Research Scientist, San, Jose, CA, USA, pucci@mit.edu

1 — Efficient Linear Programming Approach for the Approximate Solution to Factored MDPs
Carlos Guestrin, Stanford University, Ph.D. Candidate, Stanford, CA, 94305, USA, guestrin@Stanford.EDU., Daphne Koller, Ronald Parr

Many systems have significant internal structure and can be modeled compactly by a factored MDP, where state variables and a dynamic Bayesian network (DBN) specify the model. We present an approximate, linear programming technique that tackles factored MDPs with exponentially-large state and action spaces. A central element is a novel LP decomposition technique, analogous to variable elimination in BNs, which reduces an exponentially-large LP to a, provably equivalent, polynomial-sized one.

2 — Policy Evaluation Algorithms for Neuro-dynamic Programming
Angelia Nedic, Alphatech Inc., Burlington, MA, 01803, USA , angeg@mit.edu., Dimitri P. Bertsekas

We prove convergence of two policy evaluation methods for infinite-horizon DP problems with discounted cost. The methods use simulation, temporal differences, and linear least-squares. The first method is a new gradient-like algorithm, which is based on the lambda-policy iteration method of Bertsekas and Ioffe. The second is the LSTD(lambda) algorithm recently proposed by Boyan, which for lambda=0 coincides with the LSTD(0) method of Bradtke and Barto.

3 — On Constraint Sampling in the Linear Programming Approach To Approximate Dynamic Programming
Daniela Pucci de Farias, IBM Almaden Research Center, Postdoctoral Research Scientist, San Jose, CA, USA, pucci@mit.edu., Ben Van Roy

In the linear programming approach to approximate dynamic programming, one tries to solve a certain linear program with relatively few variables but an intractable number of constraints. In this paper, we study a constraint sampling scheme that retains and applies only a tractable subset of the constraints. We show that, under certain assumptions, the resulting approximation is comparable to the solution that would be generated if all constraints were taken into consideration.

4 — Exploiting Temporal Abstraction in Reinforcement Learning
Andrew G. Barto, University of Massachusetts, Amherst, MA , 01003, barto@cs.umass.edu.

Reinforcement learning is bedeviled by the curse of dimensionality: the number of parameters to be learned grows exponentially with the size of any compact encoding of a state. Recent attempts to combat the curse of dimensionality have turned to principled ways of exploiting temporal abstraction, where decisions are not required at each step, but rather only in selected portions of the state space. Between each decision, a macro-action or "option" is executed which follows a fixed policy until termination. In this talk, I briefly review the theory of options, and then discuss recent research conducted in our laboratory on how the options framework can be used to integrate orthodox control methods with reinforcement learning and one approach to automatically creating useful options on the basis of experience.

■ SB34

Hilton-Plaza

Temporal Environments: Dynamic Decision Problems

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Laura Kornish, Duke University, Durham, NC, 27708-0120, USA, kornish@duke.edu

1 — Optimal Exit from a Project with Noisy Returns
Steven Lippman, University of California, Los Angeles, Los Angeles, CA, 90095-1481, USA, slippman@anderson.ucla .edu., Reade Ryan

Suppose a project's unobservable profit rate is either H>0 or L<0 , and the cumulative profit is a Brownian motion with drift equal to the profit rate. We find a closed form solution for the optimal time to exit when the project's profit rate is not directly observable. Comparative statics results are also obtained.

2 — Programmatic Risk Analysis for the Project Development Lifecycle
Robin Dillon, Georgetown University, Washington, DC, 20057, USA, RLD9@georgetown.edu.

A manager's allocation of budget among competing risks affects the project's outcome. Prior work has focused on optimizing these trade-offs to maximize expected utility. However, the manager has the option of reanalyzing and reallocating the budget as the project develops. This work incorporates these dynamic factors into the previous model.

3 — Reaching Consensus by Local Communication
Aleksandar Pekec, Duke University, Durham, NC, 27708-0120 , USA, pekec@duke.edu.

A dynamic communication model in which agents synchronously update their binary states according to the local majority rule is considered. It is shown that a failure-free truly local communication is impossible. This allows for design of communication networks in which only a small number of agents determine the consensus decision.

4 — Technology Choice with Positive Network Effects
Laura Kornish, Duke University, Durham, NC, 27708-0120, USA, kornish@duke.edu.

We study a consumer's choice between two incompatible technologies that are subject to positive network effects. At any point, the consumer can buy or wait to gain more information about the way that the market is leaning. We compare decision theoretic and game theoretic formulations of this problem.

■ SB35

Hilton-Almaden II

QSR Best Student Paper Competition

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Bruce Ankenman, Northwestern University, Evanston, IL, 60208, USA, ankenman@northwestern.edu

■ SB36

Center-Room F1

Stochastic Modeling in Military Applications II

Sponsor: Applied Probability Society
Sponsored Session

Chair: Jeffrey Kharoufeh, Air Force Institute of Technology, Wright-Patterson AFB, OH, 45433-7765, USA, jkharouf@afit.edu

Co-Chair: Emmanuel Fernandez, University of Cincinnati, Assoc. Prof., Cincinnati, OH, 45221-0030, emmanuel@ececs.uc.edu

1 — Panel Discussion: Threats, Security and Stochastic OR
Richard Deckro, Air Force Inst. of Tech., Wright-Patterson AFB, OH, 45433-7765, USA, richard .deckro@afit.edu., Mike McGinnis, Panelists: Richard Deckro, Air Force Institute of Technology; Mike McGinnis, United States Military Academy; Edward Pohl, United States Military Academy.

In this panel discussion, several experts in the field of military operations research will discuss current trends with particular emphasis on stochastic modeling in the military OR setting. We will discuss ways in which OR models and techniques can contribute to, maintain and increase security in the present uncertain world environment. Among the panelists are: Dr. Dick Deckro, Professor of OR, Editor-in-Chief, Military Operations Research Journal, Dept. of Operational Sciences, AFIT; Col Mike McGinnis, Ph.D., Head Dept. of Systems Engineering United States Military Academy West Point; Lt Col Edward Pohl, Ph.D., Dept. of Systems Engineering United States Military Academy: Col. David LaRivee, Ph.D., Chair of Dept. of Operational Sciences, AFIT; Prof. John Kobza, Ph.D., Texas Tech University

■ SB37

Center-Room J1

Queueing Systems: Analysis and Control II

Sponsor: Applied Probability Society
Sponsored Session

Chair: Mark Lewis, University of Michigan, Ann Arbor, MI, 48109-2117, USA, melewis@engin.umich.edu

1 — Optimality of D-Policies for an Mx/G/1 Queue with a Removable Serve
Eugene Feinberg, State University of New York, Stony Brook, NY, 11794-3600, USA, eugene.feinberg@sunysb.edu., Offer Kella

We consider an Mx/G/1 queue with a removable server. When a batch arrives, the workload becomes known. The cost structure consists of switching costs, running costs, and holding costs per unit time. We prove an old conjecture that D-policies are optimal for the average cost per unit time criterion.

2 — Cyclic Queueing Networks with Subexponential Service Times
Hayriye Ayhan, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, hayhan@isye.gatech.edu., Zibigniew Palmowski, Sabine Schlegel

For a K-stage cyclic queueing model with N customers and general service times we give an explicit expression for departure times from each stage. Starting from this expression we analyze the asymptotic tail behaviour of cycle times and waiting times given that at least one service time distribution is subexponential. Furthermore, we show that the tail of the residual of a subexponential service time seen by an arriving customer is of the same order as the service time itself where the asymptotic constant depends on the queue length on arrival.

3 — Dynamic Load Balancing in Parallel Queueing Systems: Stability and Optimal Control
Douglas Down, McMaster University, Hamilton, ON, L8S4L7, Canada, downd@mcmaster.ca., Mark Lewis

We consider a system of parallel queues with dedicated arrival streams. At each arrival time or service completion a decision-maker can move customers from one queue to another. We develop stability conditions for this model via a fluid model and discuss the optimal control under a variety of assumptions.

4 — A Preemptive Priority Queue With Balking
Steve Drekic, University of Waterloo, Waterloo, ON, N2L3G1, Canada, sdrekic@math.uwaterloo.ca.

In this talk, we analyze a 2-class, single server preemptive priority queueing model with low priority balking customers. Arrivals are assumed to be Poisson with exponential service times . The system investigated is a QBD and the steady-state joint distribution is derived via the method of generalized eigenvalues . Numerical examples will be given to highlight some important computational features.

■ SB38

Center-Room N

Improving Operating Plan

Sponsor: Railroad Applications Section
Sponsored Session

Chair: Natasha Lukiantseva, CSX Transportation, Jacksonville, FL, 32205, no_lukiantseva@csx.com

1 — An Integrated Decision Support System for Railway Operating Plan Design, Evaluation and Improvement
Trent Sommers, Norfolk Southern Railroad, System Manager, Atlanta, GA, USA, trent.sommers@nscorp.com., Clark Cheng

Historically Norfolk Southern Railway has relied on several stand-alone applications and manual efforts for design, evaluation and improvement of its operating plan. The process has been cumbersome, time-consuming and costly. An integrated DSS has been developed to facilitate these efforts for Transportation Planning, Service Design and Terminal Operations. The new system allows users to select traffic data, operating plans and modify the operating plans to conduct what-if and comparison studies. The new system is a 3-tier web-based system, readily accessible via a web browser. A complete study of a weekly traffic data set can be finished and ready for analysis in hours, a significant improvement over the past processes. The primary components of the system include traffic and operating plan databases, block sequencing algorithm, trip planner, report generator and a user-friendly interface. The system also integrates with other NS Transportation and Marketing applications.

2 — Industry Changing Gateway Optimization (CN/CXT, BN/CSXT)
Natasha Lukiantseva, CSX Transportation, Jacksonville, FL , 32205, no_lukiantseva@csx.com.

Gateway Optimization between Class Ones is bringing the benefits of a merger without a merger, allowing railroads to improve their servcie to the customer on the interline traffic. The presentation will give an overview of several projects that were undertaken this last and year.

■ SB39

Center-Room K

Route and Departure Time Optimization on Transportation Networks

Sponsor: Transportation Science Section
Sponsored Session

Chair: Georgia Perakis, MIT, Associate Professor of Operations Research, Cambridge, MA, 02139, USA, georgiap@mit.edu

1 — Route and Departure Time Optimization Models For Time-Dependent Demand with Arrival Time Windows
Yue Li, University of Florida, Gainesville, FL, 32606, USA, ili@ce.ufl.edu., Athanasios K. Ziliaskopoulos

This paper is concerned with the problem of system optimum dynamic traffic assignment with fixed arrival time based demand. A linear programming formulation is proposed that propagates traffic according to the cell transmission model. The formulation can be applied to networks with many origins and destinations with the first-in-first-out principle generally observed. Concepts such as the marginal cost of additional demand or network resources (capacity and saturation flow rate) are investigated. The necessary and sufficient condition for achieving system optimum dynamic traffic assignment with simultaneous departure time and route choice, are derived based on the dual of the linear programming formulation and by applying the complementary slackness conditions. Two extensions of the model that account for network realities, such as mixed arrival and departure time traffic and schedule delays are developed and their implications are discussed.

2 — Understanding Traffic Equilibrium Under Commuters Departure Time Choice
Alejandro Lago, University of California at Berkeley, Berkeley, CA, 94705, alago@uclink.berkeley.edu., Carlos Daganzo

Most existing models of traffic equilibrium under commuters departure time choice are based on unrealistic traffic assumptions. These assumptions hide the true effects of congestion at different locations. We present a methodology that circumvents these limitations. Insights are derived both for future algorithmic development and policy-making.

3 — Modeling Network Uncertainty in Stochastic Route Choice Problem
Zhaowang Ji, Dept. of Civil & Environmental Engineering, Logan, UT, 84322-4110, zhaowangji@cc.usu.edu., Surachet Pravinvongvuth, Anthony Chen, Will Recker

Variability in travel times introduces uncertainty for travelers such that they do not know exactly when they will arrive at the destination. It is considered as a risk (or added cost) to a traveler when making a trip. In this talk, we discuss how network uncertainty and perception error can be included in a stochastic route choice model.

4 — An Operational Hybrid Model for On-Line Driver Behavior under Information Provision
Jeong Yu, Purdue University, West Lafayette, IA, 47907-1284, Srinivas Peeta

A hybrid fuzzy logit model is developed to treat non-quantitative and quantitative data simultaneously to model on-line driver behavior. A theoretical framework is proposed that seeks operational consistency between predicted network states and the actual conditions unfolding on-line by explicitly updating driver behavior model parameters. Simulation experiments are discussed.

■ SB40

Center-Room G

New Approaches to Operational Modeling and Simulation for Semiconductor Manufacturing

Sponsor: College on Simulation Section
Sponsored Session

Chair: Michele Pfund, Arizona State University, Tempe, AZ, 85287-5906, USA, michele.pfund@asu.edu

1 — Simulating from a Resource Perspective
Theresa Roeder, University of California, Berkeley, CA, USA, Lee Schruben

We present some experiences in detailed modeling of the resource cycles involved in semiconductor production. This is different from the typical approach of modeling a factory by tracking the flow of individual jobs and resulted in much faster executing code. However, certain constraints and dispatching policies appear to be difficult to model accurately and there is some loss of information. Some approximation techniques are used to mitigate this loss of information.

2 — Joint Use of Resource Driven and Job Driven Simulation
Chanettre Rasmidatta, Arizona State University, Research Assistant, Tempe, AZ, 85287, crasmida@hotmail.com., John W. Fowler, Gerald T. Mackulak

In this talk, we discuss how one might use the output of a simple model to predict what the output of a more complicated model would be.

3 — A Reference Model for Modeling and Analysis of Semiconductor Manufacturing
Leon McGinnis, Georgia Institute of Technology, Atlanta, GA, USA, leon.mcginnis@isye.gatech.edu.

This presentation is motivated by the lack of modeling tools to facilitate rapid prototyping of detailed factory operations, especially addressing the control logic that will operate these highly automated systems. A project is described that attempts to 1) develop a distributed, web-based simulation platform for modeling, analysis and control of 300mm wafer fabs, 2) provide a high degree of modeling flexibility and configurability) develop rapid prototyping through formal discrete-event modeling.

4 — Some New Results on Scheduling Two Competing Agents
Pitu B. Mirchandani, University of Arizona, Tucson, AZ, 85721, USA, pitu@sie.arizona.edu., Alessandro Agnetis, D. Pacciarelli, A. Pacifici

In many situations, a formal approach is needed to schedule two competing users for a common set of machines or processors. We review some recent results when the common set is (1) a single machine, and (2) a 2-machine shop. We study the complexity of several objectives and scheduling disciplines.

■ SB41

Center-Room M

Location Analysis II

Sponsor: Section on Location Analysis
Sponsored Session

Chair: Oded Berman, University of Toronto, Toronto, ON, M5S 3E6, Canada, berman@rotman.utoronto.ca

1 — An Efficient Genetic Algorithm for the p-Median Problem
Osman Alp, University of Alberta, Edmonton, AL, T6G 2R6, Canada, osman.alp@ualberta.ca., Zvi Drezner, Erhan Erkut

We propose a new genetic algorithm for the p-median problem. The algorithm, aided by a greedy heuristic, is relatively simple and it generates good solutions quickly. Computational tests with indicate that 70% of the problems are solved optimally and the best solution is usually within 0.1% of the optimum.

2 — Planar Location of K Capacitated Connections
Simin Huang, State University of New York-Buffalo, Buffalo, NY, 14260, USA, sh28@acsu.buffalo.edu., Dr. Rajan Batta, Rakesh Nagi

Consider the problem of selecting capacity options and planar location of connections for specified flows. We provide a mathematical programming formulation for this problem and prove Hakimi-type nodal optimality. After reducing the con-

tinuous location problem to a discrete combinatorial problem, solutions are identified through heuristic methods.

3 — Designing Distribution Systems with Reverse Flows
Vedat Verter, McGill University, Montreal, Canada, verter@management.mcgill.ca., Necati Aras, Tamer Boyaci

Reverse flows in a distribution system involve (used) goods returned by the customers. The returned items need to be inspected to determine their condition so that they can be either disposed or remanufactured. We will present models to optimize the location decisions for inspection centers and remanufacturing facilities.

4 — Location Problems with Discrete Probabalistic Weights
Oded Berman, University of Toronto, Toronto, ON, M5S 3E6, Canada, berman@rotman.utoronto.ca., Jiamin Wang

We consider the median, center, anti-median and max-min problems on networks with demand weights that are discrete random variables. We provide efficient algorithms for finding the optimal location of one facility.

■ SB42

Fairmont-Belvedere

Marketing and the Internet

Contributed Session

Chair: Weon S. Yoo, University of British Columbia, Vancouver, BC, V6T1Z2, Canada, yoo@commerce.ubc.ca

1 — How to Make Online Customers Work for You
Sujata Ramnarayan, San Jose State University, San Jose, CA, 95117, USA, sujatar27@yahoo.com.

A website is many things to a corporation today. It is the storefront, corporate image and a competitive advantage to name a few. Most of all, it is a source of valuable content to a company. While most companies today generate their own content, they ignore a free and valuable resource—the online customer. This paper demonstrates through examples of case studies how to use your online customers as a valuable resource to generate value-added content for corporate websites.

2 — Experimental Studies on the Potency of Virtual Community for Marketing Applications
Akihiro Inoue, Kwansei Gakuin University, Nishinomiya, 662-8501, JAPAN, ainoue@kwansei.ac.jp.

We have conducted three experiments that studied the potency of virtual community and the usefulness of the information via virtual community for brand management, communication planning, and new-product concept development. The experiments showed the value and effectiveness in the marketing applications. We also discuss the future potential in the field.

3 — The Impact of the Introduction of an Internet Channel on Distribution Channel Management
Eunkyu Lee, Syracuse University, Syracuse, NY, 13244-2130 , USA, elee06@syr.edu., Weon S. Yoo

This study investigates the impact of the introduction of an Internet channel on individual channel member's pricing strategies and resulting profits by comparing before and after the Internet channel. The results show the optimal channel structure depends on vertical interactions between the channel members and the ownership of the Internet channel.

■ SB43

Center-Room H

Revenue Management

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: Guillermo Gallego, Columbia University, Professor, New York, NY, USA, ggallego@ieor.columbia.edu

1 — A Two-leg Seat Inventory Management Model with Cancellation and No-show
Y. Feng, Chinese University of Hong Kong, Hong Kong, PRC, histl@jetson.uh.edu., Tong Wang

A continuous-time, two-leg revenue management model is analyzed in this study. We allow the customers to cancel their bought tickets any time prior to the departure and refund the cancelled tickets. Upon the departure, customers may not aboard the airplane and make it impossible to refill the vacancies. This study examines the optimal revenue control rules which work out when cancellation is not taken into account. It also suggests to prescribe the optimal overbooking levels which will prevent no-shows from leaving more vacancies.

2 — Deterministic Relaxations of Network Revenue Management Problems
Costis Maglaras, Columbia University, New York, NY, 10027 , USA, c.maglaras@columbia.edu.

We revisit the "classical" network revenue management problem. We show that its determistic relaxation is equivalent to a lower dimensional "workload" formulation that is algorithmically simpler and highlights the essential features of good pricing/allocation policies. This is related to state space collapse in queueing networks in heavy traffic.

3 — A Portfolio Approach to Procurement Contracts
Victor Martinez-de-Albeniz, MIT, Cambridge, MA, USA, albeniz@mit.edu., David Simchi-Levi

We consider a multi-period environment in which an industrial buyer needs to decide on long-term supply contracts with little information on demand or spot-market price. A contract is a portfolio of fixed commitment and several types of options. We address both the optimal replenishment strategy for a given contract as well as the structure of the optimal contract.

4 — Revenue Management of Flexible Products
Guillermo Gallego, Columbia University, Professor, New York, NY, USA, ggallego@ieor.columbia.edu., Robert Phillips

A flexible product is a ``menu'' of two or more alternative flights serving the same market. A customer choosing a flexible product will be assigned to one of the alternatives in the menu by the airline at a time just prior to departure. Flexible products have the advantage of increasing overall demand and enabling better capacity utilization at the cost of potentially cannibalizing higher-paying flight-specific

■ SB44

Center-Room B2

Panel: Issues in Entrepreneurship Research

Cluster: Entrepreneurship
Invited Session

Chair: Burton V. Dean, San Jose State University, San Jose, CA, 95192, USA, bvdean@aol.com

1 — Panel: Issues in Entrepreneurship Research
Burton V. Dean, San Jose State University, San Jose, CA, 95192, USA, bvdean@aol.com.,Panelists: Al Bruno, Santa Clara University; Mark Fruin, San Jose State University; Joseph Giglierano, San Jose State University; Andrew Johnson, Santa Clara University; Michael Meeks, San Francisco State University; Michael Solt, San Jose State University.

This panel examines developments in entrepreneurship research, including the importance of place in regional economic development, differences between classical entrepreneurship research and the emerging importance of high tech entrepreneurship, the role of incubation and institutional factors in entrepreneurship, Silicon Valley as a model of entrepreneurship, and pan-Pacific trends in entrepreneurship.

■ SB45

Center-Room B3

Telecomm Capacity & Location

Contributed Session

Chair: Uday Rao, University of Cincinnati, Associate Professor, Cincinnati, OH, 45221, USA, uday.rao@uc.edu

1 — Mathematical Modelling of Processing Capacity Investment and Service Provision Problems in Telecommunications and the Internet
Mark C. Stewart, University of Canterbury, Christchurch, New Zealand, m.stewart@mang.canterbury.ac.nz., Shane Dye

We present a mathematical model for determining the best investment in processing resources in a distributed processing environment in order to meet demand for telecommunications and Internet services. Issues discussed include how this decision influences the lower-level service provision, and the interrelationship between processing capacity, quality of service , and demand.

2 — Two-stage, Budget-Constrained, Capacitated, Telecom Hub Location-Allocation under Uncertain Demand
Uday Rao, University of Cincinnati, Associate Professor, Cincinnati, OH, 45221, USA, uday.rao@uc.edu., Ramesh Bollapragada, Jeffrey Camm, Junying Wu

We test a new greedy heuristic for telecom network planning with multiple stages, hub types differing in cost and capacity, and uncertain demand for wireless service. In each stage, hubs are located on (or moved from) buildings under limited budget, then, realized demand is assigned to hubs, incorporating technological constraints.

3 — A Wireless Cell Assignment Problem of IMT-2000 Networks
Youngho Lee, Korea University, Seoul, S. Korea, yhlee@korea.ac.kr.

We address the cell-hub assignment problem arising from the design of IMT-2000 networks. In this problem, we assign BTS traffic to hubs while minimizing the

cost of leased lines, facility installation and maintenance. We formulate mixed-integer programming models and present computational results.

■ SB46

Center-Room C3

Software Tools for Parallel Processing

Sponsor: Optimization Section-Integer Programming
Sponsored Session

Chair: Ted Ralphs, Lehigh University, Bethlehem, PA, 18015, USA, tkralphs@lehigh.edu

1 — Optimization on the Computational Grid
Jeffrey Linderoth, Lehigh University, Bethlehem, PA, 18015, USA, jtl3@lehigh.edu.

The CPU power offered by collections of loosely coupled, heterogeneous, non-dedicated computing resources opens new doors for users of optimization technology. We introduce the Computational Grid, describe software tools for using the Grid, highlight successful applications of the Grid in solving numerical optimization problems, and mention possible future directions.

2 — A Library Hierarchy for Implementing Scalable Parallel Search Algorithms
Ted Ralphs, Lehigh University, Bethlehem, PA, 18015, USA, tkralphs@lehigh.edu., Laszlo Ladanyi, Matthew Saltzman

We describe our framework, available from www.coin-or.org, for building parallel tree search algorithms. The framework includes general parallel search handling, a layer for implementing parallel branch and bound, and a mechanism for "data-intensive" applications (such as branch-and-cut), in which a large number of global data objects are needed to describe search nodes.

3 — Object-Oriented Tools for Easy Development of Parallel Branch-and-Bound
Bernard Gendron, DIRO-CRT, Universite de Montreal, Montreal, H3C 3J7, Canada, gendron@iro.umontreal.ca., Teodor Gabriel Crainic, Antonio Frangioni, François Guertin

We present and compare several parallel branch-and-bound approaches, which exploit various degrees of search control and memory management. Our implementations are designed for both shared-memory and message-passing environments. Because they are based on object-oriented programming tools, our implementations are generic and allow easy development of parallel branch-and-bound algorithms for any class of problems. We illustrate their use on classical combinatorial optimization problems.

4 — The PICO Package for Parallel Branch and Bound: Recent Developments
Jonathan Eckstein, Rutgers University, Piscataway, NJ, 08854, USA, jeckstei@rutcor.rutgers.edu.

PICO is a C++ class library for scalably implementing a variety of branch-and-bound algorithms on a range of parallel rchitectures. I will describe the enhancements to the design and implementation over the past few years, and present the most recent computational results for MIP problems.

■ SB47

Center-Ballroom A8

Nicholson Student Paper Prize Competition, II

Prize Session

Chair: Jayashankar Swaminathan, Kenan-Flagler Business School, Univ. of North Carolina, Chapel Hill, NC 27599-3490, msj@unc.edu

1 — Nicholson Student Prize Competition
This session features selected finalists in the Nicholson Student Paper Prize Competition. It represents an opportunity for faculty, professionals and other students to see some of the best research being performed by students. All are welcome.

Sunday 1:30 - 3:00pm

■ SC01

Center -Ballroom A4

Tutorial: Real-time Fleet Management

Invited Session

1 — Real-time Fleet Management
Michel Gendreau, Universite de Montreal, Professor, Montreal, QC, H3C 3J7, Canada, michelg@crt.umontreal.ca.

While real-time fleet management problems have been around for many years, the development of new communication and vehicle location technologies as well as the emphasis on just-in-time transportation have put a new emphasis on them. In spite of recent advances in computing power and solution methodologies, these problems remain extremely challenging, because they differ in many ways from static operations research planning problems. In this talk, we describe some of the main challenges that are typically encountered when dealing with such problems and we describe a robust, practical approach to deal with them. Applications of this approach to courier and ambulance dispatching problems will be used to illustrate it.

■ SC02

Fairmont-Cupertino

Optimal Inventory Levels in Supply Chains by APS

Cluster: Practice Track
Invited Session

Chair: Grace Lin, IBM, Yorktown Heights, NY, 10598, USA, gracelin@us.ibm.com

1 — Why Does Effectively Managing Inventories in Practice Continue to be Challenging?
Sridhar Tayur, Carnegie Mellon University, Professor, Pittsburgh, PA, 15213, USA, stayur@andrew.cmu.edu.

Based on actual experience with several supply chains from four industry verticals (Heavy Machinery, Semi-conductor, Pharmaceuticals, Retail) this talk will focus on why inventory inefficiencies continue to exist even after substantial investments in ERP and APS systems have been made and several consultants, experts and internal teams have been battling it. A proposal will be made on how some of the challenges can potentially be overcome via a comprehensive approach to planning and execution. Results from actual implementations of this approach will also be discussed.

2 — A Production-Inventory Control Tool for the Manufacturing of Server Computers
David Yao, Columbia University, Markus Ettl, Zheng Wang, Grace Lin, Feng Cheng, Yingdong Lu

We discuss the development of a "days-of-supply'' tool, which takes as input the quarterly build plan for product families, and outputs the weekly production decisions for all components. Fabrication and subassembly capacities are treated as constraints . The objective is to minimize inventory and overtime labor costs . The problem is formulated and solved as a convex program with linear constraints.

3 — Optimal Inventory Levels in Supply Chains by APS
Hartmut Stadtler, Technische Universitaet Darmstadt, D-64289 Darmstadt, Germany, stadtler@bwl.tu-darmstadt.de., Christopher Suerie

Inventories can be discriminated according to the causes of its installation. Consequently, we distinguish between safety, lot-size and seasonal stocks, etc. These are planned for in different modules of an Advanced Planning System (APS). We will present new developments regarding lot-sizing in master planning as well as the determination of adequate safety stocks in supply chains supplemented by examples from the chemical industry.

4 — Collaborative Planning in the High Volume Electronics Supply Chain: Making Theory Work
Ton de Kok, Eindhoven University of Technology, 5600 MB Eindhoven, The Netherlands, a.g.kok@tm.tue.nl.

In this presentation we report about collaborative planning (CP) in a HVE environment. We describe the basics of the Supply Chain Planning (SCP) concept used, called Modified Base Stock Policies. We discuss the modifications required to make (modified) base stock policies work in a volatile demand environment.

■ SC03

Fairmont-Fairfield

Tutorial: Practical Network Planning

Cluster: Practice Track
Invited Session

Chair: Bharat Doshi, Bell Labs

1 — Evolution of Optical Core Networks, Roles of Network Planning, and Technical Challenges
Bharat Doshi, Bell Labs

Starting with mid 1990's, we saw a rapid introduction of self-healing SONET rings with fast restoration in the event of a failure. During that time, we also saw a rapid increase in the deployment of point-to-point DWDM systems to increase the capacity of fiber and to minimize the costs associated with signal amplification and regeneration. This combination provided may technical challenges to network planning in terms of optimizing algorithms and scalable solutions to designing a system of interconnected rings with shared capacity for restoration, while also trying to optimize the use of fiber and amplifiers. During the late

1990's and early part of 21st century , we saw that the trends towards more optical level networking (including restoration function) and move towards mesh networking in the core created a new set of challenges in network planning. New restoration schemes, mixed technologies, and mixed topologies created challenges for design algorithms. Shared capacity restoration also created challenges for restoration performance, and scalability of processing engines. In the last couple of years a new set of planning flexibility and challenges have been generated by the advent of transparent optical networking. Today, network planners are faced with a multi-dimensional puzzle involving cost trade-offs among transparency, packing efficiency, and capacity unit on fiber.

■ SC04

Hilton-San Carlos II

Analytical Models for Forecasting

Contributed Session

Chair: Jiachen Liu, Rutgers,The State University of New Jersey, Piscataway, 08854, U.S.A., liujc@rci.rutgers.edu

1 — Demand Forecasting for Multi-Generation Product Combining Discrete Choice and Dynamics of Diffusion
WonJoon Kim, Seoul National University, Ph.D. Candidate, Seoul, KK, 110-011, Korea, wjkim33@snu.ac.kr.

We incorporate diffusion effects into a discrete choice model in order to capture the dynamics of demand for a multi-generation product. As an empirical application, the suggested model is applied to the case of the worldwide DRAM market. In doing so, we consider technological trajectories of the DRAM innovations as supply side constraints.

2 — Forecasting with Serially Correlated Regression Models
Yue Fang, University of Oregon, Eugene, OR, 97403, USA, yfang@darkwing.uoregon.edu.

In this article we investigate the theoretical and estimated properties of predictors of regression models with autocorrelated errors. We prove new theorems associated with the predictive efficiency of GLS and incorrectly structured GLS predictors. We also establish the form associated with their predictive mean squared errors as well as the magnitude of these errors relative to each other and to those generated from the OLS predictor. A large simulation study is used to evaluate the finite sample performance of forecasts generated from models using different corrections for the serial correlation.

3 — Target Path Modeling and Forecasting by Time Series Analysis
Jiachen Liu, Rutgers,The State University of New Jersey, Piscataway, 08854, U.S.A., liujc@rci.rutgers.edu., Melike B. Gursoy, Jin Song

Network object adaptive control system is applied in precision target tracking.One of the key points is to forecast target path at each time step. This paper introduces how to set up the model of target path and do forecasting by time series analysis. Autoregressive moving average model is applied in the analysis. Numerical example is provided.

4 — Elicitation of Probabilities using Competitive Scoring Rules
Marc Kilgour, Wilfrid Laurier University, Professor, Waterloo, ON, N2L3C5, CANADA, mkilgour@wlu.ca., Yigal Gerchak

Several forecasters predict the probability of an event, and then make or receive payments contingent on whether the event actually occurs. The payment functions generalize the concept of scoring rule to a competitive setting. We require the scheme to be anonymous, neutral, and truth-inducing. Applications include multiparty betting and fixed-budget surveys to determine subjects' truthful probability assessments. We discuss forecasters' willingness to participate in such a competition, and relate our results to De Finetti's scoring rules for eliciting probabilities.

■ SC05

Fairmont-Sacramento

Modern Technical Work

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Jennifer Howard-Grenville, Boston University, Boston, MA, 02215, USA, jahg@bu.edu

1 — The Move to Flexible Office Allocation: A Tale of Employee Workspace Values in a Time of Transition
Carlos Rodriguez-Lluesma, Stanford University, Stanford, CA, 94305-4026, USA, clluesma@stanford.edu., Jan Chong, Lilly Irani, Luke Schwartz

From field observation data collected at a large software company , we observe that employees identify with four principle aspects of workspace: physical items, location, privacy and status. We examine the employee conception of office and work and how these values affect the transition to a new system of workspace allocation.

2 — Indexical Quality — a Task-Oriented Measure of Co-orientation Effectiveness of Collaboration Technologies
David Bergner, Stanford University, Stanford, CA, 94305-4026, USA, bergner@stanford.edu., Yuechuan She, Cheng Suang Heng

Based on field observations of project teams at a large computer company during a trial of collaboration tools, we developed two related concepts - co-orientation effectiveness and indexical quality - which provide a conceptual basis for evaluating collaboration tasks and tools, and help explain why the tools, as applied, were not effective.

3 — The Role of Technology in Modern Engineering
Jan Chong, Stanford University, Stanford, CA, 94305-4026, USA, jchong@cs.stanford.edu., Diane Bailey

From field observations of structural engineers and hardware engineers, we examine the impact and role of workplace technologies in modern engineering work. We show how epistemological arguments do not fully explain technology use, adoption, and diffusion in engineering, and present additional relevant political, economic, social, and individual factors.

4 — Make it Work: How the Technical Aspects of Work Influence Its Organization and Accomplishment in a Semiconductor Manufacturer
Jennifer Howard-Grenville, Boston University, Boston, MA, 02215, USA, jahg@bu.edu.

This paper examines the relationship between technology and work at a semiconductor manufacturer. While the hardware has evolved, the underlying logic of the manufacturing process ñ that it is scalable, replicable, and divisible ñ has not. I demonstrate how this technical logic is grounded in both social and material aspects of the work.

■ SC06

Fairmont-Atherton

College on Organization Science: Industry Collective Action and Firm Growth

Sponsor: College on Organization Science Section
Sponsored Session

1 — All for One? Growth in Trade Association Activity
Michael Barnett, Sern School of Business, Andrew King

2 — Climbing Atop the Shoulders of Giants: Identifying the Impact of Institutions on the Growth of Knowledge
Jeffrey L. Furman, Boston University, Scott Stern

3 — The Role of Industry Management Standards in Fomenting Industry Growth by Solving Problems of Asymmetric Information
Ann Terlaak, University of Wisconsin

Abstracts not supplied.

■ SC07

Fairmont-Piedmont

Panel: Exploring the Role of Design in New Product Development - What We Know and What We Don't Know

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Sara Beckman, Haas School of Business, Senior Lecturer, Berkeley, CA, 94720-1900, USA, Beckman@haas.berkeley.edu

1 — Design: What We Know and Don't Know
Panelists: Michael Barry, Pointforward; Sara Beckman, Haas School of Business, UC-Berkeley; Robert Hall, Pointforward; Arnold Wasserman, Heu-ris-tic.

In their review of the product development literature, Krishnan and Ulrich say "there is essentially no academic research on industrial design, the activity largely concerned with the form and style of products". Despite increasing attention to the activities of design firms by scholars (e.g., Sutton, Leonard, Thomke), there is still a lot to learn. In this sessionwith leaders from the design community, we explore what design is, how it is done and what we can learn .

■ SC08

Center-Ballroom A2

E-Commerce: Price, Contract and Supply Chain Management

Cluster: e-Business: Integrating Academic and Industrial Perspectives

Invited Session

Chair: Han Zhang, Georgia Institute of Technology, Atlanta, GA, 30332

1 — Pricing Content for Multiple Digital Channels
Kerem Tomak, University of Texas, Austin, TX, USA, kerem .tomak@bus.utexas.edu., Ranjan Dutta

Digital payments are defined as payments which are carried out via a digital channel. In this paper, we study the following research question: For digital content, among prepay, micro-payments and aggregation to the phone bill or ISP bill, which payment method is strategically desirable for the firms?

2 — Contracting for ASP Outsourcing: A Real Options Approach
Yanjun Sun, Drexel University, D. J. Wu

ASP is a recently introduced business model that aims to share some of the IT functions with the associations. However, it cannot replace traditional acquisition model due to complexity of outsourcing. We use a real options approach to analyze optimal contracting strategies for ASP outsourcing based on a stylized model.

3 — Information Exchange and Business-to-Business Collaborations: Implications for Supply Chain Management
Kevin Zhu, University of California, Irvine, CA, USA

Focusing on the informational effects of collaboration networks, we built a game-theoretic model to explore suppliers' incentives to join such a B2B network. We found that vertical information sharing tends to be beneficial, while horizontal information transmission seems to be a double-edged sword, reflecting the trade-off between transparency and confidentiality.

■ SC09

Center-Ballroom A3

e-Business Performance Optimization

Cluster: e-Business: Integrating Academic and Industrial, Perspectives
Invited Session

Chair: Ramesh Srinivasan, Aankhen, Inc., VP of Business Engineering, San Jose, CA, 95112, ramesh.srinivasan@aankhen.com

Co-Chair: John Konopka, IBM Integrated Supply Chain, konopka@us.ibm.com

1 — Role of e-Business Transaction Standards in Supply Chain Efficiency
Ramesh Srinivasan, Aankhen, Inc., VP of Business Engineering, San Jose, CA, 95112, ramesh .srinivasan@aankhen.com.

We provide a review of the evolution of e-Business transaction standards, their extent of adoption in the high-tech industry, and potential for contribution to supply chain efficiency. We look at current inhibitors for ROI from such implementations and ways to open up enormous opportunities for supply chain efficiency.

2 — Supply Chain Risk Management Issues in Hi-Tech Environments
John Konopka, IBM Integrated Supply Chain, konopka@us.ibm .com.

We investigate supply chain risk managment issues in Hi-Tech environments. Particular focus will be on Final Assembly Manufacturers and the interactions with both their supply chain partners and customers.

3 — Available to Sell: Using Optimization to Consume Surplus Supply
Tom Ervolina, IBM, Yorktown Heights, NY, USA, ervolina@us .ibm.com., Brian Eck, Stuart Siegel

We describe a system and underlying optimization model for consuming surplus component supply. The model finds a set of products which, if produced, would maximize surplus consumption while minimizing additional purchase. It's deployed through a robust supply chain modelling framework, with configurable integration to IBM's Central Planning Engine.

■ SC10

Center-Ballroom A7

Scheduling Session 3

Cluster: Scheduling
Invited Session

Chair: Nicholas Hall, Ohio State University, Columbus, OH, 43210-1144, USA, hall.33@osu.edu

1 — Design of a Factory Layout
Marc Posner, Ohio State University, Columbus, OH, 43210, USA, posner.1@osu.edu., Hui-Chih Hung

The facility layout problem is modeled as a network of "modules". Each module has the material flow pattern of one of the traditional layouts: Functional, Cellular or Flowline. We include WIP, material handling, machine setup, and processing costs in the formulation. Heuristic procedures are used to solve the problem.

2 — Minimizing Strategic and Operational Costs in Facility Layouts
Nicholas Hall, Ohio State University, Columbus, OH, 43210-1144, USA, hall.33@osu.edu., Shahrukh Irani, Xiaoyan Liu

Classical facility layout planning uses the QAP to minimize total material handling cost. Additionally, our QAP models costs of work-in-process (including congestion delays modeled by queuing network approximations), empty travel, transportation setups, and other costs implied by a layout. A tabu search heuristic demonstrates substantial savings over the classical model.

3 — Scheduling Robotic Cells with Parallel Machines
Neil Geismar, University of Texas at Dallas, Richardson, TX, 75083, negeismar@yahoo.com., Chelliah Sriskandarajah, Milind Dawande

We present a first general analysis of the problem of scheduling operations in bufferless robotic cells with parallel machines. The results and the analysis in this paper offer practitioners (i) guidelines to determine whether parallel machines will be cost-effective for a given implementation, (ii) a simple formula for determining how many copies of each machine are required to meet a particular throughput rate, and (iii) an optimal sequence of robot moves for a cell with parallel machines under a certain condition on the processing times.

■ SC11

Center-Room C1

Lot Sizing and Scheduling

Contributed Session

Chair: Christos T. Maravelias, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, ctm@andrew.cmu.edu

1 — Uncapacitated Lot-Sizing with Time Windows
Atle Nordli, Norwegian School of Management BI, Sandvika, N-1302, Norway, atle.nordli@bi.no., Stephane Dauzere-Peres, Najib M. Najid

We extend the classical uncapacitated dynamic lot-sizing model by introducing time windows that become relevant when demands from customers are quantities that can be prosessed only within certain time frames. Dynamic programming algorithms are given for both agreeable and non-agreeable time windows.

2 — A Hybrid MILP/CP Decomposition Approach for Short Term Batch Scheduling
Christos T. Maravelias, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, ctm@andrew.cmu.edu., Ignacio Grossmann

A relaxed State Task Network MILP model is used as Master problem (assignment decisions), and a CP model is used as subproblem to check feasibility. Preprocessing for domain reduction is performed using CP techniques. Various objective functions can be accommodated (min makespan, max profit, etc.) Significant computational improvements are achieved compared to standalone MILP or CP models.

3 — New Developments of Mathematical Models and Algorithms of Economic Lotsizing and Scheduling Problems
Li ZhenHua, Institute of System Engineer,HUST, 430074 ,Wuhan, 430074, China(PRC), starlizh@yahoo.com.cn.

This paper surveys the major studies of ELSP (Economic Lotsizing and Scheduling Problems), especially the recent developments of the mathematical models and algorithms,and points out some new directions for further researches and applications.

4 — Event-Time Models in Production Scheduling
Omer Benli, CSULB, Professor, Long Beach, CA, 90840-8506, USA, obenli@csulb.edu.

The event-time models presented in this study are based on lot streaming paradigm and make use of the basic modeling framework of constraint satisfaction. The problem modeled is the following: several production lots, each consisting of a number of units, are to be processed in a job shop. Each production lot, or its sublot of given size, has a deadline. The problem is to determine the timing and size of transfer batches subject to inventory balance equations and resource constraints.

5 — Optimal Quantity Discount Schedules with Heterogeneous Customers
Rachel R. Chen, Johnson Graduate School of Management, Ph .D Candidate, Ithaca, NY, 14853, USA, rc72@cornell.edu., Lawrence Robinson

In this paper we analyze how the supplier should construct her quantity discount policy when facing a group of heterogeneous customers. Specifically, we assume the customers' demands follow a Pareto curve, where 20% of the customers account for 80% of the total volume. We derive the optimal quantity discount schedules for both all-unit and incremental discount plans, show that incremental plans are consistently better for the supplier, and generalize the results beyond 80/20 distributions.

■ SC12

Fairmont-Regency 1

State of the Art and Future Directions in DEA Health Applications

Sponsor: Health Applications Section
Sponsored Session

Chair: Yasar Ozcan, Virginia Commonwealth University, Professor, Richmond, VA, 23298, USA, ozcan@mail2.vcu.edu

1 — DEA Panel Session — I
David Sherman, Northeastern University, Boston, MA, 02115 , USA, h.sherman@neu.edu.

This panel session will report on the state of the art in "DEA Health Applications" by experts who have contributed to this field. The panel will also explore future directions and applications.

2 — DEA Panel Session — II
Liam O'Neill, Cornell University, Assistant Professor, Ithaca, NY, 14853, USA, lo22@cornell.edu.

This panel session will report on the state of the art in "DEA Health Applications" by experts who have contributed to this field. The panel will also explore future directions and applications.

3 — DEA Panel Session — III
Larry Seiford, University of Michigan, Ann Arbor, MI, 48109, USA, seiford@umich.edu.

This panel session will report on the state of the art in "DEA Health Applications" by experts who have contributed to this field. The panel will also explore future directions and applications.

■ SC13

Center-Room D

Global Optimization II

Sponsor: Optimization Section-Global Optimization
Sponsored Session

Chair: Zelda Zabinsky, University of Washington, Professor, Seattle, WA, 98195, USA, zelda@u.washington.edu

1 — Discrete Hit-and-run Algorithms: Theoretical and Computational Studies
Yanfang Shen, University of Washington, Seattle, WA, 98195, USA, shyf@u.washington.edu., Zelda Zabinsky, Robert L. Smith

Several families of Discrete Hit-and-Run algorithms are described and shown to asymptotically generate a uniform distribution on an integer lattice in n dimensions in fourth order polynomial time. Variations of Discrete Improving Hit-and-Run, a random search global optimization algorithm based on these sampling methods, are introduced and computational results are presented.

2 — Pure Random Search for Noisy Objective Functions
Stephen Baumert, University of Michigan, Ann Arbor, MI, 48109, USA, sbaumert@umich.edu., Robert L. Smith

Pure random search is an abstract model of the simplest stochastic algorithm for global optimization. Although computationally impractical, it provides important insights into the challenges of global optimization. We extend pure random search to the case of noisy, i.e. stochastic, objective functions and assess implications for global optimization.

3 — The OptQuest/Multistart (OQMS) Algorithm for Global Optimization and its GAMS Implementation
Leon Lasdon, University of Texas, Professor, Austin, TX, 78731, USA, lasdon@mail.utexas.edu., John Plummer, Zsolt Ugray, James Kelly

OQMS is a multi-start algorithm for smooth constrained continuous and mixed integer global optimization. It uses OptQuest, a scatter search algorithm, to provide starting points for a local NLP solver. We describe features and performance of its GAMS implementation, which allows it to call any GAMS NLP solver.

■ SC14

Center-Room E

Algorithms for Complementarity and Related Problems

Sponsor: Optimization Section-Linear Programming and Complementarity
Sponsored Session

Chair: Stephen Billups, University of Colorado at Denver, sbillups@carbon.cudenver.edu

1 — Regularization Methods for Complementarity Problems
Janine Kennedy, University of Colorado at Denver, jmkenned@math.cudenver.edu., Stephen Billups

Algorithms for solving complementarity problems often encounter difficulties converging to non-regular solutions. Regularization methods address this difficulty when some knowledge of problem structure is available. This talk reviews some of the main ideas behind regularization strategies and proposes some new ideas for regularizing complementarity problems.

2 — Preprocessing Complementarity Problems
Todd Munson, Argonne National Laboratory, Enrico Fermi Scholar, Argonne, IL, 60439, USA, tmunson@mcs.anl.gov.

Preprocessors have been extremely effective in reducing the size of linear and quadratic programs. In this talk, we discuss how similar reductions can be made to complementarity problems and provide numerical results for a preprocessor developed for the PATH algorithm.

3 — On a Class of Complementarity Problems in Function Spaces
Michael Hintermueller, University of Graz, Graz, Austria, michael.hintermueller@kfunigraz.ac.at., Karl Kunisch

Complementarity problems related to pre-dual problems of a class of non-differentiable minimization problems in function spaces are considered. Among others, typical applications are image recovery problems. A class of semi-smooth Newton methods is introduced and the locally superlinear convergence in a function space setting is established. Numerical results are discussed.

■ SC15

Center-Room B4

Network Optimization 5

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Daniel Bienstock, Columbia University, Professor, New York, NY, 10027, USA, dano@ieor.columbia.edu

1 — Lagrangian Decomposition for General Step Cost Single Path Network Design
Mikael Prytz, Royal Institute of Technology, Stockholm, Sweden, mikael.prytz@math.kth.se.

This talk concerns the general step cost network capacity design problem with single path routing and discrete non-uniform capacity levels. The problem is formulated as a binary programming problem. A solution approach based on Lagrangian decomposition through cost splitting is proposed, where the subproblems reduce to sequences of shortest path and knapsack problems. A natural branch-and-bound scheme that maintains the full cost splitting decomposition is also given.

2 — UMTS Radio Network Design
Andreas Eisenblaetter, Konrad-Zuse-Zentrum fuer Informationstechnik Berlin, Berlin, D-14195, Germany, eisenblaetter@zib.de.

UMTS is a 3G standard for mobile cellular telecommunication, supporting data rates between a few bit per sec. and hundreds of kilobit per sec. A UMTS radio cell's size varies with the offered data rates and the actual data traffic. The selection of locations for and the configuration of base stations have to reflect this. New tools for the resulting, intricate planning task are developed within MOMENTUM, project funded by the EU under the IST FP5. The talk surveys the underlying mathematics.

■ SC16

Center-Room C4

Integer Programming II

Cluster: Discrete Optimization
Invited Session

Chair: Jon Lee, IBM, Yorktown Heights, NY, 10598, USA, jonlee@us.ibm.com

1 — Integer Rounding Property of Multidimensional Tables
Serkan Hosten, San Francisco State University, San Francisco, CA, 94132, USA, serkan@math.sfsu.edu.

In order to figure out the smallest and largest integer entry in a cell of a multidimensional contingency table with given marginals, one can solve an integer program. We will compare the optimal value of the integer program and its linear relaxation and give a global upperbound on the gap between them.

2 — Testing for Integer Feasibility in Integer Programming: Symbolic-algebraic Algorithms
Jesus De Loera, University of California, Assistant Professor, Davis, CA, 95616, USA, deloera@math.ucdavis .edu.

In this talk we briefly survey the known methods for testing the feasibility of integer program. We then introduce two new approaches for attacking this problem: A generating function approach based on work by Barvinok and an

approach based on Hilbert bases of polyhedral cones. We present initial experimental results indicating their potential applicability and how they can be combined with Branch-and-Bound approaches.

3 — Combining Sums of Squares and Groebner Basis Techniques for Optimization
Pablo A. Parrilo, Swiss Federal Institute of Technology, Zurich, ZH, CH-8092, Switzerland, parrilo@aut.ee.ethz.ch.

We show how the algebraic structure of polynomial optimization problems with equality constraints can be exploited within the sum of squares / semidefinite programming framework. Using Groebner basis techniques, all computations can be done in the coordinate ring, notably decreasing the computational burden. Additionally, for zero dimensional systems, we obtain a simple constructive proof of the existence of distinguished sum of squares representations for polynomials nonnegative over semialgebraic sets. Degree bounds are directly obtained, as the cardinality of the support of the summands equals the number of points in the variety.

■ SC17

Center-Room B1

FMS Scheduling

Cluster: Flexible Manufacturing Systems
Invited Session

Chair: Kathy Stecke, University of Texas at Dallas, Richardson, TX, 75083-0688, USA, KStecke@utdallas.edu

Co-Chair: Ashok Kumar, Grand Valley State University, Grand Rapids, MI, 49504-6495, USA, kumara@gvsu.edu

1 — Simultaneous Versus Sequential Balancing and Scheduling of Surface Mount Technology Lines
Tadeusz Sawik, University of Mining & Metallurgy, Krakow, 30-059, Poland, ghsawik@cyf-kr.edu.pl.

MIP forumulations are proposed for simultaneous or sequential balancing and scheduling of surface mount technology lines. SMT line is a hybrid flow line with finite in-process buffers. The objective is to determine an assignment of components to feeder slots at placement stations and the shortest assembly schedule of a mix of boards.

2 — Open Shop Scheduling Problems with Late Work Criteria
Jacek Blazewicz, Poznan University of Technology, Poznan, 60-965, Poland, blazewic@put.poznan.pl., Erwin Pesch, Malgorzata Sterna, Frank Werner

The paper concerns the application of a non-classical performance measure, a late work criterion (YiYw), to scheduling problems. It estimates the quality of the obtained solution with regard to the duration of the late parts. The paper contains general complexity studies and the results of investigating open-shop scheduling cases.

3 — Parallel Processor Scheduling with Limited Number of Preemptions
Oliver Braun, Saarland University, Saarbrucken, 66123, Germany, ob@itm.uni-sb.de., Gunter Schmidt

We investigate the problem where a set of independent parts has to be scheduled on identical processors with the objective of minimizing the makespan. We compare the makespans of preemptive and i-preemptive schedules where only a limited number of preemptions is allowed.

■ SC18

Center-Room J2

Applications of Optimization Theory in Semiconductor Manufacturing Under Uncertain Demand

Cluster: Applications of Optimization Theory
Invited Session

Chair: Shabbir Ahmed, Georgia Institute of Technology, Assistant Professor, Atlanta, GA, , 30332, USA, sahmed@isye.gatech.edu

1 — Supply-Network-Capacity Planning for Semiconductor Manufacturing Under Uncertain Demand
Aditya Rastogi, Arizona State University, Tempe, AZ, USA, John W. Fowler, Matthew Carlyle

We present a two-stage stochastic integer-programming model with recourse of semiconductor supply network that makes strategic capacity decisions based on the uncertain demand. We develop a framework to determine the threshold at which key decisions change and study the effects of correlation between the demands of the products.

2 — Coordinating Semiconductor Capacity Planning using Stochastic Optimization
Suleyman Karabuk, Lehigh University, Bethlehem, PA, USA, S. David Wu

Semiconductor capacity planning requires the coordination between marketing and manufacturing. We model these different perspectives using multi-stage stochastic programming. We show that the information exchange between the decision makers can be modeled as a nonlinear component in the local models. We construct the convergence proof using the Auxiliary Problem Principle.

3 — Pricing of Quantity Flexible Supply Contracts
Alan King, IBM Research, Research Staff Member, Yorktown Hts., NY, 10590, USA, kingaj@us.ibm.com., Shabbir Ahmed

Motivated by applications in semiconductor manufacturing, we consider the problem of hedging risks in a contract that requires a supplier to deliver flexible order quantities. A framework for pricing the contract based on analyzing a stochastic programming formulation for the supplier-side hedging problem is presented.

4 — Scheduling of Photolithography Operations in Semiconductor Manufacturing: An Optimization Based Approach
Elif Akcali, University of Florida, Assistant Professor, Gainesville, FL, USA, akcali@ise.ufl.edu., H. Edwin Romeijn

We consider a scheduling problem that arises in the context of photolithography operations in semiconductor manufacturing. We investigate a two-level optimization approach, where the scheduling problem is decomposed into two sub-problems of capacity allocation and detailed lot sequencing. We develop solution methods for the sub-problems and report computational results.

■ SC19

Fairmont-Regency 2

Pricing and Risk Management in Electricity Markets

Sponsor: Energy/Natural Resources/Environment Section - Electricity Markets and Energy Modeling
Sponsored Session

Chair: Shi-Jie Deng, Georgia Institute of Technology, Asst. Professor, Atlanta, GA, 30332-0205, USA, deng@isye.gatech.edu

1 — Modeling of Electricity Forward Curve Dynamics
Jussi Keppo, University of Michigan, Ann Arbor, Assistant Professor, Ann Arbor, MI, 48109-2117, USA, keppo@umich .edu., Nicolas Audet, Pirja Heiskanen, Iivo Vehvilainen

We model forward curve dynamics with paramterized volatility and correlation structures. The model parameters are estimated from market data and we show how the model is used in practice.

2 — Pricing Forward Contracts for Electricity & Reserves
Afzal Siddiqui, Lawrence Berkeley National Lab, Post-doctoral Researcher, Berkeley, CA, 94720, USA, afzal@ieor.berkeley.edu.

We use a market equilibrium model to analyze a competitive framework in which electricity and reserves are substitute products for the generators. Price-responsive demand enables end-user participation. Upon solving the model, we obtain equilibrium forward prices for both types of contracts.

3 — Quantile-type ARCH Models with Value-at-Risk (VaR)
Shi-Jie Deng, Georgia Institute of Technology, Asst. Professor, Atlanta, GA, 30332-0205, USA, deng@isye.gatech .edu., Wenjiang Jiang

We propose ARCH-type commodity price models built upon two new classes of distributions with closed-form quantile functions. These models can capture important distributional deviations from Gaussianity, particularly various tail behaviors of the financial time series data and yield a fast and efficient numerical implementation in VaR and CVaR applications.

■ SC20

Fairmont-Hillsborough

Spectrum Auctions I

Cluster: Auctions
Invited Session

Chair: Karla Hoffman, George Mason University, Professor, Fairfax, VA, 22030, USA, khoffman@gmu.edu

1 — Design Objectives of the FCC Multiround Package Bidding Spectrum Auction
Melissa Dunford, Decisive Analytics Corporation, Arlington, VA, 22202, USA, md@decisive-analytics.com., Karla Hoffman, Rudy Sultana, Dinesh Menon

Combinatorial auctions raise a number of design issues not present in the auctioning of single items. We present an overview of the current rules for the FCC's first-ever-multiround package-bidding auction of spectrum, the underlying reasons for these rules and their scalability implications.

2 — BidBots: Recent Developments to Support Combinatorial Auction Testing
Thomas Wilson, Decisive Analytics Corp, Arlington, VA, 22202,

USA, thw@decisive-analytics.com.

The combinatorial auction testing platform, BidBots, was developed to support auction analyses. A variety of recent enhancements to this software will be described. New capabilities include the ability for autonomous bidding agents to participate in auctions hosted by an independent auction simulation system and bidding strategies that improve auction realism.

3 — Pricing Issues in Combinatorial Auctions
Karla Hoffman, George Mason University, Professor, Fairfax, VA, 22030, USA, khoffman@gmu.edu., Melissa Dunford, Rudy Sultana, Dinesh Menon

In multiround package-bidding auctions, bidders must be informed of the current value of licenses and packages of interest. When such prices are combined with minimum bid increment rules, they provide valuation information to bidders and move the auction along. We present alternative strategies for obtaining such price estimates.

■ SC21

Fairmont-Glen Ellen

Options

Contributed Session

Chair: Zeger Degraeve, London Business School, London, NW1 4SA, United Kingdom, zdegraeve@london.edu

1 — On the Exercise and Valuation of Executive Stock Options
Ashay Kadam, Statistics and Management Science Dept., University of Michigan Business School, Ann Arbor, MI, 48109-1234, USA, ashay@umich.edu., Peter Lakner, Anand Srinivasan

Using optimal stopping theory, we propose a continuous-time stochastic model to determine the optimal exercise policy and the value of an executive stock option. We characterize the behavior of the optimal solution with respect to the stock price process (drift, volatility) and to the executiveΔs preference parameters (impatience, risk aversion).

2 — Value-at-Risk Estimation of Brazilian Options using Monte Carlo Simulation
Charles U. De Montreuil Carmona, Universidade Federal de Pernambuco (UFPE), Recife, 50710-030, Brazil, carmona @npd.ufpe.br.

This study examines Value-at-Risk estimates on some Brazilian options applying Monte Carlo method. A sample of options listed in the Spo Paulo Stock Exchange (BOVESPA) is used for empirical evaluations. In the first stage, Monte Carlo simulation was compared with parametric methods as maximum likelihood estimation , Delta and Delta-Gamma approximation.

3 — Application of the Fast Gauss Transform to Option Pricing
Yusaku Yamamoto, Hitachi Ltd., Kokubunji, 1858601, Japan, marula@crl.hitachi.co.jp., Mark N. Broadie

The fast Gauss transform is a technique to compute multiple sums of Gaussians much faster than the direct evaluation. We apply this technique to multinomial methods and the stochastic mesh method for option pricing and show how it can speed up them dramatically.

4 — Modeling Real Options using Influence Diagrams: Valuing a Biotechnology Firm
Riza Demirer, University of Kansas, Lawrence, KS, 66045-2003, USA, riza@ku.edu., John M. Charnes

This paper introduces Influence Diagrams (ID) as an effective tool to represent and solve Real Options. We present an ID model to value a biotechnology firm, Agouron Pharmaceuticals, Inc., in terms of the sum of the values of its drug development projects. We compare the computed values of Agouron to actual market values at selected points in time during the development of Viracept, a drug used to treat HIV-positive patients. The proposed model yields better estimates of the share price compared to the values found using a binomial lattice with the addition of a growth option. Our results add support to the suggestion that managerial flexibility in projects can still be valued using the Net Present Value framework, if applied (and modeled) correctly.

5 — Project Options Valuation with Net Present Value and Decision Trees: An Application at General Motors
Zeger Degraeve, London Business School, London, NW1 4SA, United Kingdom, zdegraeve@london.edu., Bert De Reyck

We illustrate a new approach for valuing Real Options with the application in 'A Scenario Approach to Capacity Planning' (Eppen et al., OR., 1989). The authors state there is no scientific way to determine the appropriate discount rate based on estimated demand. We derive the scientifically correct discount rates.

■ SC22

Fairmont-Paseo

OR/MS in Forestry - Habitat Reserve Design and Selection

Sponsor: Energy/Natural Resources/Environment Section - Forestry Sponsored Session

Chair: Laurel Travis, Metropolitan State University, Dept. Information and Computer, Sciences, Minneapolis, MN, 55403, USA, Laurel.Travis@metrostate.edu

1 — Solving a Large Scale Reserve Design Problem in Bahia, Brazil
Richard Church, University of California, Santa Barbara, Santa Barbara, CA, 93016, church@geog.ucsb.edu., Ross Gerrard, David Stoms

We present a reserve design model and an application to a reserve planning problem of Bahia, Brazil. This model attempts to build a reserve by selecting from among thousands of building blocks, that set which best meets a number of objectives. Factors of edge, connectedness, size and representativeness are discussed. Results of a heuristic that has been designed to solved this model are presented as well.

2 — Markov Models of Endangered Species Populations and Habitat
Laurel Travis, Metropolitan State University, Dept. Information and Computer Sciences, Minneapolis, MN, 55403 , USA, Laurel.Travis@metrostate.edu., Michael Taaffe, Michael Bevers, Curtis Flather

We compare continuous-time Markov models of small populations in patchy habitats to metapopulation models used in ecology. Numerical integration is used to explore how extinction probability varies over time as influenced by the amount and spatial arrangement of habitat. We assess the impact of critical assumptions in both frameworks.

3 — A Model for Minimizing Individual Site Importance in Reserve Network Planning
Jesse O'Hanley, University of California, Berkeley, Berkeley, CA, USA, johanley@nature.berkeley.edu., Richard Church

A model is formulated to maximize resultant "fallback" coverage whenever any site within a limited set can not be acquired following a location decision. The model illustrates tradeoffs between potential and fallback coverage as well as how alternate optima to the maximal covering problem vary in fallback coverage.

4 — A Scenario Optimization Model for Dynamic Reserve Site Selection
Robert Haight, USDA Forest Service, North Central Research Station, St. Paul, MN, 55108, USA, rhaight@fs .fed.us., Stephanie Snyder, Charles ReVelle, Jane Ruliffson

Urban planners acquire open space to protect natural areas and provide recreation. To account for uncertainty in site availability and funding, we developed a 2-period site-selection model to maximize expected species coverage subject to budget and accessibility constraints. Results are presented for the Fox River watershed in Chicago.

■ SC23

Center-Room L

Fleet Management

Contributed Session

Chair: James Orlin, MIT E40-147, Professor, Cambridge, MA, 02139, USA, jorlin@mit.edu

1 — A Heuristic Technique for Solving the Aircraft Rotation Problem
Roberto C. Pontes, Rio-Sul Linhas Aereas, RIO DE JANEIRO, 22260-001, BRAZIL, rcvpontes@hotmail.com., Abilio Lucena, Lucidio Cabral

The Aircraft Rotation Problem can be solved before the flight schedule is fixed, allowing that lower cost solutions can be obtained by adjusting flights departure and creating ferry flights. A GRASP heuristic is presented for solving real world instances from VARIG Brazilian Airlines.

2 — The Airline Fleet Planning Problem for Low Traffic Sectors
Balram Avittathur, Indian Institute of Management Calcutta, Assistant Professor, Kolkata, WB, 700104, India , balram@iimcal.ac.in., Bani Sinha

The airline fleet planning problem for low-traffic sectors is formulated in this paper. The airline fleet planning for low-traffic sectors is comparatively more complex. Bigger aircraft have higher operational economies but have difficulty in matching demand owing to low traffic. It is shown numerically that optimal profit per period for a fleet comprising of small and big capacity aircraft types is greater than that for a fleet consisting of big capacity aircraft only.

3 — Neighborhood Search Algorithms for the Combined Through and Fleet Assignment Model with Time Windows
Jian Liu, University of Florida, Gainesville, FL, 32611, US, liu-jian@ufl.edu., James Orlin, Amit Mukherjee, Ravindra Ahuja, Jon Goodstein

Given a flight schedule, an airline's planning group needs to decide the fleet and through assignment so that the total revenue is maximal, and all the operational constraints are satisfied. In this paper, a combined through and flight assignment model with time windows (ctFAMtw) is presented. Computational results on data from the United Airline indicate that this model can achieve savings of tens of millions dollars a year.

■ SC24

Hilton-Pacific

Panel: On Line Education

Sponsor: Education
Sponsored Session

Chair: John Lawrence

1 — On Line Education
Panelists: Richard Larson, MIT; Barry Pasternack, California State at Fullerton; Michael Speed, Texas A&M University; Gary Waissi, University of Michigan; Morgan Wang, University of Central Florida; John Lawrence, California State at Fullerton.

Interest in a distance education approach for teaching quantitative (statistics and operations research) courses is growing dramatically with an increasing number of universities offering such courses in distance learning formats. But distance learning approaches and results vary widely from university to university. In this session six professors experienced with different distance learning formats will discuss their approaches and their success and failures. A round table discussion and a question and answer session follow the individual presentations.

■ SC25

Center-Room F2

Panel Discussion: The Role of Gender in Military Operations

Sponsor: Women's Forum
Sponsored Session

Chair: Nita Miller, , nlmiller@nps.navy.mil

1 — Panel Discussion: The Role of Gender in Military Operations
Panelists: Richard Larson, MIT; Barry Pasternack, California State at Fullerton; Michael Speed, Texas A&M University; Gary Waissi, University of Michigan; Morgan Wang, University of Central Florida; John Lawrence, California State at Fullerton.

■ SC26

Hilton-San Carlos I

Service Operations and Capacity Flexibility

Cluster: Service Operations
Invited Session

Chair: Robert Shumsky, Simon School, Associate Professor, Rochester, NY, 14627, US, shumsky@simon.rochester.edu

1 — Dynamic Capacity Management with Substitution
Robert Shumsky, Simon School, Associate Professor, Rochester, NY, 14627, US, shumsky@simon.rochester.edu., Fuqiang Zhang

We examine a multiperiod capacity allocation model with upgrading . There are multiple product types, corresponding to multiple classes of demand. Superior products may be used to satisfy demand for inferior products. Capacities are purchased before the first period and thereafter replenishment is not possible. We characterize the optimal rationing policy using state-dependent protection limits and, for simple cases, determine the optimal capacity for each type of product.

2 — A Heavy Traffic Approximation for Queues with Restricted Customer-server Matchings
Rene Caldentey, Stern School of Business, New York, NY, 10012, US, rcaldent@stern.nyu.edu., Edward H. Kaplan

We consider a queueing system with n customer classes and m servers. For each class i there is only a subset S(i) of servers that can process customers' i requests using a FCFS discipline. For this system, we are interested to compute P(ij) the steady-state fraction of class-i customers that are served by server j. Under the assumption that the system is heavy loaded, we approximate P(ij) as well as other performance measures. Computational experiments show the quality of our approximations.

3 — Analyzing Outsourcing Contracts for Call Centers
Francis de Vericourt, Fuqua School of Business, Duke University, Assistant Professor, Durham, NC, 27708, US, fdv1@mail.duke.edu., Fikri Karaesmen

We investigate outsourcing contracts between a call center operator and a contract service provider. In fixed-capacity contracts, the provider keeps a constant capacity level during the day. In price-per-call contracts, the provider can fluctuate its capacity level. We propose discrete-time multi-period models to assess the value of such contracts.

4 — Managing Patient Service in a Diagnostic Medical Facility
Sergei Savin, Columbia University Graduate School of Business, New York, NY, 10027, US, svs30@columbia.edu., Linda Green, Steve Chan, Ben Wang

We consider the operations of a typical hospital diagnostic facility that, in addition to outpatients, serves inpatients as well as emergency patients. Our analysis focuses on two inter-related tasks: establishing an appointment schedule for outpatients and setting the system of dynamic priority rules for admitting patients into the service. We identify the properties of the optimal management policies and conduct a numerical study of the performance of several heuristic rules for appointment acceptance and patient scheduling.

■ SC27

Center-Room C2

E-commerce for Reverse Supply Chains

Cluster: Reverse Supply Chain
Invited Session

Chair: Sarah Ryan, Iowa State University, Associate Professor, Ames, IA, 50011-2164, USA, smryan@iastate.edu

1 — Lowering Uncertainty Factors of Returns Through the Use of Electronic Marketplaces. Case Study: End-of-Use PCs
Angelika Kokkinaki, Erasmus University, kokkinaki@few.eur .nl.

Planning and control in reverse logistics networks is complicated by uncertainty regarding each return's operational status, configuration, condition and origin. We examine the types and timing of information flows available for reducing the uncertainty, discuss how their reliability and speed could be enhanced by an electronic marketplace, and present a prototype for end-of-use PCs.

2 — Experimental Study of Reverse Logistics E-Commerce
Sarah Ryan, Iowa State University, Associate Professor, Ames, IA, 50011-2164, USA, smryan@iastate.edu., Jumpol Vorasayan

Experiments were conducted with an experimental prototype auction system in a simulated cyclical market for used electronics to test the effects of the number of trading opportunities and the amount of previous price and bid information presented to users. The participants' profits improved with the number of trading opportunities but showed mixed effects for increasing price and bid information. Some measures of market robustness and bid/price dynamics were affected by the information in unexpected ways.

3 — Facilitating Reverse Supply Chain On-Line Auctions
Sigurdur Olafsson, Iowa State University, Assitant Professor, Ames, IA, 50011, USA, olafsson@iastate.edu., Jaekyung Yang

On-line auctions have the potential of unifying the fragmented markets that can be found in many reverse logistics situations. However, sifting through the vast amounts of product and participant information to locate appropriate opportunities may be overwhelming. We discuss how optimization-based attribute selection can be employed to create a view of the on-line auctions that quickly enables users to identify products of interest and make decisions regarding their participation.

■ SC28

Center-Ballroom A1

Contracts and Outsourcing in Supply Chains

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Raj Rajagopalan, University of Southern California, Professor, Los Angeles, CA, 90089, U.S.A, srajagop@marshall.usc.edu

1 — Risk Sensitivity in Distribution Channel Partnerships: Implications for Manufacturer Return policies
Andy Tsay, Santa Clara University, Santa Clara, CA, 95053 , U.S.A., atsay@stanfordalumni.org.

The manufacturer return policy is widely regarded as a means for channel partners to share risk. Yet most existing studies assume risk-neutrality of all parties. This paper analyzes how sensitivity to risk affects both sides of the manufacturer-retailer relationship, and how these dynamics are altered by a return policy.

2 — Contracts in Vendor-managed Inventory Systems
Raj Rajagopalan, University of Southern California, Professor, Los Angeles, CA, 90089, U.S.A, srajagop@marshall.usc.edu., Mahesh Nagarajan

We consider contracts to align retailer (distributor) and supplier incentives in a continuous review inventory system with replenishment costs, holding costs and stockout costs. We evaluate various contracts for such systems and show that the retailer can offer some simple contracts to the supplier to improve system performance.

3 — Optimal Outsourcing of Warranty Services
Jayashankar Swaminathan, University of North Carolina, Chapel Hill, NC, 27599, U.S.A, swaminaj@bschool.unc.edu., Michelle Opp, Vidyadhar Kulkarni

In the PC industry, warranty service is often outsourced to repair vendors. The manufacturer's warranty cost for a failed PC includes a contracted repair cost and a goodwill cost for waiting customers. In this paper, we consider the problem of outsourcing the warranty services for K computers among V outsourced vendors.

4 — Supplier-Manufacturer Relationships Under Forced Compliance Contracts
Natalia Golovachkina, Cornell University, Ithaca, NY, 14853-6201, USA, nig2@cornell.edu., James Bradley

We consider a contract for options between a supplier and a manufacturer in the presence of a spot market with uncertain spot price, limited supplier capacity, and where the manufacturer must fulfill the stochastic demand of a downstream supply-chain link in full. We derive the optimal contract terms and assess when such a contract is incentive compatible and effective.

■ SC29

Center-Ballroom A5

Labor Scheduling: Stochastic Models and Optimization

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Armann Ingolfsson, University of Alberta, Edmonton, AB, T6G 2R6, Canada, armann.ingolfsson@ualberta.ca

1 — Combining Simulation and Optimization in Service Systems.
Julius Atlason, University of Michigan, Ann Arbor, MI, 48109-2117, jatlason@umich.edu., Marina A. Epelman, Shane Henderson

We present an iterative cutting plane algorithm for solving problems in service systems where the objective function, constraints, or both are evaluated via simulation. The call center staff scheduling problem motivates our research and we discuss convergence properties and implementation issues of the algorithm.

2 — The Cost of Insuring Telephone Call Center Service Levels via the LagMax SIPP Algorithm
Peter J. Kolesar, Columbia University, pjk4@columbia.edu., Joao Soares, Linda Green

Many telephone call centers and similar service systems that face cyclic customer demand patterns use the "SIPP" algorithm, which uses a series of stationary independent queuing models, to find the minimum staffing level for each planning period that assures the desired service level. In a series of papers, we have shown that this widely used approach seriously understaffs in many practical situations. A modification of SIPP, called LagMax SIPP, that lags the demand curve and uses its maximum during the planning period, has been shown to solve the understaffing problem inherent in SIPP -- in most cases. We explore the cost of the added service insurance provided by LagMax SIPP and show that it is modest compared to the improvement in customer service.

3 — Service Chain Management at Catalog Sales Companies: Demand and Supply Planning, and Optimal Agent Scheduling
Turgut Aykin, ac2 Solutions, Trenton, NJ, 08608, taykin@ac2solutions.com.

In this presentation, we review the state of the art in service chain management at customer contact centers, and present new tools and approaches for services demand forecasting, supply planning, and optimal agent scheduling. We also discuss the similarities between service chain management and supply chain management that are important, among others, to catalog sales companies.

4 — Combining Integer Programming and the Randomization Method to Schedule Employees
Armann Ingolfsson, University of Alberta, Edmonton, AB, T6G 2R6, Canada, armann.ingolfsson@ualberta.ca., Edgar Cabral

Using steady state queueing formulas to determine staffing requirements can lead to shift schedules with lower service level than desired. We present an approach that calculates transient service levels and solves a sequence of integer programs, terminating with a schedule that has the desired service level and, sometimes, lower cost.

■ SC30

Center-Ballroom A6

Assembly Systems

Contributed Session

Chair: Yew Loon Lau, Department of Industrial & Systems Engineering, National, University of Singapore, 119260, Singapore, engp0512@nus.edu.sg

1 — Common Components Reallocation Policy for Assemble to Stock
Yew Loon Lau, Department of Industrial & Systems Engineering, National University of Singapore, 119260, Singapore, engp0512@nus.edu.sg., Ek Peng Chew, Loo Hay Lee

A periodic review inventory policy for a two-echelon assembled-to-stock system consisting of several components and products is reviewed. This paper compares the effectiveness of the common components reallocation policy in terms of the component safety stock over a policy that disallows the component reallocations.

2 — Components Commonality in ATO Environments with Demand and Supply Uncertainty
Esmail Mohebbi, University of Nebraska-Lincoln, Lincoln, NE, 68588, USA, emohebbi@unlnotes.unl.edu., F. Fred Choobineh

We present the results of a simulation study on the performance of ATO systems with/without common components when both product demand and supply channels are uncertain. Our experimental results provide interesting insights into the effectiveness of components commonality in assembly environments.

■ SC31

Center-Room J3

Knowledge Management

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Irma Becerra-Fernandez, Florida International University, Asst. Professor, Miami, FL, 33199, USA, becferi@fiu.edu

1 — Information Technology and the Boundary of the Firm: A Knowledge-Based Perspective
Rajiv Sabherwal, sabherwal@umsl.edu.

IS scholars predict that, by reducing transaction costs, IT causes a shift from firm-based to market-based governance. A recent view is that firms exist not for lower transaction costs, but due to better ability to integrate multiple knowledge streams . Examining the optimal network structures for knowledge integration, we conclude that even from a knowledge-based view, IT can facilitate a shift from firms to markets, although not in all situations. (Co-authored with V. Choudhury)

2 — The Role of Individuals' Knowledge in Explanations about the Post-Adoptive Use of Enterprise IT Applications
V. Sambamurthy, smurthy@pilot.msu.edu., Jon Jasperson, Robert Zmud

Organizations are increasingly investing in enterprise IT applications to support their enterprise-wide processes, workflows, and related work activities. After making significant investments in such technologies, organizations seek to realize business value from their investment by encouraging individuals to use the technology in their work. Given the interpretive flexibility of such complex information technologies, however, the manner in which individuals incorporate specific functionalities of the application into ongoing work practices varies from one individual to another. Such variation leads to heightened interest in understanding the nature of individual IT use behaviors in organizational settings. Prior research investigations have focused on the role of individual IT beliefs in predicting and explaining these behaviors. Here, we argue that the current understanding of the determinants of IT use might be limited with regard to enterprise IT applications given: 1) the focus on simple, generic use contexts and 2) a conceptualization of technology use at the application level. We propose that though individual IT beliefs play a vital role in individuals' initial adoption and use behaviors, their IT knowledge plays a more dominant role in predicting and understanding their post-adoptive use of enterprise IT applications.

3 — Knowledge Reuse Factors in the Innovation Process
Lynne Cooper, Jet Propulsion Laboratory, Pasadena, CA, 91109, USA, lynne.p.cooper@jpl.nasa.gov., Ann Majchrzak

The knowledge reuse process when radical innovation is expected is a phased process influenced by organizational and contextual factors, as well as characteristics of the participants and of the knowledge itself. Six case studies of reuse at the Jet Propulsion Laboratory, with varying degrees of innovation, were studied. Across these six cases, factors were identified as contributing to "successful" reuse based on the development of an innovative solution to problems relating to the scientific exploration of Mars. This talk describes the factors, how they differentially influence the knowledge reuse process depending on phase, and the implications for both future research and current practice.

■ SC32

Center-Room J4

Stochastic Optimization I - Modeling and Analysis

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Leonardo Lopes, Northwestern University, Evanston, IL, 60208, USA, leo@iems.nwu.edu

1 — Modeling Constructs and Solution Algorithms for Stochastic Programming: New Developments in SPInE
Patrick Valente, Brunel University, Mr, Uxbridge, UB8 3PH , United Kingdom, Patrick.Valente@brunel.ac.uk., Chandra Poojari, Gautam Mitra

We give an overview and the recent developments of our Stochastic Programming Integrated Environment (SPInE). We illustrate new modelling features which include SP language constructs for AMPL, and support of scenario-based Chance Constrained Problems. We also present our SP solver which now includes integer stochastic programming.

2 — A Hybrid Approach to Multistage Stochastic Optimization
Andrew J. Schaefer, University of Pittsburgh, Department of Industrial Engineering, Pittsburgh, PA, 15261, USA, schaefer@ie.pitt.edu.

We develop a new methodology for modeling and solving large-scale multistage stochastic optimization problems. This method combines many of the best aspects of stochastic optimizaiton techniques such as stochastic programming and Markov decision processes. We provide preliminary results, specific applications and indicate directions for future work.

3 — A Modeling System for Multistage Stochastic Programming Problems
Leonardo Lopes, Northwestern University, Evanston, IL, 60208, USA, leo@iems.nwu.edu., Robert Fourer

We present a modeling system specifically designed for Stochastic Optimization, including an AMPL extension that allows, for the first time, for a filtration process to be given the same importance as the algebraic components of the model. This approach allows for cleaner model formulations, a higher degree of abstraction.

■ SC33

Hilton-University

Approximate Dynamic Programming III

Sponsor: Optimization Section-Dynamic Programming
Sponsored Session

Chair: Daniela Pucci de Farias, IBM Almaden Research Center, Postdoctoral Research Scientist, San, Jose, CA, USA, pucci@mit.edu

1 — A Price-Directed Approach to Stochastic Inventory/Routing
Dan Adelman, University of Chicago, Associate Professor of Operations Management, Chicago, IL, 60637, dan .adelman@gsb.uchicago.edu.

We consider a new approach to stochastic inventory/routing that approximates the future costs of current actions using optimal dual prices of a linear program. We obtain two such linear programs by formulating the control problem as a Markov decision process and then approximating the optimal value function with the sum of single customer inventory value functions.

2 — Approximate Dynamic Programming for Multistage Discrete Resource Allocation Problems
Warren Powell, Princeton University, Professor, Princeton , NJ, 08540, USA, powell@princeton.edu., Huseyin Topaloglu, Ben Van Roy

Discrete, multistage resource allocation problems fall in between discrete dynamic programs (which are typically of low dimensionality) and multistage linear programming (which struggles with integrality constraints). We show how the use of approximate dynamic programming techniques, using specially chosen functional approximations, can be used to solve large-scale instances of these problems with results that outperform standard engineering approximations.

3 — A Binary DP Problem with Linear Transition and Reward Functions
Ricardo Gatica, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, ricardog@isye.gatech.edu., Alan Erera, John Vande Vate

We consider a binary-decision dynamic programming problem with linear transition and reward functions. After proving the optimality of threshold policies, we develop a polynomial approximation scheme whose key feature is to replace the search for an optimal threshold value by a search for an optimal decision sequence. We show that this search can be restricted to a countable set of periodic decision sequences, which we order so that the value function is unimodal.

■ SC34

Hilton-Plaza

Practitioners' Award Competition

Sponsor: Decision Analysis Society
Sponsored Session

Chair: L. Robin Keller, University of California, Irvine, CA, 92697-3125, USA, lrkeller@uci.edu

1 — Commercial Evaluation of a Blood Clot-Busting Drug
Jeff Stonebraker, Bayer Pharmaceutical, Research Triangle Park, NC, jeff.stonebraker.b@bayer.com.

Even though Bayer Pharmaceutical's (Pharma) use of decision analysis began in the late-1980s, this commercial evaluation was the first decision analysis project by Bayer Biological Products (BP). Previously, BP had analyzed a few business cases for review by Pharma. Pharma senior managers considered our recommendations relevant to their decision making.

2 — Antidepressant Go-No-Go Decision
Bill Poland, Pharsight Corporation, Mountain View, CA, 94040, poland@pharsight.com.

A pharmaceutical company had to decide whether to start expensive efficacy trials for a potential antidepressant with an unproven mechanism of action and toxicity risks that increased sharply with dose. Analysis incorporating probabilities of development success and ranges of commercial value as a function of dose made the decision clear.

3 — IctNeo: A Decision Support System for Neonatal Jaundice Management
Concha Bielza, Technical University of Madrid, mcbielza@fi.upm.es., Manuel Gomez, Juan A. Fernandez del Pozo, Sixto Rios-Insua, Manuel Sanchez Luna, Silvia Caballero

Management of jaundiced neonates is a common, yet challenging medical decision-making problem under uncertainty, for which the IctNeo decision support system at Gregorio Maranon Hospital (Madrid) was developed. The basic representation is an influence diagram, including admission and treatment decisions. We focus on modeling issues in structuring, elicitation and computation.

4 — Risk Assessment and Management for Chemical Weapons Disposal
Gary J. Boyd, Science Applications International Corporation, Abingdon, MD, 21009, gary.j.boyd@saic.com., Gregory St. Pierre

The Chemical Stockpile Disposal Program aims to eliminate the nation's stockpile of chemical agents and munitions with maximum protection of the health & safety of the public, facility staff, and the environment. Risk assessments and management programs are used in day-to-day management, responding to the Pentagon and other inquiries.

■ SC35

Hilton-Almaden II

Panel Discussion: Tolerancing: Current Perspectives and Emerging Trends for Quality and Productivity Improvement

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Darek Ceglarek, University of Wisonsin, Madison, WI, USA, darek@engr.wisc.edu

1 — Tolerancing: Current Perspectives and Emerging Trends for Quality and Productivity Improvement
Panelists: Ken Chase, Brigham Young University; Andrew Kusiak, University of Iowa; Tony Woo, University of Washington-Seattle; Jeff Wu, University of Michigan-Ann Arbor.

■ SC36

Center-Room F1

Analysis and Optimization of Complex (Multi-Type) Stochastic Systems

Sponsor: Applied Probability Society
Sponsored Session

Chair: Kevin Glazebrook, University of Edinburgh, UK, kevin.glazebrook@ed.ac.uk

1 — Analyzing the Limiting Behavior of a Muti-class Strict-priority Fluid Queue by Stochastic Discretization
Vidyadhar Kulkarni, University of North Carolina, Chapel Hill, NC, 27599, USA, E. Tzenova, I. Adan

We consider a stochastic fluid flow model with a single infinite capacity buffer and K independent on-off Markovian input sources with constant peak rate. The fluid

is emptied from the buffer at a constant rate according to a SPFS (Strict Priority Full Service) discipline in which type 1 fluid has the highest priority and type K the lowest. The output process of type k is defined to be on if fluid of type k is leaving the buffer and off otherwise. In this paper we use stochastic discretization to compute the mean on and off times of the output process of type k.

2 — On the Markov Block Replacement Policy in Multivariate Repairable Systems
S. H. Xu, Penn State University, Professor, University Park, PA, 16802, USA, shx@psu.edu., H. Li

We study a multi-component repairable system with a maintenance policy that performs imperfect repairs to failed components and block replacements according to a Markov block replacement schedule. We study the impact of Markov block replacements on the dependence structure of the system and also discuss how to effectively coordinate the block replacements in order to optimize several performance measures.

3 — Optimal Policies for Single Class M/G/1 Systems with a Charge for Service and Index Heuristics for Multi-class Systems with General Holding Costs
Kevin Glazebrook, University of Edinburgh, UK, kevin .glazebrook@ed.ac.uk., P. S. Ansell, J. Nino-Mora

Index-based solutions are developed for a server control problem defined for a (single class) M/G/1 system where the goal is to minimise costs incurred through holding customers in the system and in paying for service. These indices are then used to construct service policies for multi-class systems with general holding cost rates. A numerical study shows these index heuristics to perform well for some problems with the average cost criterion.

4 — Multiserver Priority Queues
Sidney L. Hantler, IBM TJ Watson Research Center, Manager , Stochastic Analysis, Yorktown Heights, NY, 10598, USA, hantler@us.ibm.com., Richard Gail, B. A. Taylor

We give an algorithm for computing the stationary distribution of multiserver multiclass priority queues. This method can be viewed as an extension of the technique developed by Neuts to study Markov chains of M/G/1 type. Examples include nonpreemptive, preemptive and partially preemptive disciplines.

■ SC37

Center-Room J1

Queueing Systems: Analysis and Control I

Sponsor: Applied Probability Society
Sponsored Session

Chair: Amy Ward, Georgia Tech, Assistant Professor, Atlanta, GA, 30332, USA, amy@isye.gatech.edu

1 — Non-sufficiency of Pseudostation Conditions in Fluid and Stochastic Networks
John Hasenbein, University of Texas, Austin, TX, 78712-1063, USA, jhas@mail.utexas.edu.

Pseudostation workload conditions, an extension of virtual station conditions, are known to be necessary for global stability and stability under certain priority policies. We demonstrate that these conditions are not in general sufficient for stability of fluid networks or for stochastic networks under various distributional assumptions.

2 — Stabilizing Kelly Networks with Setups
Otis Jennings, MIT, Cambridge, MA, 02142, USA, otisj@mit .edu., Jim Dai

Jobs at a given station in a Kelly Network have identical mean processing times, regardless of the class in which they reside. The mean setup times, however, are sequence-dependent. We show that a hybrid of the FIFO and k-limited service policies stabilize such networks.

3 — Performance Evaluation and Policy Selection for Multiclass Networks
Shane Henderson, Cornell University, Assistant Professor, Ithaca, NY, 14853, USA, henderson@orie.cornell.edu., Sean Meyn, Vladislav Tadic

A 2-parameter model is introduced to allow independent modeling of variability and mean processing rates, while maintaining model simplicity. Policies are constructed from fluid workload models, and then translated to the discrete model via safety stocks. Simulation is used to evaluate policies and to tune safety-stock levels. The simulation variance reduction is tuned using stochastic approximation. The search for safety-stock levels is coordinated by a cutting plane algorithm.

4 — Performance Measure Approximations for GI/GI/1 Queues with Reneging
Amy Ward, Georgia Tech, Assistant Professor, Atlanta, GA, 30332, USA, amy@isye.gatech.edu., Peter W. Glynn

We consider a GI/GI/1 queue in which each job reneges after an independent, generally distributed amount of time. When the arrival rate is close to the processing rate and reneging times are large, we develop performance measure approximations via both a reflected Ornstein-Uhlenbeck diffusion and a reflected affine diffusion.

■ SC38

Center-Room N

Roundtable - Railroads in The Customers Supply Chain

Sponsor: Railroad Applications Section
Sponsored Session

Chair: Michael F. Gorman, University of Dayton, Professor, Dayton, OH, 45469, USA, michael.gorman@udayton.edu

1 — Setting the Table: Supply Chain Applications in the Rail Industry
Michael F. Gorman, University of Dayton, Professor, Dayton, OH, 45469, USA, michael.gorman@udayton.edu.

We give an overview of major railroads and suppliers to create a seamless shipping experience for rail shippers. The dimensions of "supply chain services" and the rail industry are bracketed.

2 — Rail-centric Supply Chain Services: Selling to our customers and ourselves
Dan Bingeman, Dan Bingeman.

We discuss the shipping public's lack of understanding of shipping via rail, and the rail employee populations lack of understanding of the shipper's logistics problem. We talk about the reality of educational barriers that must be overcome in order to make rail-centric supply chain services a reality.

3 — Use of Optimization in Rail-centric Supply Chain Consulting and Services
Todd Olsen, Burlington Norhern Sante Fe, Ft. Worth, TX, 76131, todd.olsen@bnsf.com.

BNSF Supply Chain Solutions has found the use of home-grown and commercial optimization techniques valuable for identifying opportunities, gaining credibility with clients, and ultimately in delivering Supply Chain Solutions to our clients. This talk will cover some of the tools we have built and procured, and how they play into building BNSF's supply chain capabilities.

■ SC39

Center-Room K

Methods and Applications of Stochastic and Time-Dependent Shortest Paths

Sponsor: Transportation Science Section
Sponsored Session

Chair: Barrett W. Thomas, University of Iowa, Iowa City, IA, 52242-1000

1 — Dynamic and Stochastic Shortest Path Problem with Anticipation
Barrett W. Thomas, University of Iowa, Iowa City, IA, 52242-1000, Chelsea C. White

Real-time traffic information has become an important component of routing strategies in the just-in-time delivery environment. We present a stochastic and dynamic shortest path model that allows us to examine the optimal policy when we have a distribution on the amount of time that arcs spend in a congested state.

2 — Multicriteria Adaptive Paths in Stochastic, Time-Varying Networks
Sathaporn Opasanon, Pennsylvania State University, University Park, PA, 16802, sxo@psu.edu., Elise Miller-Hooks

We will describe three exact and efficient algorithms for addressing multicriteria adaptive path problems in stochastic, time-varying networks. The first algorithm determines all Pareto-optimal hyperpaths. The latter two employ utility functions, substantially reducing computation time and storage requirements.

3 — Stochastic Dynamic Network Analysis for Routing and Scheduling of Hazardous Materials Shipments
Linda K. Nozick, Cornell University, Ithaca, NY, LKN3@Cornell.edu., Mark A. Turnquist

Path finding in stochastic dynamic networks is a key tool for routing and scheduling of hazardous materials. This talk will focus on algorithms for stochastic dynamic network analysis applied to routing and scheduling of hazardous materials including the consideration of multiple objectives. Emphasis will be placed on frontiers for new research.

4 — State Space Reduction for Non-stationary Stochastic Shortest Path Problems with Real-time Traffic Information
Seongmoon Kim, University of Michigan, Ann Arbor, MI, 48109, smoonkim@umich.edu., Mark Lewis, Chelsea C. White

The optimal vehicle routing problem with real-time traffic information becomes intractable due to a huge state space. We present an easily implementable 2-step technique of state space reduction without loss of optimality for non-stationary stochastic shortest path problems with real-time traffic congestion information, and verify the methods via numerical studies.

■ SC40

Center-Room G

Panel Discussion: The Future of Operational Modeling and Simulation for Semiconductor Manufacturing

Sponsor: College on Simulation Section
Sponsored Session

Chair: Michele Pfund, Arizona State University, Tempe, AZ, 85287-5906, USA, michele.pfund@asu.edu

1 — Panel Discussion
Frank Robertson, Intel Corporation, frank.h .robertson@intel.com. Panelists: John Fowler, Arizona State Univ.; Leon McGinnis, Georgia Institute of Technology; Nipa Patel, AMD; Kishore Potti, Texas Instruments; Oliver Rose, University of Wuerzburg; Alexander Schoemig, Infineon Technologies; Lee Schruben, Univ. of California-Berkeley.

In this session, we will have speakers from academia and industry discuss what they see as the future of operational modeling and simulation in the semiconductor industry.

■ SC41

Center-Room M

Location Analysis III

Sponsor: Section on Location Analysis
Sponsored Session

Chair: Michael Johnson, Carnegie Mellon University, Asst. Prof., Pittsburgh, PA, 15213-3890, USA, johnson2@andrew.cmu.edu

1 — Overview of Location Models in Forest Management and Habitat Reserve Design
Stephanie Snyder, USDA Forest Service, St. Paul, MN, 55108, USA, stephaniesnyder@fs.fed.us.

Managers face a variety of location-related resource allocation, selection, scheduling and routing problems in the fields of forest management and habitat reserve design. We review applications of classic location science models to forest management and habitat reserve design, and discuss emerging areas of location-related research in these fields.

2 — An Efficient Equity Mazimizing Heuristic for Zone Design
Anton Ovtchinnikov, University of Toronto, Toronto, ON, M5S 3E6, Canada, anton@rotman.utoronto.ca., Oded Berman, Dmitry Krass

Unlike the popular travel-minimization formulation of the zone design problem, this paper employs the equity maximization objective. We propose exact and heuristic algorithms based on multilevel partitioning which result in better partitions than "standard" algorithms. We consider several types of "compactness constraints" and develop worst-case error bound under "pseudo-compactness".

3 — Location of Elderly Service Facilities
Michael Johnson, Carnegie Mellon University, Asst. Prof., Pittsburgh, PA, 15213-3890, USA, johnson2@andrew.cmu.edu., Wilpen Gorr, Stephen Roehrig

Senior centers are facilities for elderly adults who live independently. We present a single-period facility location planning model based on point demand forecasting, incorporating efficiency and equity considerations. We solve small instances of this model using actual data from Allegheny County, PA. Alternative solution methods are evaluated and policy tradeoffs analyzed.

■ SC42

Fairmont-Belvedere

Quality in Marketing

Contributed Session

Chair: Susan A. Slotnick, Arizona State University West, Phoenix, AZ, 85069-7100, USA, slotnick@asu.edu

1 — Quality and Reputation
Susan A. Slotnick, Arizona State University West, Phoenix , AZ, 85069-7100, USA, slotnick@asu.edu., Kathy A. Paulson Gjerde

We model the effects of quality investment on revenue and costs internal to the firm, examining tradeoffs between short- and long-term quality investments. Our results yield insights about when it is worthwhile for the firm to expend resources on different types of quality improvements.

2 — Competition and the Quality-Price-Advertising Dynamics
Ram Narasimhan, Michigan State University, East Lansing, MI, 48824, USA, narasimh@msu.edu., Anand Nair

Strategic aspects of quality and the role of quality in competitive strategy are recently gaining prominence in operations management literature.In this paper we extend this stream of research by considering a dynamic model of competition utilizing a differential game approach. The purpose of this paper is to examine the dynamic interactions among price, quality and advertising in order to gain insights relating to corporate and competitive strategy.

3 — Can Automotive Manufacturers' CPO Program Pay for Itself?
Yong Yang, Ford Motor Company, Dearborn, 48126, USA, yyang1., Rose Peng

Automotive manufacturers have embraced certified pre-owned (CPO) program since it boosts their vehicle resale values. While incurring warranty costs for CPO vehicles, manufacturers hope they can capture some of the boosted resale values to pay for CPO program costs. We present some empirical evidence on what benefit manufacturers can glean.

4 — Quality Improvement and Goodwill Accumulation in a Dynamic Duopoly
Fouad El Ouardighi, ESSEC Business Scholl, Professor, Cergy Pontoise, CP, 95021, France, elouardighi@essec.fr., Federico Pasin

In this paper, we use the Lanchester differential game model to represent the market share competition in a dynamic duopoly, where each firm's attraction effort is due to its own goodwill level, while each firm's abandon rate depends on its own quality level. The search for a Nash solution by numerical means leads to determine for each competitor the optimal mix strategy of price, advertising investment and quality improvement effort.

5 — An Integrated Operations-Marketing Model for Optimal Trade-in Rebate for Remanufacturable Products
Saibal Ray, Faculty of Management, McGill University, Assistant Professor, Montreal, PQ, H3A 1G5, Canada, saibal.ray@mcgill.ca., Tamer Boyaci, Necati Aras

Many firms offer a product take-back policy by awarding trade-in rebates. This research will deal with determining and analyzing an optimal trade-in rebate for remanufacturable products when there is some cost involved with inducing a customer to return a product and the potential for reuse of some parts of the returned products. We explicitly take into account the age distribution of the existing product base, the revenue from the returned products and the customer's willingness to buy.

■ SC43

Center-Room H

Auctions and Dynamic Pricing

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: Pinar Keskinocak, Georgia Institute of Technology, Atlanta, GA, USA, pinar@isye.gatech.edu

1 — Minimal-revelation VCG-based Combinatorial Auctions
David Parkes, Harvard University, Cambridge, MA, 02138, USA, parkes@eecs.harvard.edu.

We identify the central role of prices in the design of minimal-revelation VCG-based auctions. The efficient-allocation problem is informationally equivalent to the competitive-equilibrium (CE) prices problem, for a wide class of preference-elicitation languages. A simple extension, to Universal CE prices, provides a clean integration of incentive considerations.

2 — Winner's Curse, Reserve Prices, and Endogenous Entry: Empirical Insights from eBay Auctions
Ali Hortacsu, University of Chicago, Chicago, IL, 60637, USA, hortacsu@uchicago.edu.

Internet auctions have recently gained widespread popularity and are one of the most successful forms of electronic commerce. We examine a unique data set of eBay coin auctions to explore the determinants of bidder and seller behavior. We specify and estimate a structural econometric model of bidding on eBay. Using our parameter estimates from this model, we measure the extent of the winner's curse and simulate seller revenue under different reserve price schemes.

3 — Searching for Equilibria in Progressive, Combinatorial Auctions
Peter Wurman, North Carolina State University, wurman@csc.ncsu.edu.

Combinatorial auctions are a new class of allocation mechanisms that allow participants to make offers on combinations of objects , thus allowing bidders to eliminate the risks associated with purchasing objects separately. In many practical settings, the Generalized Vickrey Auction is not an appropriate mechanism, and other, often iterative, mechanisms are required. A bidder that must participate in a progressive combinatorial auction has to select a strategy that will maximize her utility. Many of scenarios, either implicitly or explicitly, involve collusion on the part of the bidders. In this study we examine techniques for finding potential equilibrium strategies in a proxy-enabled version of A1BA, a

progressive combinatorial auction that has the property that it generates anonymous equilibrium bundle-prices. We use a genetic algorithm to search the strategy space to find potential equilibria, and find that the solutions found often create more surplus for the bidders than other equilibria, including the GVA outcome.

4 — On Pooling Bidders in Competing Online Auctions
Damian Beil, MIT Operations Research Center, PhD Candidate, Cambridge, MA, 02139, USA, beil@mit.edu., Lawrence M. Wein

We consider two competing online auctions and three types of bidders: those dedicated to auction 1, to auction 2, and those participating simultaneously in both. Exact expressions are derived for the auctioneers' expected revenues. This pooling analysis suggests conditions for when bidder sharing is beneficial.

■ SC44

Center-Room B2

Decision Support Systems

Contributed Session

Chair: Aysegul Toker, Bogazici University, Istanbul, Turkey, tokera@boun.edu.tr

1 — Decision Support System for Disaster Management: A Scenario Approach for Estimating Earthquake Casualties
Aysegul Toker, Bogazici University, Istanbul, Turkey, tokera@boun.edu.tr., Gulay Altay, Arzu Iseri, Fuad Aleskerov, Levent Akin

During mitigation and preparedness efforts for a possible earthquake, estimation of building damage and fatalities are the preliminaries. We present a Decision Support System as a part of a Disaster Management System, which estimates the human losses and injuries as well as the need for shelters, in a residential area.

2 — An Integrated Expert System/Operations Research Approach for the Optimization of Waste Incinerator Siting Problems
Wann-Ming Wey, Graduate School of Architecture and Urban Design, Chaoyang University of Technology, wmwey@mail.cyut.edu.tw.

This research aims at developing an integrated decision support system for the optimization of waste incinerator siting problems. In this integrated approach, both expert systems and operations research techniques are used to model the siting problems of waste incinerator. Computational results both of the cost minimization and of the whole systems are provided.

3 — Implementing Optimization Software in a Technology-Resistant Industry
Manas C. Fuloria, SupplyChainge, Inc., Portland, OR, 97223, USA, manas@supplychainge.com.

We describe the implementation of sophisticated supply chain optimization software at a mid-sized fashion apparel company. We discuss the cultural and technological challenges in getting users with no operations research background to trust and use the system, which is based on an advanced 2-stage newsboy model.

4 — A Decision Support System for Global Capacity Utilization in Plastics Industry
Glenn Munshaw, GE Plastics, HPP Production Manager, Mt Vernon, IN, 47620, USA, Glenn.Munshaw@gepex.ge.com., Kunter Akbay, Peter Kalish, Rajesh Tyagi

We present a Global Fulfillment Network Model for capacity planning developed for GE Plastics. The Excel-based DSS uses an LP model to optimize production quantities of twenty-six products . The model maximizes contribution margin taking into consideration product demands & prices, plant capacities, production costs, distribution costs, and raw material costs.

5 — Effects of Instance Similarity on Automaticity Development and Transfer
Hassan Qudrat-Ullah, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, qudrat@andrew.cmu.edu., Cleotilde Gonzalez

This research examined the effects of instance similarity on automaticity development and transfer in Real-Time Dynamic Decision Making environments. In our experiment, we varied task's start time and deadlines. Our results indicate that automaticity was developed faster in constant task condition than in randomized task condition. Also, subjects in the randomized task condition showed more rule-following performance. Implications of these findings for research and practice are discussed.

■ SC45

Center-Room B3

Telecomm Network Design

Contributed Session

Chair: Rosemary Berger, Lehigh University, Bethlehem, PA, 18015, USA, rosemaryberger@hotmail.com

1 — Optimal Design of Reliable SONET Feeder Networks
Byung H. Lim, Univ. of San Francisco, San Francisco, CA, 94117, USA, limb@usfca.edu., June S. Park, Larry J. LeBlanc

We address the physical SONET network design problem of selecting stackable, unidirectional rings connecting central office nodes (COs) and remote nodes (RNs). This problem frequently arises in designing feeder transport networks to support centralized traffic between the COs and RNs. We formulate a binary mixed integer programming model for this problem.

2 — A Path-Based Model for SONET Ring Network Planning
Rosemary Berger, Lehigh University, Bethlehem, PA, 18015, USA, rosemaryberger@hotmail.com.

The objective of the SONET Ring Network Planning problem is to determine routing, topology and sizing decisions in such a way as to minimize equipment costs. A path-based formulation is introduced, and a solution algorithm that generates candidate rings is presented.

3 — Computational Issues Associated with the Network Signal Design Problem
Minnie H. Patel, San Jose State University, San Jose, CA, 95192, US, npatel@uwm.edu., Alan J. Horowitz

The objective function of the network signal design problem (NSDP) takes enormous amount of calculations to determine the savings in the vehicle hours travel (VHT) over the entire network , if a given intersection were to be signalized. A modified greedy objective function (MDF) is proposed to optimize the NSDP.

4 — Resilient Data-Centric Storage in Wireless Ad-Hoc Sensor Networks
Abhishek Ghose, UC Berkeley, Berkeley, CA, 94720, USA, aghose@eecs.berkeley.edu., Jens Grossklags, John Chuang

In this paper we propose Resilient Data-Centric Storage (R-DCS) as a method for data storage and retrieval in an ad-hoc wireless sensor network. Through theoretical analysis and simulations, we analyze energy-savings, scalability and robustness in the presence of clustered as well as isolated node failures.

■ SC46

Center-Room C3

Strong Valid Inequalities for Structured Mixed Integer Programs

Sponsor: Optimization Section-Integer Programming
Sponsored Session

Chair: Andrew Miller, University of Wisconson, Madison, WI, USA, amiller@ie.engr.wisc.edu

1 — Lifted Inequalities for 0-1 Mixed Integer Programming : Theory and Computation
Jean-Philippe Richard, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, jpacc@isye.gatech.edu., Ismael de Farias, George Nemhauser

We study the polytope defined by a single knapsack constraint that contains binary and bounded continuous variables. We derive some families of easily obtainable facets for this polytope and show how they are used as strong cuts for general mixed integer programs. We also show how they are used to generate cuts from simplex tableaux. We report computational results on general mixed integer problems.

2 — Strong Inequalities for the Capacitated Lot-sizing Problem
Alper Atamturk, University of California, Berkeley, CA, 94720-1777, USA, atamturk@ieor.berkeley.edu., Juan Carlos Munoz

We will describe new strong valid inequalities for the capacitated lot-sizing problem and a polynomial-time separation algorithm for a special case. We will also present a summary of computational experiments.

3 — Using Strong Valid Inequalities to Solve Multi-item Capacitated Lot-sizing Problems
Andrew Miller, University of Wisconson, Madison, WI, USA, amiller@ie.engr.wisc.edu.

We discuss computational progress in using valid inequalities for simple submodels to solve a variety of problems: single- and multi-machine, single- and multi-level, with or without backorders and overtime, etc. This talk summarizes research carried out with George L. Nemhauser, Yves Pochet, and Martin W.P . Savelsbergh.

■ SC47

Center-Ballroom A8

Software Demonstration Session 03

Cluster: Software Demonstrations
Invited Session

1 — Brooks-PRI Automation — Simulation with AutoMod
Jay Stacey, Brooks-PRI Automation, Salt Lake City, UT, 84116,

USA, jay.stacey@brooks-pri.com.

Simulation with AutoMod - AutoMod, with newly released Composite Systems, allows modelers to easily and quickly construct 3D VR models using and linking existing models. This presentation will highlight the features of AutoMod, illustrate Composite Systems and show some examples. Other topics will include optimization and Excel spreadsheet interfaces.

2 — Wolfram Research — Mathematica Product Presentation
Anton Rowe, Wolfram Research, Champaign, IL, 61820, anton@episoft.com.

Mathematica Product Presentation - Mathematica is a fully integrated technical computing system that combines fast, high-precision numerical and symbolic computation with data visualization and programming capabilities. In this demonstration , we will cover the basic principles of Mathematica, present the latest features, and illustrate how Mathematica seamlessly connects to environments such as Microsoft Excel, ODBC databases and custom programs.

■ SC48

Fairmont-Valley

INFORMS Teachers Program: How to Teach the Teachers

Sponsor: INFORMS Public Awareness Committee

Chair: Frank Trippi, , ftrippi@msn.com

1 — INFORMS Teachers Program: How to Teach the Teachers
Frank Trippi, ftrippi@msn.com.

Operations research professionals are needed to "Teach the Teachers" at local math teacher conferences. The Public Awareness Committee has: (1) held one-day workshops for high school math teachers at INFORMS national meetings; (2) presented workshops at national and regional math teachers conventions; and (3) developed ten Teachers Instructional Modules (TIMs) that can be brought directly into a high school math classroom. INFORMS members are invited to reach out and present workshops at their state and/or local math teacher conferences. Members of the TIMs development team will demonstrate how to conduct these workshops at a comprehensive briefing session. Session participants will receive all program materials, videos, software packages (with instructions), and the Teacher Instructional Modules, allowing them to deliver a similar program at a state, county or school district conference.

Sunday 4:30 - 6:00pm

■ SD01

Center -Ballroom A4

Tutorial: Supply Chain Scheduling

1 — Supply Chain Scheduling
Nicholas Hall, Ohio State University, Columbus, OH, 43210-1144, USA, hall.33@osu.edu.

The most active topic in manufacturing research during the last 10 years has been supply chain management. The key idea within supply chain management is that decision makers at different parts of a supply chain should coordinate their decisions in order to improve overall system performance. Much of the research in supply chain management, however, has focused on strategic decision making in stochastic environments. Recent reviews of the supply chain management literature point out this limitation. This work refocuses supply chain management research on operational problems that take place in deterministic environments. In particular, we describe three manufacturing environments where the coordination principle of supply chain management can be applied to scheduling decisions. In each of these environments, we identify and evaluate opportunities for improving system performance through coordinated decision making, and discuss mechanisms by which those opportunities can be realized. Possible future research directions will also be discussed.

■ SD02

Fairmont-Cupertino

Tutorial: Technology Portfolio Planning

Cluster: Practice Track
Invited Session

Chair: Oliver Yu, Star Strategy Group, oliveryu@starstrategygroup.com

1 — Technology Portfolio Planning and Management
Oliver Yu, Star Strategy Group, oliveryu@starstrategygroup.com.

This tutorial presents a combination of qualitative and quantitative concepts and to technology portfolio planning and management. The key concepts include how to set clear corporate goals, identify candidate technologies, develop innovative portfolios, forecast future changes, manage complex risks, make good selections, and modify the portfolio effectively in response to changes. The main emphasis is to be both practical and easy to use.

■ SD03

Fairmont-Fairfield

Challenges in Managing New Product Development

Cluster: Practice Track
Invited Session

Chair: Sara Beckman, Haas School of Business, Senior Lecturer, Berkeley, CA, 94720-1900, USA, Beckman@haas.berkeley.edu

1 — The New Challenges in Managing New Product Development: A High-Tech Industry Panel
Sara Beckman, Haas School of Business, Senior Lecturer, Berkeley, CA, 94720-1900, USA, Beckman@haas.berkeley.edu.

New product development managers in high tech industry face new challenges in outsourcing design, managing product development across corporate boundaries, defining changing product platforms, truly integrating customer needs, coping with product proliferation all with reduced budgets. Join managers from Adobe, Lifescan (a J&J subsidiary) and Intel to discuss these challenges.

■ SD04

Hilton-San Carlos II

Tutorial: An Overview of Data Mining Applications and Modeling

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Kwok Tsui, School of ISyE, Professor, Atlanta, GA, USA, ktsui@isye.gatech.edu

1 — Tutorial: An Overview of Data Mining Applications and Modeling
Kwok Tsui, School of ISyE, Professor, Atlanta, GA, USA, ktsui@isye.gatech.edu., Tom Au

This tutorial presents data mining strategy, data pre-processing, applications, algorithms and modeling, and case studies. Applications include acitivity monitoring, customer relationship management, market basket analysis, sales and revenue forecasting . Modeling methods include prediction, forecasting, classification, clustering, association rules. Case studies include supermarket, telecommunication, finance and banking, and manufacturing industries.

■ SD05

Fairmont-Sacramento

Teams and Technology

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Julie Rennecker, Case Western Reserve University, Cleveland, OH, 44106, USA, jar27@po.cwru.edu

1 — Conflict on Distributed Teams
Mark Mortensen, Stanford University, Stanford, CA, 94305-4026, USA, mmorten@stanford.edu., Pamela Hinds

In this paper, we examine the antecedents to task and affective conflict in geographically distributed as compared with collocated teams. We consider the effect of different contexts (e.g. culture, time zone, etc.), reliance on communication technologies, and physical proximity on conflict and conflict handling.

2 — Collaboration in Distributed Teams: Evidence for the Importance of Time
Stine Grodal, Stanford University, Stanford, CA, 94306-4026, USA, grodal@stanford.edu., Rosanne Siino, Andrew Nelson

Research on distributed collaboration typically examines the impact of physical distribution on team cohesion or communication effectiveness. Alternatively, our ethnographic study of three distributed technical teams at a global high technology company suggests that the notion of time is central to understanding the work practices and collaboration of distributed teams.

3 — Local-Global Tensions in Virtual Teams: A Structural Perspective on Incentives Shaping Their Resolution
Julie Rennecker, Case Western Reserve University, Cleveland, OH, 44106, USA, jar27@po.cwru.edu.

Virtual teams, almost by definition, represent mixed-motive situations where team members ongoingly negotiate concurrent local and team demands for time, attention, and cooperation. This paper proposes a 2x2 typology of local-team tension resolutions based on the virtual team's revenue and governance structures.

■ SD06

Fairmont-Atherton

College on Organization Science: Industry Growth

Sponsor: College on Organization Science Section
Sponsored Session

1 — Organizational Limits on the Red Queen
Bill Barnett, Stanford University

2 — The rise of the corporation in a craft industry: Conflict and conformity in institutional logics
Patricia Thornton, Duke University

No abstracts supplied

■ SD07

Fairmont-Piedmont

Product Development in a Virtually-Integrated World

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Edward Anderson, University of Texas, Austin, TX, 78712, USA, edward.anderson@bus.utexas.edu

1 — Managing New Product Development as a Set of Directed and Self-guided Team Efforts
Jovan Grahovac, Tulane University, New Orleans, LA, 70118 , USA, jgrahov@tulane.edu., Thomas Roemer

We model new product development as a search for the final specification of a set of interrelated components by a team of agents. We examine how various types of interaction affect near-optimal allocations of group, subgroup, and individual rights to make final component-level decisions as well as the accompanying incentives.

2 — Aligning Product Architecture and the Supply Network
Manuel Sosa, INSEAD, Fontainebleau, France, manuel .sosa@insead.edu.

Outsourcing design and manufacture of systems has become widespread practice in many industries resulting in complex networks of suppliers. I present an approach to map the architecture of a product onto its supply network. I study how actual relations among suppliers are aligned to relations imposed by the product architecture.

3 — Product Co-development in the Automotive Specialty Equipment Market
Maxime Phomma, MIT, Cambridge, MA, 02142, USA, phomma@mit .edu., Thomas Roemer, Ali Yassine

Motivated by how much automotive customization is performed by aftermarket suppliers (a $25B industry), we are studying to what extent OEMs and aftermarket suppliers (AMS) should cooperate. In particular, we are interested in determining what type of design information OEMs should release to AMSs at what time. The principal trade-off here is that AMSs, on the one hand, may add significant brand awareness to OEMs and increase sales, while, on the other hand, directly cut into the revenue stream of OEMs.

■ SD08

Center-Ballroom A2

Modeling Business-to-Business Relationships in E-Commerce

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Rachel Yang, University of Illinois, ryang@uiuc.edu

1 — Paid Placement Strategy for Information Gatekeepers
Juan Feng, Pennsylvania State University, jifl@psu.edu., Hemant Bhargava

Recently, information gatekeepers such as search engines, comparison shopping sites have begun implementing "paid placement" strategy, where some content providers are given prominent positioning for a fee. We analyze the gatekeeper's tradeoff between paid placement revenue and the potential loss from its biasness. Competition between two gatekeepers is also studied.

2 — Modeling the Impact of Smart Packaging on Channel Participants
Kwaneng Wee, University of Illinois, Urbana-Champaign, IL , USA, kwanwee@uiuc.edu., Ananth Iyer

We consider the benefit of Smart Packaging in a one-manufacturer-one-retailer distribution channel. The manufacturer can choose to (a) invest in this technology or not, and (b) share this information with the retailer or not. We study how these different information levels impact the pricing strategy and the corresponding profit for both manufacturer and retailer.

3 — Vendor Selection through Online Dynamic Bidding
Y. Stephen Chiu, Chinese University of Hong Kong, Rachel Yang

Selecting vendors through online dynamic bidding is a reverse auction by a single buyer awarding a business contract to several competing vendors. This paper addresses its distinct features not existing in a regular auction where multiple buyers bid to buy from a single seller: such as a lower bid bound and contract holdup.

4 — Outside Option, Bargaining Power, and e-Marketplaces
Rachel Yang, University of Illinois, ryang@uiuc.edu., Y. Stephen Chiu

Whether a firm's participation in e-Marketplaces enhances or diminishes its bargaining power with its supply chain partners depends on whether the commitment is reversible and the e-Market acts as a threat point, or the commitment is irreversible and the e-Market acts as an outside option.

■ SD09

Center-Ballroom A3

Supply Chain Modeling and Analysis

Cluster: e-Business: Integrating Academic and Industrial, Perspectives
Invited Session

Chair: Roger R. Gung, IBM, rgung@us.ibm.com

1 — A Data Envelopment Analysis (DEA) Model for Supply Chain Management
Roger R. Gung, IBM, rgung@us.ibm.com., Tong Wu, Tzu-Liang Tseng

Data Envelopment Analysis (DEA) has been applied to numerous problems due to its strength in evaluating multi-criterion systems. We develop an Internet based test bed system based on DEA technique. A supplier evaluation case study is given to illustrate the application of this system.

2 — Material and Capacity Feasible Solver in PeopleSoft's Supply Chain Planning Products
Bor-Ruey Fu, PeopleSoft, Inc., Product Strategy Manager, Pleasanton, CA, 94588, USA, bor-ruey_fu@peoplesoft.com., Magesh Ranganathan

We will discuss the new solver developed for the next release of PeopleSoft's Supply Chain Planning products. The solver generates a feasible supply plan that satisfies both material and capacity constraints. Additionally, we will give an overview of the PeopleSoft Optimization Framework technology that makes this possible and share our experiences.

3 — Supply Chain and Service Chain Management at Catalog Sales Companies
Turgut Aykin, ac2 Solutions, Trenton, NJ, 08608, taykin@ac2solutions.com.

Many companies employ customer service/contact centers to accept orders through a variety of channels including call centers, email, etc. The level of service they provide through their contact centers affect their orders, and supply requirements. This paper presents new approaches for managing supply chain and service chain operations.

4 — Data Value Development to Enhance Yield and Maintain Competitive Advantage for Semiconductor Manufacturing
Cheng-Yung Peng, National Tsing Hua University, Taiwan, ROC, smithpeng@mxic.com.tw., Chen-Fu Chien

In semiconductor manufacturing, reducing cycle time, producing high quality products, on-time delivery, continual reduction of costs and improving efficiency are critical factors to maintain competitive advantage. An Engineering Data Analysis (EDA) system is a very important off-line analysis-oriented system that can be used to support yield analysis and quality improvement.

■ SD10

Center-Ballroom A7

Scheduling Algorithms

Cluster: Scheduling
Invited Session

Chair: Peter Brucker, University of Osnabrueck, Osnabrueck, D 49069, Germany, peter.brucker@mathematik.uni-osnabrueck.de

1 — Two-machine Open Shop Problem with Job-dependent Machine Speeds
T. C. Edwin Cheng, Hong Kong Polytechnic University, Kowloon, Hong Kong, mscheng@inet.polyu.edu.hk., Natalia Shakhlevich

We consider a two machine open shop problem in which machine speeds are controllable and can vary for different jobs. Both machines can process a particular job faster if the job uses additional resources but this incurs additional costs. We propose a polynomial time algorithm to determine the job orders on the

machines and machine speeds for each job in order to minimize the sum of the makespan and the costs associated with machine speeds.

2 — Generic Techniques to Minimize Total Weighted Tardiness and Total Weighted Flow Time on One Machine
Antoine Jouglet, Univ. de Tech. de Compiegn, Compiegne, 60200, France, antoine.jouglet@hds.utc.fr.

We study the One-Machine problem with release dates and we consider several objective functions such as total (weighted) tardiness and total (weighted) flow time. We present dominance properties, propagation rules and intelligent backtracking techniques. Our experimental results show the efficiency of these techniques that improve the best known results.

3 — Meta-heuristic Algorithms for Multiprocessor Task Scheduling in Multi-stage Flow-shops
Ceyda Oguz, Hong Kong Polytechnic University, Kowloon, Hong Kong, msceyda@polyu.edu.hk.

We consider multiprocessor task scheduling problems in multi-stage flow-shops and present three meta-heuristic algorithms: Tabu Search, Simulated Annealing and Genetic Algorithm. We discuss the implementation of each algorithm and conclude with the results of our computational experiments on the performance of the algorithms.

4 — Scheduling Vehicles in an Underground Cargo Transportation System
Johann Hurink, University of Twente, Enschede, NL-7500 AE , Netherlands, j.l.hurink@math.utwente.nl., Mark Ebben, Matthieu van der Heijden, Marco Schutten

Motivated by a Dutch pilot project on an underground cargo transportation system, a scheduling problem for automated guided vehicles (AGV's) in a transportation network is considered. Based on a set of transport orders with given origin, destination, earliest departure, and latest arrival times an assignment of orders to AGV's and a schedule of the AGV's on the given resources has to be determined. The goal is to perform well in terms of customer service level, AGV requirement, and empty kilometers driven.

■ SD11

Center-Room C1

Production Planning Applications

Contributed Session

Chair: Pankaj Chandra, Indian Institute of Management, Ahmedabad, Professor, Ahmedabad, Gj, 380015, India, chandra@iimahd.ernet.in

1 — Production Process Planning for a Two-stage Continuous Facility with a Steady Production of Intermediates
Brigitte M. Werners, Ruhr-University Bochum, Bochum, 44780, Germany, or@ruhr-uni-bochum.de.

In a two-stage reaction/extrusion process several intermediates are produced and transformed into many different polymer granulates. A schedule in combination with varying production intensities to allow steady production and near-minimal make-span can be determined by the developed heuristic algorithm which is based on a MILP model.

2 — Production Scheduling for Disk Drive Manufacturer
Loo Hay Lee, Department of Industrial & Systems Engineering, National University of Singapore, 119260, Singapore, iseleelh@nus.edu.sg., Ek Peng Chew, Tsan Sheng Ng

In this paper, we consider the production scheduling problem of a disk drive manufacturer. The objective is to meet the weekly demand by scheduling the building of the customer orders, subjected to limited production capacity, availability of components, and the customers' specifications.

3 — Production Planning and Scheduling in a Multi-Plant Environment: A Case Study of a Chemical Company
Peeyush Mehta, Indian Institute of Management, Ahmedabad, Doctoral Student, Ahmedabad, Gj, 380015, India, peeyush@iimahd.ernet.in., Pankaj Chandra, Devanath Tirupati

In this paper, we model production planning and scheduling decisions in multi-plant, multi-product environment. We solve a MIP model to determine production quantities and develop scheduling heuristics to provide detailed equipment wise schedules. We report interesting problem complexities and significant savings in an implementation at a chemical company.

4 — Mixed Assembly and Disassembly Operations for Remanufacturing
Michael Ketzenberg, Colorado State University, Assistant Professor, Fort Collins, CO, 80528, USA, michael .ketzenberg@mail.biz.colostate.edu., Gilvan Souza, V. Daniel Guide

We consider the problem of designing a mixed assembly-disassembly line for remanufacturing. We study two main configurations with the assumption that the disassembly sequence is exactly the reverse of the assembly sequence. Under a parallel configuration , there are two separate lines - one for each operation. Under a mixed configuration, there is one line, where each station is used for both disassembly and assembly of a specific part. The problem is studied using simulation.

■ SD12

Fairmont-Regency 1

Health Applications

Contributed Session

Chair: Eliezer Geisler, Stuart Graduate School of Business, Illinois Institute of Technology, Chicago, IL, 60661, geisler@stuart.iit.edu

1 — Information Technologies and Future Healthcare Performance
David H. Walker, Valley Children's Hospital, Madera, CA, USA, ceo@technotech.com.

Recent economic publications suggest that the healthcare markets within the United States will increase their financial holdings over the next 5 to 8 years, at rates, which will be higher than any other industry. However, new and emerging information technologies will be key components for ensuring success for these predictions.

2 — Length of Stay Prediction From a Clinical Database: Data Mining
Margaret R. Kraft, VA Hospital, Hines, IL, 60514, USA, margaret.kraft@med.va.gov., Kevin C. DeSouza

Healthcare systems frequently use length of stay as an indicator of cost and resource allocation. The ability to predict length of stay for specific populations can be useful in the development of care maps, case management, and more efficient resource allocation. Mining a spinal cord injury clinical databases from the VA healthcare system identified nursing elements used to develop prediction models with artificial neural nets. Issues related to the mining of clinical data, including data preparation, are presented along with the resulting neural nets.

3 — Organizational Technology: What Makes Agile Healthcare Organizations Agile?
Roel W. Schuring, University of Twente, School of Management Studies, The Netherlands, r.w.schuring@sms .utwente.nl.

The contemporary interest for improving the operations and organization of healthcare organizations is evident in the design of new organizational forms. Hospitals focus on "pursuing perfection" or "open access". We are trying to cross the quality chasm. Yet, it remains difficult to comprehend why these new organizational forms are so much "better" than existing forms. This paper discusses a selection of operational process characteristics that explain, including lead-time and duration of feedback loops, the number of people involved in processes. The values of these characteristics induce productive or non-productive behavior of people that is self-reinforcing. Practical examples illustrate these effects.

4 — The Stem Cell/Business Structure Analogy
William Komaiko, Stuart Graduate School of Business, President, ProbeLabs, Chicago, IL, 60661, USA, billprobe@aol.com.

Stem cell biology is reviewed to assess its likely impact on the future of medicine and medical commerce. Aspects of the cycle of corporate development, including corporate structure and the problem of achieving renewal are then compared to an individual's embryological outgrowth from the later maintenance via stem cells .

■ SD13

Center-Room D

Global Optimization I

Sponsor: Optimization Section-Global Optimization
Sponsored Session

Chair: Shabbir Ahmed, Georgia Institute of Technology, Assistant Professor, Atlanta, GA, , 30332, USA, sahmed@isye.gatech.edu

1 — Inverse Shortest Path Length Problems
Joel Sokol, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, jsokol@isye.gatech.edu., Shabbir Ahmed, Ozlem Ergun, Cheng-Huang Hung

We discuss some of our recent results on inverse shortest path length problems, where shortest path distances must be satisfied by routes are unspecified. We show that the the general case is NP-hard, as are many special cases, and report on preliminary computational results for an iterative solution algorithm.

2 — The Inverse Optimal Value Problem
Shabbir Ahmed, Georgia Institute of Technology, Assistant Professor, Atlanta, GA, 30332, USA, sahmed@isye.gatech .edu., Guan Yongpei

We consider the following inverse optimization problem: given a linear program, a desired optimal objective value, and a set of feasible cost coefficients, determine a cost-coefficient vector such that the corresponding optimal objective value of the linear program is closest to the given value. The problem is NP-hard in general. We provide sufficient conditions under which the problem is polynomially

solvable and describe a bilinear programming based algorithm for the general problem.

3 — Minimal Kernel Classifiers
Olvi Mangasarian, University of Wisconsin, Professor, Madison, WI, 53706-1685, USA, olvi@cs.wisc.edu., Alex Smola, Glenn Fung

A finite concave minimization algorithm is proposed for kernel classifiers with a minimal number of data points, both in generating and characterizing a classifier. The algorithm is theoretically justified on the basis of linear programming perturbation theory, a leave-one-out error bound and effective computational results on seven real world datasets.

4 — Monotonic Optimization: Algorithms and Extensions
Faiz Al-Kayyal, ISyE, Georgia Tech, Atlanta, GA, 30332, faiz@isye.gatech.edu., Hoang Tuy, Myun-Seok Cheon, Shabbir Ahmed

We present recent results on solving optimization problems, with monotone functions, for global solutions. We implement and extend the Polyblock Algorithm due to Tuy et al. Extensions include refined search, integer restrictions and convex relaxations. Computational experience is reported for the basic algorithm and for an enhanced version specialized for separable polynomial programming.

5 — Neuro-Dynamic Programming for Radiation Treatment Planning
Meta M. Voelker, University of Wisconsin, Madison, WI, 53706, USA, voelker@cs.wisc.edu., Michael C. Ferris

Radiotherapy treatment is often delivered as a series of small dosages over time. New machines being developed measure the actual dose delivered, allowing for adaptive treatment plans. To adapt for delivery errors, we model the day-to-day planning problem as a stochastic linear program. For realistic instances, we apply neuro-dynamic programming to approximate the stochastic solution. From the results, we generate practical rules of thumb that can be immediately implemented.

■ SD14

Center-Room E

Applications of Complementarity

Sponsor: Optimization Section-Linear Programming and Complementarity
Sponsored Session

Chair: Mihai Anitescu, Argonne National Laboratory, Pittsburgh, PA, 15260, anitescu@math.pitt.edu

1 — A Modern Approach to Solid Contact with Friction by Complementarity Problem Methods
Michael M. Kostreva, Clemson University, Clemson, SC, 29634, Claude Lacoursiere

For the rigid multibody contact/friction models of Anitescu-Potra and Trinkle-Stewart, we investigate perturbations of the solvable mixed LCP which allow a block pivot method. This method has been applied to very large cases, and was found to run fast enough for use in real-time simulations, and virtual reality settings.

2 — Modeling and Solving Multi-rigid-body Dynamics with Contact and Friction.
Mihai Anitescu, Argonne National Laboratory, Pittsburgh, PA, 15260, anitescu@math.pitt.edu.

We discuss ways of describing the contact, collision and friction phenomena that are exhibited in multi rigid body dynamics systems that allow for an efficient computation of reasonable approximations of large time-scales dynamics.

3 — Market Share Determination and Equilibrium Pricing for Suppliers Based on Their Logistic Efficiency
Yu Xia, Washington State University, Pullman, WA, 99164, xiayu@mail.wsu.edu., Bintong Chen

The paper studies competitive behavior of suppliers in a two-echelon supply chain. The equilibrium prices and the associated market shares are determined based on the suppliers' logistic efficiency.

4 — A Sequential Steady Sliding Algorithm for Multirigid-body Contact Problems
James A. Tzitzouris

We present a time-stepping scheme that estimates the frictional sliding directions for a multi-rigid-body contact problem at the beginning of each time step. The resulting algorithm is less intensive computationally than similar schemes using the full Coulomb friction model. We present examples illustrating the accuracy and efficiency of this algorithm.

■ SD15

Center-Room B4

Network Optimization 1

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Teodor Gabriel Crainic, U.Q.A.M., Professor, Montreal, QC, H3C 3P8, Canada, theo@crt.umontreal.ca

1 — A Reoptimization Algorithm with Tight Upper Bounds for the All Pairs Shortest Path Problem
Hani S. Mahmassani, University of Maryland, Director, Maryland Transportation Initiative, College Park, MD, 20742, USA, masmah@mail.utexas.edu., Xuesong Zhou

An efficient reoptimization algorithm with tight upper bounds is developed to solve the all pairs shortest path problem as a series of origin change problems. We discuss how to sequence origins so as to solve the problem efficiently within limited memory. Numerical experiments on large transportation networks illustrate the range of performance improvement.

2 — A Priori Routing Policies for Dynamic and Stochastic Traveling Salesman Problems
Amelia Regan, University of California, Irvine, CA, 92697 , USA, aregan@uci.edu., Xiangwen Lu, Jiri Herrmann

Our research begins with analytic analysis of single for single vehicle dynamic and stochastic traveling salesman problems and then extends this analysis with empirical analysis of several heuristics for both single and multiple vehicle problems. We examine the performance of several a priori routing policies for DTSP and PTSP problems.

3 — A Method and an Upper Bound for Networks with Random Arc Capacities
Raymond Cheung, Hong Kong Univ. of Science & Technology, Kowloon, Hong Kong, rcheung@ust.hk., Haiqing Song, Haiyan Wang

A method is developed to obtain new upper bounds of the objective values for a class of two-stage stochastic networks. It decomposes a network into trees whose arcs are exchanged iteratively and the benefits of the exchanges are obtained by an efficient procedure. We show how this method can be used to solve three-stage networks.

■ SD16

Center-Room C4

Combinatorics and Integer Programming of Multidimensional Tables

Cluster: Discrete Optimization
Invited Session

Chair: Serkan Hosten, San Francisco State University, San Francisco, CA, 94132, USA, serkan@math.sfsu.edu

1 — Toric Algebra of Graphical Models
Bernd Sturmfels, University of California, Berkeley, CA, 94720, USA, bernd@math.berkeley.edu., Dan Geiger, Chris Meek

We formulate necessary and sufficient conditions for a discrete probability distribution to factor according to an undirected graphical model, or a log-linear model, or other more general exponential models. This result extends the well-known Hammersley-Clifford Theorem.

2 — Algebra and Geometry of Cyclic and Reducible Models
Seth Sullivant, University of California, Berkeley, CA, 94720, USA, smus@math.berkeley.edu., Serkan Hosten

We discuss the algebra and polyhedral geometry of multi-way tables. In particular, we characterize the set of all marginal vectors when the underlying model is a binary n-cycle. Further, we construct Groebner bases for a reducible model from the Groebner bases of its pieces.

3 — Small 3-way Tables are Hard
Jesus De Loera, University of California, Assistant Professor, Davis, CA, 95616, USA, deloera@math.ucdavis .edu., Shmuel Onn

We describe the computational complexity of feasibility, counting , and entry-range problems for tables of type 3 x c x h. Our main new contribution is to show that all these problems are already intractable even when one of the dimensions is fixed.

■ SD17

Center-Room B1

Work Force Team Creation and Scheduling

Cluster: Manufacturing Systems
Invited Session

Chair: Bryan Norman, University of Pittsburgh, Pittsburgh, PA, 15261,

USA, banorman@engrng.pitt.edu

1 — Modeling Inherent Worker Differences for Workforce Planning
Esma Gel, Arizona State University, Assistant Professor, Tempe, AZ, 85287-5906, USA, esma.gel@asu.edu., Matthew Carlyle, John W. Fowler, Robert Cardy

There is broad empirical support for the influence of abilities and personal characteristics on job performance and other workplace relevant criteria from the field of Human Resource Management (HRM). We present an optimal workforce management (planning and control) framework that recognizes the critical importance of individual differences in the workplace.

2 — Assigning Workers to Tasks on Multifunctional Teams
Ron Askin, University of Arizona, Tucson, AZ, 85721, USA, ron@sie.arizona.edu.

Teams require coordinated effort and group synergy for success. Assigning team members to tasks requires consideration of each individual's natural fit to the required tasks, their current skill level, training time, and time required to complete each task. We propose a model for assigning tasks to maximize synergistic team success while minimizing project completion time and training costs.

3 — Workforce Training and Deployment Considering Learning and Forgetting Effects
Bryan Norman, University of Pittsburgh, Pittsburgh, PA, 15261, USA, banorman@engrng.pitt.edu., D. A. Nembhard

We consider how to effectively cross train and assign workers in environments where the tasks have significant learning and forgetting effects. In particular, we look at how learning and forgetting interact with other system parameters such as absenteeism, turnover, rate of new product development, task tenure, and system performance objectives.

■ SD18

Center-Room J2

Some Recent Military Optimization Applications

Cluster: Applications of Optimization Theory
Invited Session

Chair: Robert Dell, Naval Postgraduate School, Associate Professor, Monterey, CA, 93943, USA, dell@nps.navy.mil

1 — An Improved Heuristic for Tomahawk Land Attack Predesignation
Alexandra Newman, Colorado School of Mines, Denver, CO, USA, anewman@mines.edu., Gerald Brown, Justin Kubu, Paul Wingeart

Assigning tasks requiring Tomahawk Land Attack Missiles (TLAM) to firing units is a complex, time-consuming, and, currently, manual process. We present a heuristic for TLAM predesignation to assist the Tomahawk Strike Coordinator in finding efficient, logical and reproducible allocations and compare heuristic solutions to manual allocations from U.S. Fleet exercises.

2 — JOIST (Joint Optimal Information Strike Tool)
Alan Washburn, Naval Postgraduate School, Monterey, CA, 93943, USA, awashburn@nps.navy.mil.

JOIST deals with the optimal tasking of both strike and information assets. Using both Linear Programming and Partially Observable Markov Decision Processes, phenomena modeled include damage assessment, surveillance, and target tracking. Realistically scaled problems can be solved in minutes or hours, depending on the degree of precision required.

3 — CIPA: Capital Investment Planning Aid for the US Navy
Javier Salmeron, Naval Postgraduate School, Monterey, CA, 93943, USA, jsalmero@nps.navy.mil., Gerald Brown, Robert Dell, Anton Rowe

We present CIPA, an optimization-based decision support system, custom built for the Navy to help plan ship, submarine, and aircraft procurement and retirement schedules over a 30-year horizon. These plans represent over a $1 trillion commitment to ensure the Navy stays ready to fulfill its missions.

■ SD19

Fairmont-Regency 2

Challenges of Energy Trading

Sponsor: Energy/Natural Resources/Environment Section - Electricity Markets and Energy Modeling
Sponsored Session

Chair: Chung-Li Tseng, University of Maryland, Assistant Professor, College Park, MD, 20742, USA, chungli@eng.umd.edu

1 — The Challenges of Online Energy Trading
Graydon Barz, Opt4 Derivatives, Inc., Chief Risk Officer, Berkeley, CA, 94710, USA, gbarz@yahoo.com.

The introduction of online energy trading has brought with it many new issues concerning market development, contract pricing, and risk management. While much attention has recently focused on increasingly sophisticated option pricing and risk management techniques, many of the primary concerns regarding online trading are much more prosaic. Trade permissioning and execution as well as clearing, guarantee, post-trade management, and product intrgration each require special consideration.

2 — Capital Allocation for Energy Trading and Marketing Firms
Aram Sogomonian, Aram.Sogomonian@constellation.com., Adrian Dragulescu

We review and compare the traditional methods firms use to allocate capital for investment purposes e.g. the net-present-value approach, and Sharpe ratio, with recent proposals e.g. value-at-risk (VAR), and risk-adjusted-rate-of-return (RAROC). We discuss the agreggation of individual projects and the use of a relevant time horizon for the proposed metrics.

3 — A Probabilistic Optimization Model for Settlement Risk in Retail Electrical Power Markets
Steven Gabriel, University of Maryland, Assistant Professor, College Park, MD, 20742-3021, USA, sgabriel@eng.umd.edu., Supat Kietnithiamorn

We consider the electrical power retailer who contracts with suppliers and end users and provides future load estimates to the suppliers. We develop a probabilistic optimization model to optimize the retailer's net profits given the cumulative performance in previous time periods. The resulting model is formulated as a mixed integer linear program with binary variables due to the disjunctive nature of certain "bandwidth" constraints.

■ SD20

Fairmont-Hillsborough

Spectrum Auctions II

Cluster: Auctions
Invited Session

Chair: Karla Hoffman, George Mason University, Professor, Fairfax, VA, 22030, USA, khoffman@gmu.edu

1 — A Spectrum Auction for Deregulation without Confiscation or Unjust Ennrichment
Michael Rothkopf, Rutgers University, Piscataway, NJ, 08854, USA, rothkopf@rutcor.rutgers.edu.

We propose a series of market-clearing-price auctions for residual spectrum rights. Adapting McGuire's "inter-tract" bidding idea, we make bidders for different spectrum bands compete with each other. Only those offering the highest bids per MHz-Pop will win . Combinatorial bids can be allowed while maintaining a polynomial winner determination process.

2 — FCC Spectrum Auctions
Janos Csirik, AT&T Labs -- Research, Florham Park, NJ, 07932-0971, USA, janos@research.att.com.

Some of the biggest auctions that occured to date were auctions where governments sold licences for wireless phone use. We have implemented a simulator for FCC spectrum auctions and used it to study strategies for a recent FCC spectrum auction (No. 35) where approximately $17 billion was raised. This talk will report on the work done, some of our conclusions, and a discussion of their applicability to other auctions. (Joint work of S Baveja, JAC, ML Littman, PSA Reitsma, P Stone.)

3 — Bid Evaluation for FCC Auction 31 Using Column Generation
Marta Eso, IBM T. J. Watson Research Center, Yorktown Heights, NY, 10598, USA, martaeso@us.ibm.com., David Jenson, Laszlo Ladanyi

We report on implementing a shadow solver to verify results obtained by the FCC in-house solver. We use branch-and-price(COIN/BCP with OSL) for bid evaluation, avoiding most numerical difficulties associated with the natural formulation. Computational aspects of both the bid evaluation and pricing problems are addressed and tested on FCC simulated data.

■ SD21

Fairmont-Glen Ellen

Portfolio Optimization

Contributed Session

Chair: Sunil Kumar, Stanford University, kumar_sunil@gsb.stanford.edu

1 — Multi-Dimensional Portfolio Selection with Transaction Costs — A Numerical Approach
Muthukumar Muthuraman, Stanford Univ, Stanford, CA, 94305 , USA, mkumar@stanford.edu., Sunil Kumar

In this paper we present a Numerical Method to solve the optimal consumption-investment problem with Transaction costs. We consider n risky assets and one risk-free asset. Proportional transaction costs are assumed in trading between the assets. We model the price processes of the n assets with a geometrical brownian

motion driven by an m dimensional brownian motion. Naturally this model allows non-zero covariance, giving rise to interesting hedging strategies. We recast the model into a stochastic control problem with both continuous and singular controls. Then we describe a very efficient numerical method to solve the problem.

2 — A Mean-variance Optimization (MVO) with Hybrid Tax, Yield and Turnover Consideration
Robert Groat, NetDecide Corp, Falls Church, 22043, USA, robert.groat@netdecide.com., Yuan H. Wang, Raghu Chintala, Spencer Dillard

In this paper, we build an MVO model by considering the non-taxable account and taxable account as a whole. We systematically consider its tax factors, turnover and yield. Its optimization should be superior to a simple summation of the two subsystems.

3 — Index Tracking
J. E. Beasley, Imperial College, London, SW7 2AZ, England , j.beasley@ic.ac.uk.

The index tracking problem is to decide a tracking portfolio to reproduce the performance of a stock market index, but without purchasing all of the stocks that make up the index. We give an algorithm and computational results for portfolios that track major world markets and out-perform them.

4 — Mean-Variance Market Portfolio, Its Inefficiency , and CAPM in Continuous-Time
Chun Hung Chiu, The Chinese University of Hong Kong, Hong Kong, HK, PRC, chchiu@se.cuhk.edu.hk., Xunyu Zhou

This research studies a continuous-time capital market where all the agents are mean-variance efficiency seekers. The market portfolio is explicitly derived given homogeneous expectations. It is then proved that the market portfolio must be inefficient. Finally, a modified continuous-time mean-variance capital asset pricing model is developed.

■ SD22

Fairmont-Paseo

OR/MS in Forestry - Forest Operations

Sponsor: Energy/Natural Resources/Environment Section - Forestry
Sponsored Session

Chair: Susan King, USDA Forest Service, Operations Research Analyst, Newtown Square, PA, 19073, USA, sking01@fs.fed.us

1 — Adaptive Optimisation in the Roundwood Supply Chain
Peter Lohmander, Swedish Univeristy of Agric. Science, Professor, Umea, Sweden, plohmander@hotmail.com., Leif Olsson

An adaptive dynamic linear programming model with stochastic disturbances of critical parameter values is applied to a real forest company logistics and supply chain problem. Optimal road investment and stock policy decisions are reported. The number of state space dimensions is too large for adaptive optimisation via stochastic dynamic programming.

2 — Optimal Mixed Stand Management Under Risk
Fadian Lu, Swedish University of Agric. Science, Umea, S-901 83, Sweden, fadian.lu@sekon.slu.se., Peter Lohmander

Different tree species are sensitive to damages from different kinds of fungi, insects and vertebrates. Product prices also change over time. Mixed species stands provide valuable options to sequential adaptive management. An adaptive optimisation model is developed which determines the initial mix of species that maximizes the expected present value.

3 — Optimal Road Investments — A Forest Company Case Study
Leif Olsson, Midsweden University, Sundsvall, S-85170, Sweden, leiols69@icqmail.com.

A mixed integer programming model with high spatial resolution is developed. It calculates optimal road investment strategies over a ten year planning horizon. A forest company case study indicates that an increased level of road investments is optimal. As a consequence, the stock levels at the terminals are reduced.

4 — Computer Simulation Model for Assessing Wood Procurement Practices in the Southeastern United States
William Howell, Warnell School of Forest Resources, Athens, GA, 30602, USA, whh9704@owl.forestry.uga.edu., Michael Clutter

Many wood procurement strategies exist in the Southeast. The goal of the strategies is to balance costs and procurement risks of consistent raw materials furnish. We present a wood procurement simulation model that is mill specific, can evaluate current wood procurement practices and identify possible changes that will reduce cost and/or risk associated with the wood procurement system. Monte-Carlo simulation techniques are used.

■ SD23

Center-Room L

Airline Operations I

Sponsosr: Transportation Science Section, Aviation Applications Section
Sponsored Session

Chair: John-Paul Clarke, Massachusetts Institute of Technology, Cambridge, MA, 02139, johnpaul@mit.edu

1 — Virtual Hubs: A Schedule Recovery Approach
Michelle Karow, Massachusetts Institute of Technology, Cambridge, MA, 02139, karow@mit.edu.

Abstract not supplied

2 — Degradable Airline Scheduling
Laura Kang, Massachusetts Institute of Technology, Cambridge, MA, 02139

We present a methodology for deriving an airline schedule robust to unpredictable weather from a revenue perspective. Central to the approach is the division of the schedule into independent sub-schedules prioritized on the basis of revenue. We discuss solution of a linear approximation to the resulting optimization problem.

3 — Impact of Passenger Demand and System Capacity on Hub-and-Spoke Networks
Flora Garcia, Massachusetts Institute of Technology, Cambridge, MA, 02139

Commercial airlines have developed hub-and-spoke networks as a means of satisfying passenger demand while minimizing operating costs in a capacity-constrained system. We present an analytical approach to determine the optimal number of hubs and their locations for an airline operating in this environment.

4 — Evaluating Airline Schedules and Schedule-Recovery Procedures for Improved Operational Dependability
Tuell Green, American Airlines, DFW Airport, TX, 75261, tuell.greeen@aa.com.

We present a multi-phased approach to evaluate the operational dependability of a planned schedule at American Airlines. The objective is to understand relationships between schedule attributes and dependability that can be incorporated into the schedule-optimization tools to explicitly account for dependability and improve operational performance. A valuable bi-product of this effort is a simulation-based environment in which many other issues (OSO recovery procedures, crew pairing strategies, resource allocation strategies, etc.) can be addressed and evaluated.

■ SD24

Hilton-Pacific

Best Cases

Sponsor: Education
Sponsored Session

Chair: Peter Bell, University of Western Ontario, pbell@ivey.uwo.ca

1 — Best Cases
Peter Bell, University of Western Ontario, pbell@ivey.uwo .ca.

Several teachers from business schools and MS/OR departments will present their favorite OR/MS cases, describing them and reviewing how to use them in the classroom.

■ SD25

Center-Room F2

Panel discussion: Creative Solutions to Balancing Work and Family

Sponsor: Women's Forum
Sponsored Session

Chair: Janny Leung, Chinese University of Hong Kong, Shatin, NT, Hong Kong, janny@se.cuhk.edu.hk

1 — Panel Discussion: Creative Solutions to Balancing Work and Family
Panelists: Sarah Ryan, Iowa State University Susan Monkman, University of Texas Eylem Tekin, University of North Carolina Rhonda L. Righter, Santa Clara University

■ SD26

Hilton-San Carlos I

Management Science Models in Health Care Delivery

Cluster: Service Operations
Invited Session

Chair: Stefanos Zenios, Graduate School of Business, Stanford, CA, 94305, USA, stefzen@stanford.edu

1 — Estimating HIV Incidence from HIV Reporting Data
Edward H. Kaplan, Yale School of Management, Beach Professor of Management Sciences, New Haven, CT, 06520-8200, USA, edward.kaplan@yale.edu.

National HIV incidence estimates are needed to monitor the HIV epidemic, evaluate interventions, and allocate resources. New HIV testing procedures determine if an individual was recently infected with HIV. Also, HIV (as opposed to AIDS) reporting is now standard policy in 35 states, and CDC expects most states to adopt HIV reporting. We review models for estimating HIV incidence from HIV reporting data, and also discuss practical difficulties with obtaining the necessary data.

2 — Analyzing Smallpox Response Logistics: The Case of Smallpox
Lawrence M. Wein, Stanford University, Prof. of Operations, Information & Technology, Stanford, CA, 94305-5015, USA, lwein@stanford.edu., Edward H. Kaplan, David L. Craft

We embed the key operational features of an emergency response to a smallpox attack into a disease transmission model. An approximate analysis of this large (16 ODE) system yields closed-form estimates for the total number of deaths and reveals how congestion makes the ``race to trace'' difficult to win.

3 — Optimal Control of a Medical Waiting System with Autonomous Patients
Xuanming Su, Graduate School of Business, Stanford, CA, 94305, USA, su_xuanming@gsb.stanford.edu., Stefanos Zenios

Waiting systems for medical services have two distinctive features that differentiate them from queueing systems commonly studied in Operations Management: variability in the quality of service, and patient autonomy. To capture these features, we develop and analyze a stylized competitive M/M/1 queueing model with reneging.

■ SD27

Center-Room C2

Current Issues in Reverse Logistics

Cluster: Reverse Supply Chain
Invited Session

Chair: Geraldo Ferrer, University of North Carolina, Assistant Professor of Operations, Management, Chapel Hill, NC, 27599-3490, USA, ferrerg@bschool.unc.edu

1 — Reverse Logistics: a review of case studies
Rommert Dekker, Erasmus University Rotterdam, Prof, Rotterdam, ZH, 3000 DR, The Netherlands, rdekker@few.eur .nl.

In this paper a review of over 60 cases on reverse logistics is presented. Many cases are based on OR models, which gives a wealth of information on how reverse logistics was done. The cases are classified into five groups, viz. reverse logistic networks, relationships, inventory managment, recovery planning and control and finally IT methods. From the cases we derive typical, standard cases for which standard OR decision models can be formulated.

2 — On the Combined Planning and Control of Asset Replacement and Reallocation Paper 4
Simme Douwe Flapper, Technische Universiteit Eindhoven, Eindhoven, 5600MB, The Netherlands, s.d.p.flapper@tm.tue .nl.

In literature on Total Cost of Ownership it is usually assumed that replacement decisions are made for individual assets in isolation. However, there are many situations in practice where replacement decisions for assets are not, or should not, be made independently from other actual or future replacement decisions. An algorithm is presented to support combined asset replacement-reallocation decisions. The working of the algorithm is illustrated by a real life application in a lease company.

3 — Strategic Planning of Closed-loop Supply Chains
Frank Schultmann, University of Karlsruhe, Institute for Industrial Production, Karlsruhe, D, D-76187, Germany, frank.schultmann@wiwi.uni-karlsruhe.de.

Recent developments in European environmental legislation force industries to close their supply chains. Two approaches for the planning of closed-loop supply chains are presented. First, mixed-integer linear programming formulation and process simulation are used to model a supply chain for the collection, sorting and recycling of spent batteries. Second, the multi-stage reverse supply chain of plastic components from end-of-life-vehicles (ELV) is studied using tabu search heuristics.

4 — Lifecycle Management of Remanufactured Products
Geraldo Ferrer, University of North Carolina, Assistant Professor of Operations Management, Chapel Hill, NC, 27599-3490, USA, ferrerg@bschool.unc.edu., Enno Siemsen, Ann Marucheck

We model the timing of introduction and price of a remanufactured product competing with a new product of known lifecycle. Timing defines the potential market and price limits the demand for remanufactured products. We identify the Nash equilibrium that determines the time of introduction and sets prices to induce self-selection.

■ SD28

Center-Ballroom A1

Contract Manufacturing

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Sezer Ulku, McDonough Schol of Business, Assistant Visiting Professor, Washington, DC, 20057, USA, su8@georgetown.edu

1 — Structuring Buyer-Supplier Relationships
Wedad Elmaghraby, Georgia Institute of Technology, welmaghr@isye.gatech.edu., Se-Kyoung Oh

When a supplier's costs decrease over time, it may be advantageous for the buyer to keep an incumbent supplier, in the hopes of reducing her procurement costs. However, this will only occur if the supplier is forced to pass along a portion of his cost savings to the buyer. We explore procurement mechanisms the buyer can use to help capture some of the cost savings.

2 — The Impact of Outsourcing on the Timing of Entry Under Evolving Demand Information
Sezer Ulku, McDonough Schol of Business, Assistant Visiting Professor, Washington, DC, 20057, USA, su8@georgetown.edu., Beril Toktay, Enver Yucesan

A firm holding an innovation faces an uncertain market demand that evolves over time. The firm must decide on the optimal time of entry and the magnitude of the investment. We examine the impact of outsourcing on these decisions.

3 — Capacity Options and Subcontracting Strategies for Producers with Limited Capacity and Volatile Demand
Baris Tan, Koc University, Istanbul, Turkey, btan@ku.edu .tr.

The strategy of increasing the production capacity temporarily by using capacity options is investigated. These options give the right to receive additional production capacity from subcontractors. A continuous material flow production system that supplies materials to meet a random demand is analyzed. The optimal policies for production and subcontracting are determined. Application of the approach in a textile-apparel-retail channel is discussed and simulation results are reported.

4 — Advanced Demand Information and Safety Capacity as a Hedge Against Demand and Capacity Uncertainty
Xinxin Hu, University of Michigan Business School, Roman Kapuscinski, Izak Duenyas

To control a production-inventory system, a manager has to consider the variabilities in both demand and production process, which can be alleviated by either investing in better information systems or having safety capacity. We address, in this paper, the associated tactical and strategic decisions that a firm makes for such system.

■ SD29

Center-Ballroom A5

Applying Supply-Chain Theory in Practice

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Sean Willems, Boston University, Assistant Professor, Boston, MA, 02215, USA, willems@bu.edu

1 — Reflections on Putting Inventory Research into Software Products
Stephen Graves, Massachusetts Institute of Technology, Cambridge, MA, 02143, USA, sgraves@mit.edu.

In this presentation I will talk about experiences in transferring multi-echelon inventory research to software for industry use. I will discuss success factors and failure modes, as well as lessons learned. I will conclude with comments on the general applicability of our research, as well as the research needs we have identified from our experiences.

2 — Coordinating Production, Inventory and Transportation Decisions in the Supply Chain
David Simchi-Levi, MIT, Professor, Cambridge, MA, 02139, USA, dslevi@mit.edu.

n this talk we look at problems faced by shippers that rely on TL (Truckload) and LTL (Less-Than-Truckload) carriers for the distribution of products across their supply chain. In this case, the goal is to design a production/inventory policy and a transportation strategy so as to minimize system-wide cost by taking advantage of the transportation cost structure. We demonstrate how theoretical analysis can be applied in the development of effective and robust algorithms.

3 — Application of Simulation-based-Optimization, a Flexible Approach to Solve Real Supply Chain Inventory Planning Problems

Sridhar Tayur, Carnegie Mellon University, Professor, Pittsburgh, PA, 15213, USA, stayur@andrew.cmu.edu.

This talks discusses the application of Simulation-based-Optimization, a flexible approach to solve real supply chain inventory planning problems due to its modeling versatility as well as its ability to find gradients with respect to inventory targets. Its relationship to purely analytical or a purely simulation approach is also discussed.

4 — Integrating Theory into Optiant's Power Chain Inventory Product
Sean Willems, Boston University, Assistant Professor, Boston, MA, 02215, USA, willems@bu.edu.

This talk will describe how academic work in multiechelon inventory optimization has been applied at Optiant. In particular, we will discuss how assumptions, objectives, and outputs have to change when developing commercial software.

■ SD30

Center-Ballroom A6

Retail Supply Chain Management I

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Stephen Smith, Santa Clara University, Professor, Santa Clara, CA, 95053-0382, USA, ssmith@scu.edu

Co-Chair: Narendra Agrawal, S.C.U, Associate Professor, Santa Clara, CA, 95053, USA, nagrawal@scu.edu

1 — Retail Assortment Decision in the presence of Consumer Search
Yi Xu, The Wharton School, Ph.D. Candidate, Philadelphia, PA, 19104, USA, xuyi@wharton.upenn.edu., Gerard Cachon, Christian Terwiesch

We develop a decision framework for a retailer's assortment problem that incorporates consumer search. Our model suggests that a retailer should not only look at the direct costs and revenues of the assortment, but also anticipate the indirect benefit that an extended assortment has in preventing consumer search. We demonstrate that the traditional approaches to assortment planning may lead to an assortment with fewer items than optimal.

2 - Drivers of Variation in Retail Inventory Turnover
Vishal Gaur, Stern School of Business, NYU, New York, NY, 10012, USA. vgaur@stern.nyu.edu, Marshall Fisher, Ananth Raman.

We explain the variation in retail inventory turnover using data for 311 firms for 16 years. Our model gives a new benchmark for inventory turnover and shows whether inventory turnover improved with time and with investment in capital assets.

3 — Choosing Optimal Retail Assortments Using Conjoint Preference Data
Stephen Smith, Santa Clara University, Professor, Santa Clara, CA, 95053-0382, USA, ssmith@scu.edu.

Retail buyers must choose among a wide variety of brands and features in specifying their assortment of products of a certain type. This paper develops mixed integer, LP formulations for maximizing profit, subject to different consumer choice assumptions, e.g., utility maximization versus "saticificing." The solution properties are illustrated using an actual conjoint database of consumer preferences for DVD players.

■ SD31

Center-Room J3

ICS Prize Tutorial

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Renato Monteiro, Georgia Tech, Professor, Atlanta, GA, 30332, USA, monteiro@isye.gatech.edu

Co-Chair: Yin Zhang, Rice University, Houston, TX, 77005, USA, zhang@caam.rice.edu

1 — A Unified Analysis for a Class of Long-Step Primal-Dual Path-Following Interior-Point Algorithms for Semidefinite Programming
Renato Monteiro, Georgia Tech, Professor, Atlanta, GA, 30332, USA, monteiro@isye.gatech.edu., Yin Zhang

We present a unified analysis for a class of long-step primal-dual path-following algorithms for semidefinite programming whose search directions are obtained through linearization of the symmetrized equation of the central path. We also survey the main results on polynomial convergence of primal-dual path-following algorithms for emidefinite programming . If time permits, we will discuss some implementation issues elated with these methods.

■ SD32

Center-Room J4

Stochastic Optimization II - Solution Methodology

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Leonardo Lopes, Northwestern University, Evanston, IL, 60208, USA, leo@iems.nwu.edu

1 — Advances in an XML-based Representation for Instances of Mathematical Programs.
Leonardo Lopes, Northwestern University, Evanston, IL, 60208, USA, leo@iems.nwu.edu., Robert Fourer

We report progress over the last year on an XML-based dialect for conveying instances of mathematical programs belonging to a wide range of categories. Amongst the advances, we emphasize: better definitions of all components an AMPL drive for basic linear programming problems; and a problem server solvers can connect to .

2 — On Stages and Consistency Checks in Stochastic Programming
Horand Gassmann, horand.gassmann@dal.ca., Andras Prekopa

Different branches of stochastic programming use different definitions of stages. This talk proposes a unified approach, necessary to permit automatic problem generation from user input. This affects the construction of input formats (SMPS) and the design of algebraic modelling languages (such as AMPL). It also allows automatically generated consistency checks.

3 — A Superadditive Dual Approach to Two-Stage Stochastic Integer Programming
Nan Kong, University of Pittsburgh, Pittsburgh, PA, 15261 , USA, nak11@pitt.edu., Andrew J. Schaefer

We consider a class of stochastic programs with integer recourse and reformulate them using superadditive duality. This allows us to solve instances that are several orders of magnitude larger than problems found in the literature. We provide theoretical and computational results and give directions for future research.

■ SD33

Hilton-University

Approximate Dynamic Programming IV

Sponsor: Optimization Section-Dynamic Programming
Sponsored Session

Chair: Daniela Pucci de Farias, IBM Almaden Research Center, Postdoctoral Research Scientist, San, Jose, CA, USA, pucci@mit.edu

1 — Boosting for Approximate Dynamic Programming
David Choi, Stanford University, student, Palo Alto, CA, 94303, USA, dchoi@stanford.edu., Ben Van Roy

Boosting is a computational learning technique originally designed to reduce error rates in pattern classification. Boosting has also found application in regression and linear programming column generation. In this talk, we discuss ways of using boosting in the linear programming approach to approximate dynamic programming.

2 — Shaping and Policy Search in Reinforcement Learning
Andrew Ng, Stanford University, Palo Alto, CA, 94305-9010 , USA, ang@cs.stanford.edu.

I present two ideas that have enabled the successful application of reinforcement learning to four-legged robot walking and to autonomous helicopter flight. The first, potential-based reward shaping, describes how rewards may be modified to accelerate learning while guaranteeing optimal learned policies. The second, PEGASUS, is an efficient policy search method that enjoys strong performance guarantees. Joint work with Daishi Harada, Michael Jordan, Hyounjin Kim, Greg Lawrence, Stuart Russell, Shankar Sastry, and Doron Tal.

3 — Portfolio Optimization and Approximate Dynamic Programming
Martin Haugh, Columbia University, Assistant Professor, Industrial Engineering and Operations Research, New York, NY, 10027, USA, mhaugh@ieor.columbia.edu., Leonid Kogan, Andrew Lo, Jiang Wang

Abstract not supplied

4 — Dynamic Optimization for Direct Marketing Problem
John Tsitsiklis, MIT, Cambridge, MA, USA, jnt@mit.edu., Duncan Simester, Peng Sun

Direct marketing (catalog mailing) is a very important contributor to the effectiveness of retailing both traditionally and via the worldwide web. Catalog firms in the USA mailed almost 17 billion catalogs in 2000, generating over $88 billion in consumer and business to business spending. This research explores the dynamic nature of catalog mailing decision strategies and develops approximate dynamic programming models to solve the problem. We also address the upward bias problems in dynamic programming caused by data inherited with endogeneity and random noise limitations. Computational results with data from a retail catalog mailer show that the models have the potential to greatly improve long-run profits.

■ SD34

Hilton-Plaza

Risk Environment

Sponsor: Decision Analysis Society
Sponsored Session

Chair: John Butler, Ohio State University, Columbus, OH, 43210, USA, butlerj@cob.ohio-state.edu

1 — Accommodating Utility Discontinuities at the Status Quo
R. Duncan Luce, University of California, Irvine, CA, 92697-5100, USA, rdluce@uci.edu.

Data suggest that gambles with a zero consequence are evaluated quite differently from those with zero replaced by a small positive consequence. But existing rank- and sign-dependent utility axiomatizations assume otherwise. A new axiomatization designed to accommodate this phenomenon is reported. It leads to RDU and to a new family of representations.

2 — The Calculus of Subjective Risk Preferences and Beliefs
Mark Machina, University of California, La Jolla, CA, 92093-0508, USA, mmachina@ucsd.edu.

By adopting an event-theoretic approach, this paper establishes the local and global robustness of the basic analytical concepts, tools and results of the classical expected utility / subjective probability model to "event-smooth" preferences over subjectively uncertain acts that do not necessarily exhibit either expected utility risk preferences or probabilistic beliefs.

■ SD35

Hilton-Almaden II

Quality and Productivity Improvement for Multistage Manufacturing Processes

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Jionghua (Judy) Jin, University of Arizona, Tucson, AZ, 85721-0020, USA, jhjin@sie.arizona.edu

1 — Issues in Applying Variation Models for Multistage Processes
Jeffrey Robinson, General Motors, Warren, MI, 48090-9055, USA, jeffrey.a.robinson@gm.com.

Tracking and measuring products as they pass through a manufacturing process enables a multitude of potentially beneficial analyses. Some methods and their application at an auto company are summarized. More importantly, issues that could affect future applications are discussed.

2 — Multiple Stream Process, Process-Oriented Basis and Multivariate Statistical Process Control
George Runger, Arizona State University, Tempe, AZ, 85287-5906, USA, runger@asu.edu.

Multiple stream processes are ubiquitous. The presentation describes new methods to model and build control schemes for these types of processes. The emphasis is on large, high-dimensional data sets. The advantages from models and process knowledge are quantified. It is shown how many important process features can be controlled within the same model.

3 — Diagnosability Study of Multistage Manufacturing Processes Based on Linear Mixed-effects Models
Shiyu Zhou, University of Wisconsin, Madison, WI, 53706-1572, USA, zhous@engin.umich.edu., Yu Ding, Yong Chen, Jianjun Shi

This paper examines the diagnosability of process faults in a multistage manufacturing process using a mixed-effects model. Fault diagnosability is defined in a general way that does not depend on specific diagnosis algorithms. A minimal diagnosable class is proposed to expose "aliasing" fault structure in a partially diagnosable system.

4 — A Generic Intelligent Nonconformance Tracking and Diagnostic Recovery (GINTDR) System
Hossein Cheraghi, Wichita State University, hossein .cheragi@wichita.edu.

Tracking, diagnosis and recovery of nonconformance with multiple causes in a multistage manufacturing process is time consuming and tedious. Based on the soft computing and case-based reasoning technology, this research develops a generic intelligent system to trace the root causes of the nonconformance and provides timely recovery.

■ SD36

Center-Room F1

Tutorial: Using Random Equations for Reliable IP Transport

Sponsor: Applied Probability Society
Sponsored Session

Chair: L. D. Servi, MIT Lincoln Laboratory, Lexington, MA, servi@ll.mit.edu

Co-Chair: Emmanuel Fernandez, University of Cincinnati, Assoc. Prof., Cincinnati, OH, 45221-0030, emmanuel@ececs.uc.edu

1 — Tutorial: Using Random Equations for Reliable IP Transport
Vivek Goyal, Digital Fountain, Inc., Senior Researcher, Fremont, CA, 94538, USA, goyal@digitalfountain.com., Michael Luby

IP network design is based on the fundamental philosophy that it is easier and more economical to build high performance scalable networks if guaranteed packet delivery is not a requirement. The TCP protocol provides reliable IP transport, but sacrifices both performance and scalability. We introduce a random equations approach to reliable IP transport that doesn't sacrifice performance or scalability. In this tutorial we give an overview of the problem and solutions approaches mentioned above.

■ SD37

Center-Room J1

Queueing I

Contributed Session

Chair: Javier Faulin, Public University of Navarra - UNED, Associate Professor, Pamplona, NA, 31006, Spain, javier.faulin@unavarra.es

1 — Scheduling in Multiclass Networks with Deterministic Service Times
Rhonda L. Righter, Santa Clara University, Santa Clara, CA, 95053, USA, RRighter@scu.edu.

We consider general feed-forward networks of queues with deterministic service times, arbitrary arrival processes, holding costs at each queue, and unreliable servers. We partially characterize the optimal policy and give conditions under which lower priority should be given to jobs that would be delayed later if processed now.

2 — Predicting Simulation Output for Staffing Nonhomogeneous Service Systems with Routing
John C. Goodale, University of Oregon, Eugene, OR, 97403-1208, USA, jgoodale@LCBmail.uoregon.edu., Don G. Wardell

Tractable, closed-form solutions for customer-waiting measures are often used when conducting experiments that examine effects on staffing decisions for service systems with cyclic demand. However, this approach becomes infeasible when one considers the effects of routing and individual service rates. We develop an approach that uses tractable queueing models for predicting simulation output of nonhomogeneous service systems with routing.

3 — Effects of the Choice of the Decision Epochs on the Optimal Policy and Optimal Value of the Arrival Control of a M/G/1 Queue
Yarlin Kuo, National Yunlin University of Science and Technology, Touliu, Yunlin, 640, Republic of China, kuoyl@pine.yuntech.edu.tw.

A comparison of optimal arrival control policies and optimal values of a M/G/1 queue at arrival epochs and at departure epochs is studied. First, we prove that the optimal policy of the arrival control at the departure epochs is of control-limit type. Then, numerical comparison of the optimal policies and values of these two different control systems is presented.

4 — Equilibrium and Optimal Pricing of Priority Services
Kuo-Hwa Chang, Department of Industrial Engineering, Chung Yuan Unversity, Chung-Li, 320, R.O.C., kuohwa@cycu .edu.tw.

This study considers a queueing system that offers priority services to heterogeneous customers and sets prices to maximize its total net profit. Each customer selects her service level based on prices, performances of services and the service value perceived by her. Stability conditions, uniqueness of equilibrium arrival rates and optimal pricing are discussed.

5 — Decision Analysis in a Call Center using an Excel Add-in Simulator
Javier Faulin, Public University of Navarra - UNED, Associate Professor, Pamplona, NA, 31006, Spain, javier .faulin@unavarra.es., Angel A. Juan

We describe the behavior of a call center, having the classical constraints related to the queue length. Our paper uses simulation to design the appropriate parameters of the queues associated to a call center. This simulation is performed having the help of an add-in for Excel which has been especially built for this kind of systems of service.Finally, the situations of several scenarios are compared in order to discuss the efficiency of the decisions designed by the simulation process.

■ SD38

Center-Room N

Roundtable - Railroads in The Customers Supply Chain II

Sponsor: Railroad Applications Section
Sponsored Session

Chair: Michael F. Gorman, University of Dayton, Professor, Dayton, OH, 45469, USA, michael.gorman@udayton.edu

1 — CP/Tronicus experience with rail-provided supply chain services
Carl Young, Tronicus, Inc., Alberta, Canada

We review the evolution of the 3PL marketspace and it's impact on the railroad industry. We highlight how CPR is responding to market trends and forces and sight how Tronicus is deploying leading-edge technologies to enhance customers supply chain performance.

2 — Intelligent Supply Chain Control
Ed Dougherty, IntelliTrans, LLC, Atlanta, GA, 30303, edougherty@august-design.com.

The next generation supply chain management system will provide intelligent end-to-end visibility and control over multiple modes , multiple commodities, and multiple customers. The talk will describe how a near optimum next generation supply chain solution is being created by loosely coupling point solutions and controlling them with a combination of expert systems and fuzzy logic.

3 — A Prototype for a Successful Implementation of Rail-based Supply Chain Services
Mike Miller, NS Modalgistics, Atlanta, GA, 30303, momiller@nscorp.com.

We discuss how NS Modalgistics took a key customer from prospect, to consulting client, to full-blown implementation and execution. In particular, we talk about how service and technology come together to create a valuable product for a Norfolk Southern shipper.

■ SD39

Center-Room K

Network Design and Reliability

Sponsor: Transportation Science Section
Sponsored Session

Chair: Srinivas Peeta, Purdue University, West Lafayette, IN, 47907, USA, peeta@ce.ecn.purdue.edu

1 — Handling Demand Uncertainty and Multiple Objectives in Network Design Problem
Kitti Subprasom, Dept. of Civil & Environmental Engineering, Logan, UT, 84322-4110, torutah@hotmail.com., Zhaowang Ji, Anthony Chen

Network design is an important topic in the field of transportation network research. In this talk, we extend the classical network design problem to include multiple objectives and demand uncertainty. A simulation-based genetic algorithm will be presented to solve this multi-objective stochastic network design problem.

2 — Critical Link Determination for Origin-destination Connectivity in a Dynamic Transportation Network with Random Failures
Pamela Murray, Civil & Environmental Engineering Department, Austin, TX, 78712, USA, p.murray@mail.utexas .edu., Hani S. Mahmassani

A criticality index is developed to express a link's importance to OD-specific and overall connectivity in a dynamic transportation network with time-varying multi-commodity (including passenger) OD flows. This measure supports the a priori planning of contingency measures in the event of random breakdowns.

3 — Reliability-based Network Design for Disaster Management
Kannan Viswanath, Purdue University, W. Lafayette, IN, 47907-1284, Srinivas Peeta, F. Sibel Salman

We seek to design reliable transportation networks in the context of earthquake management while ensuring maximum population coverage, minimizing the overall travel time between the critical origin-destination pairs, and incorporating budgetary considerations.

■ SD40

Center-Room G

Simulation Optimization

Sponsor: College on Simulation Section
Sponsored Session

Chair: Michael Fu, University of Maryland, mfu@isr.umd.edu

1 — Roles for Ranking & Selection in Optimization via Simulation
Barry L. Nelson, Northwestern University, Evanston, IL, 60208, bnelson@northwestern.edu., Juta Pichitlamken

We describe roles for statistical ranking and selection procedures within and after the termination of algorithms for optimization via simulation. We also display some ranking and selection procedures that have been specifically designed for this purpose.

2 — Constrained Stochastic Optimization over Discrete Sets with Application to Resource Allocation
James E. Whitney, III, Morgan State University, Baltimore , MD, whitney@eng.morgan.edu., Stacey Hill

This paper presents a version of the simultaneous perturbation stochastic approximation algorithm for optimizing non-separable functions over discrete sets under constraints. The algorithm appears suitable for large-scale simulation optimization. We discuss the basic algorithm and its application to resource allocation. Simulation results are presented which illustrate its performance.

3 — Convergence of Simulation-Based Policy Iteration
William L. Cooper, University of Minnesota, Minneapolis, MN, 55455, billcoop@me.umn.edu., Shane Henderson, Mark Lewis

Simulation-based policy iteration is a modification of policy iteration for computing optimal policies for Markov decision processes. At each iteration, simulation provides an estimate of the solution to a set of equations. We relate the accuracy of three different simulation estimators to the almost sure convergence of SBPI.

4 — Simulation Budget Allocation: The Correlated Case
Michael Fu, University of Maryland, mfu@isr.umd.edu., Jian-Qiang Hu

We consider the problem of efficiently allocating simulation replications to maximize the probability of selecting the best design, under the scenario in which the various system designs are estimated in the presence of induced correlation. In the case of two designs, we are able to derive the optimal allocation exactly.

■ SD41

Center-Room M

Location Analysis IV

Sponsor: Section on Location Analysis
Sponsored Session

Chair: Zuo-Jun (Max) Shen, University of Florida, Gainesville, FL, 32611-6595, USA, shen@ise.ufl.edu

1 — A Reliability-based P-Median Model
Lawrence Snyder, Northwestern University, Evanston, IL, 60208, USA, l-snyder3@northwestern.edu., Mark Daskin

We extend the P-median problem to minimize the demand weighted total distance between demands and the nearest of P facilities subject to a constraint on the demand weighted total distance when a subset of the P facilities becomes unavailable. The model is formulated and preliminary results are presented.

2 — Two-echelon Distribution Network Design with Risk Pooling
Jia Shu, National University of Singapore, 119260, Singapore, smap9069@nus.edu.sg., Teo P. Chung

In this paper, we propose a model to determine the locations of warehouses in a two-echelon distribution network, integrating 2-echelon inventory replenishment costs with risk pooling effect. Using insights from classical OWMR models and parametric linear optimization techniques, we show that the pricing subproblem can be solved efficiently.

3 — A P-Robust Location/Inventory Model
Mark Daskin, Northwestern Unversity, Evanston, IA, 60208, USA, m-daskin@northwestern.edu., Lawrence Snyder

We extend an integrated location/inventory model to find a solution with minimum expected cost over a set of scenarios given that the cost under each scenario must be within a specified fraction of the scenario's optimal cost. We formulate the model, describe an exact solution method, and present preliminary results.

4 — Average-case Error Analysis for Location Model Demand Point Aggregation
Hulya Emir, University of Florida, Gainesville, FL, 32611-6595, USA, hulya@ufl.edu., Richard Francis, Zuo-Jun (Max) Shen

The NP-hardness of many location problems can lead to demand point aggregation. Aggregation causes error, which should be identified and measured. While most aggregation error analysis follows a worst-case approach, some average-case approaches exist . We survey the latter, and indicate some recent developments.

■ SD42

Fairmont-Belvedere

Customer and Agent Retention

Contributed Session

Chair: Kieko Yamakawa, The Ohio State University, Columbus, OH, 43235, U.S.A., yamakawa.3@osu.edu

1 — Attrition in the Financial Services Industry
Dirk Van den Poel, Ghent University, Professor, Gent, B, 9000, Belgium, dirk.vandenpoel@rug.ac.be., Bart Lariviere, Patrick Van Kenhove

Most attrition research mainly investigates the churn incidence by using questionnaire data; and thus, neglects both longitudinal aspects of duration times, and the impact of other predictor categories. We fill this gap by exploring different longitudinal predictor categories from the data warehouse linked to customer perception data gathered by questionnaires.

2 — Agent Common Risk Measurement using Frailty Analysis
Kieko Yamakawa, The Ohio State University, Columbus, OH, 43235, U.S.A., yamakawa.3@osu.edu.

Frailty analysis successfully shows the evidence of common risk on the retention time of the same agent and the evidence of dependency within products under the same agent. This analysis provides the principal-agent relationship the quantitative measurement of common risk and of effect of dependent variables on the retention time.

3 — Market Segmentation, Competitive Market Structure, and Switching Reasons
Geonha Kim, Waseda University, Research Associate, Tokyo, 169-8555, Japan, ghkim@aoni.waseda.jp., Takahiro Ohno

Previous studies concentrate on the identification of CMS at the aggregate level, and on the explanation that how many loyal customers or free flyers a brand has. But not on the demographic information and the reasons of brand switching. We propose a simple method of the identification of CMS and critical segments, and an analysis of Switching reasons among the critical segments.

4 — Application of Service Profit Chain to Korean Service industries
Minho Lee, College of Business Administration, Korea University, Ph.D. Student, Seoul, 136-701, Korea, kieslo@korea.ac.kr., Kwangtae Park

Main Objective of this study is to verify the hypothesized causal relationships among internal service quality, employee satisfaction, employee retention, service value and customer satisfaction. Statistical analysis is carried out on the samples from different service industries. The results show that internal service quality is important because it relates to both job satisfaction and customer satisfaction.

■ SD43

Center-Room H

Moving Towards Greater Revenue Management Proficiency

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: Warren Lieberman, Veritec Solutions, President, Palo Alto, CA, 94301, USA, warren@veritecsolutions.com

1 — Presented by Teresa Surin
Teresa Surin, tsurin@loews.com.

No abstract supplied

2 — Increasing Proficiency of Revenue Management on Long-distance Passenger Rail
Bill Sheridan, Amtrak, AVP, Revenue and Capacity Management, Washington, DC, 20002, USA, sheridw@amtrak .com.

Amtrak has practiced Revenue Management since 1991. Up until recently, their accomplishments have been constrained by several factors. Bill will cover the major challenges that Amtrak faces as it increases the proficiency of revenue management for passenger trains. Topics include: Internal Perceptions and Support; Pricing Structure; Manual Revenue Management; and Performance Measurement.

3 – Car Rental Revenue Mangement: A Real Options Approach
Chris Anderson, Ivey School of Business, Univ. of Western Ontario, London, Ontario, Canada, canderson@ivey.ca

Revenue management is the process of actively managing inventory or capacity so as to maximize revenues. The active management typically occurs through managerial levers such as price, promotion or availability. We present a novel Real Options approach to revenue management, which is specifically amenable for car rental revenue management. We develop a continuous time stochastic price model for future prices and determine availability limits temporally as a function of remaining inventory. We illustrate the concept with actual car rental data.

4 — Non-traditional Opportunities for Revenue Management
Warren Lieberman, Veritec Solutions, President, Palo Alto , CA, 94301, USA, warren@veritecsolutions.com.

Integrating dynamic pricing and revenue management principles with decisions traditionally considered the responsibility of the Marketing Department has the potential to provide substantial benefits. For example, integrating revenue management with personalized marketing techniques could revolutionize how goods are sold through the internet. Also new products can be designed to target profitable customer segments. We discuss the opportunities and challenges of this in several industries.

■ SD44

Center-Room B2

Group Decision & Negotiation

Contributed Session

Chair: Abhijit Deshmukh, Department of Industrial Engineering, Amherst, MA, 01003, United, States of America, deshmukh@farm.ecs.umass.edu

1 — Multi-agent Rationality
Chandrasekar Sundaram, Department of Industrial Engineering, Department of Mathematics and Statistics, University of Massachusetts, Amherst, Amherst, MA, 01002, United States of America, sundaram@math.umass.edu., Abhijit Deshmukh

We present combinations of agents' preference types that lead to irrational outcomes, when agents try to decide on an outcome over a given set of three choices as a group. By identifying the combinations, we can try to overcome group irrationality, which will help in avoiding deadlocks/conflicts in group decision making.

2 — An Agreement Index for Group AHP
Shivraj Kanungo, George Washington University, Washington , DC, 20052, USA, kanungo@gwu.edu., Ipininder Monga

We propose a framework for the calculation of an agreement index. The agreement index is used to calculate the degree of consonance or dissonance for group decision-making. The algorithm for the calculation of the index is presented followed by the demonstration of three scenarios where the calculated index shows its utility. The AI is compared to the geometric variance and shown to perform better in certain situations. Results of an experiment that we conducted on the use of such an index are also reported. Results indicate that AI can be used to measure the degree of consonance in a group.

3 — Identity Metamorphosis and Group Decision-Making Under Threat
Marlene E. Turner, San Jose State University, San Jose, CA, 95192, USA, turner_m@cob.sjsu.edu., Tara Samuels, Anthony R. Pratkanis

We examine the role of social identity metamorphosis in group decision-making under threat and in the circumvention of groupthink-like processes. We use Intel's to exit the DRAM market to illustrate our perspective.

4 — Negotiation in the 21st century
William F. Morrison, San Jose State University, CA, Palo Alto, CA, 94306, USA, wfmorrison@earthlink.net.

A dramatic change has taken place during the last 20 years in the way negotiations are conducted and in their objectives. This change is from a process of conflict to a process of compromise. The new model for negotiation's process, planning and objectives is provided in this presentation.

5 — Integrated Virtual Negotiation Framework Incorporating Natural Language and Fuzzy Logic
Yasser Hosni, Industrial Engineering & Management Systems, University of Central Florida, Orlando, FL 32816, yhosni@mail.ucf.edu, Ayman Wasfy.

There is an increasing need by both companies and government agencies for an effective capability for negotiation training and preparation. The unique combination of immersive Virtual Environment (VE) technology, hierarchical rule-based Natural Language Interface (NLI), and fuzzy-logic based negotiation simulation can provide a powerful framework for modeling negotiation scenarios realistically both from a sensory and behavioral perspective.

■ SD45

Center-Room B3

Stochastic Models of Telecomm Systems

Contributed Session

Chair: Lerzan E Ormeci, Koc University, Sariyer, 80910, Turkey, lormeci@ku.edu.tr

1 — Workload Characterization of Web Applications
Hugh L. Smith, B.E.C Consultants,Inc, San Francisco, 94109, USA, javasmiths2000@yahoo.com.

Workload characterization is crucial for performance analysis and capacity planning. Web application workloads present special challenges due to the bursty nature of web traffic. Statistical clustering techniques can be used to group traffic into representative workloads. Techniques are presented for workload characterization of web application based on web log data.

2 — A Tandem Queueing Model with Coupled Processors
Lerzan E Ormeci, Koc University, Sariyer, 80910, Turkey, lormeci@ku.edu.tr., Jacques Resing

A Markovian tandem queueing model with two coupled servers is developed for modelling the transmission of data in the upstream of hybrid fiber/coax networks. A corresponding functional equation for the generating function of the stationary distribution is derived and solved through the theory of Riemann-Hilbert boundary value problems.

3 — Synergistic Modeling of Repair Call Handling
Dennis C. Dietz, Qwest Communications Intl., Boulder, CO, 80303, USA, dxdiet2@qwest.com., Jon G. Vaver

We synergistically apply queueing theory, integer programming, and stochastic simulation to determine an optimal staffing policy for repair call handling. A standard queueing model populates an integer programming optimization. Performance of the optimal policy is evaluated using simulation, with the analytical queueing model producing an appropriate control variate.

4 — Stochastic Media Gateway Protection Management with hot-standbys in Next Generation Network
Song-Kyoo Kim, Samsung Electronics, Engineer, Ph.D., Suwon.., 442-742, South Korea, amang.kim@samsung.com.

The media gateway is used for converting data from the format required for one type of network to the format required for another and it uses 1-on-1 mirroring protection which needs a lot of resources to preserve reliable units. This paper offers the enhanced protection management which can be categorized by a class of closed queue with hot-standbys and gives the connection between media gateway protection and queueing model. The stochastic optimization method is used for decision making.

■ SD46

Center-Room C3

Advances in Commercial IP Solvers

Sponsor: Optimization Section-Integer Programming
Sponsored Session

Chair: Eva K. Lee, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, eva.lee@isye.gatech.edu

1 — Recent Progress in the Dash Xpress-MP Integer Optimizer
Bob Daniel, Dash Optimization, Northants, NN7 3BX, UK, bob.daniel@dashoptimization.com., Richard Laundy

We describe some of the recent advances in the Xpress-MP Integer Optimizer. We present computational experiences on some challenging problems.

2 — Goals: A New Approach To Searching a MIP Tree
Javier Lafuente, ILOG, Inc., Madrid, 28023, Spain, jlafuent@ilog.fr.

While users typically treat a MIP solver as a black box, some want to have more control over the search. Some may know an effective domain-specific branching strategy, while others may want to dynamically vary the strategy used to solve the model as they consider different sub-models of the whole model, while others may want to use branching to enforce non-linear constraints held outside of the MIP formulation. This talk describes Goals, a powerful framework borrowed from Constraint Programming that allows a user to elegantly specify precisely how the MIP tree should be searched.

3 — Recent MIP Developments in LINGO and What's Best
Linus Schrage, University of Chicago, Prof., Chicago, IL, 60637, USA, linus.schrage@gsb.uchicago.edu.

We describe recent advances in the solution of mixed integer programs in the LINGO modeling language and the What'sBest spreadsheet solver. We especially look at issues of exploiting the close integration of a modeling frontend and a solver.

■ SD47

Center-Ballroom A8

Software Demonstration Session 04

Cluster: Software Demonstrations
Invited Session

1 — ScienceDirect: Availability, Contents and Functionality
Gerard L. Wanrooy, Elsevier Science, 100 BZ Amsterdam, Netherlands, g.wanrooy@elsevier.com.

ScienceDirect: Availability, Contents and Functionality - ScienceDirect www.sciencedirect.com is the world's largest database of peer-reviewed articles. This presentation surveys: (1) how to check your access, (2) what ScienceDirect contains, and (3) what functionality is offered.

2 — Prentice Hall — SimQuick: Process Simulation with Excel
David Hartvigsen, University of Notre Dame, Notre Dame, IN, 46556-5646, USA, hartvigsen.1@nd.edu.

SimQuick is an easy-to-learn, inexpensive computer package for process simulation that runs in the Excel spreadsheet environment. SimQuick is accompanied by a short text with numerous examples and exercises. Students in OM, MS, and supply chain courses can quickly learn to build models for waiting lines , inventory and supply chains, and manufacturing, and do real-world projects on their own.

Monday 8:00 - 9:30am

■ MA01

Center -Ballroom A4

Tutorial: Modeling Bioterror Response Logistics

Invited Session

1 — Modeling Bioterror Response Logistics
Edward H. Kaplan, Yale School of Management, Beach Professor of Management Sciences, New Haven, CT, 06520-8200, USA, edward.kaplan@yale.edu., Lawrence M. Wein

Because deterrence and counterproliferation are largely ineffectice at combating biological warfare, our security from a bioterror attack rests primarily on a strong logistical response. For the two most feared biological agents - smallpox and anthrax - we formulate and analyze new models to compare various response strategies. In both cases, key operational features of interventions, such as queues for tracing, vaccinating, distributing antibiotics or providing hospital care, are combined with traditional biological models - a disease transmission model for smallpox and an atmospheric dispersion model for anthrax. The use of probabilistic reasoning within an otherwise deterministic epidemic framework is featured throughout . Policy implications will be highlighted. (This is joint work with David L. Craft, Operations Research Center, MIT).

■ MA02

Fairmont-Cupertino

Panel: Roundtable Companies and Universities Join Forces

Cluster: Practice Track
Invited Session

Chair: Laurie Dutton, Praxair, Inc., Tonowanda, NY, laurie_dutton@praxair.com

1 — Roundtable Companies and Universities Join Forces: How We Avoid Disappointment and Share Success
Laurie Dutton, Praxair, Inc., Tonowanda, NY, laurie_dutton@praxair.com.

It's not easy but it's possible and even profitable. The INFORMS Roundtable presents members from leading companies who will share their personal experiences related to company/university interactions. Each panelist will illustrate the types of OR/MS focused relationships their company has with academia, how these associations have evolved over the years, and the lessons they have learned along the way. Gather useful tips and guidelines on how to create a win-win relationship between industry and academia.

■ MA03

Fairmont-Fairfield

Physical Environment: Natural Environments in Decision Analysis

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Eva Regnier, Naval Postgraduate School Code 64/RG, Monterey, CA, 93943-5296, USA, eregnier@nps.navy.mil

1 — Uncertainty Analysis of a Large-scale Water Quality Model Used for Regulatory Decision Support
Martin Schultz, Dept. of Engineering and Public Policy, Pittsburgh, PA, 15213-3890, USA, mschultz@andrew.cmu.edu., Paul Fischbeck, Mitchell Small, Scott Farrow

A reduced-form model built using logit regression replaces a complex deterministic regional water quality model. Simulations of the inputs to the reduced-form model are used to determine underlying uncertainties in various water-quality metrics so that decision problems for multiple stakeholders can be structured. State policy alternatives are evaluated.

2 — Valuing Sequences of Lives Lost or Saved Over Time: Consistent with Discounting Models or Not?
Jeffery Guyse, California State Polytechnic University, Pomona, CA, 91768-4083, USA, L. Robin Keller

Preferences for temporal sequences of mortality numbers are presented and compared to previous results on preferences over monetary, health, and environmen-

tal outcomes. Anomalies (Gain/Loss Asymmetry, Short/Long Asymmetry, and Absolute Magnitude Effect) found in discounting research on money are investigated in the lives domain. Modeling recommendations of lives saved/lost are presented.

3 — Constraining Environmental Decision Problems
Eva Regnier, Naval Postgraduate School Code 64/RG, Monterey, CA, 93943-5296, USA, eregnier@nps.navy.mil.

The imbalance in complexity between models and the systems being modeled is especially severe in environmental decision analysis problems. In formulating these problems, decision analysts must answer difficult questions about how best to trade off expediency against the exploitation of available and acquirable information.

4 — Decision-making Based on Sound Science: How is the Role of Decision Analysis?
Kara Morgan, Research Triangle Institute, Washington, DC, 20011, kmorgan@rti.org.

Making decisions based on "sound science" is the stated goal of health and environmental policy makers. However, many non-scientists do not understand what science can and cannot contribute towards such decisions. This paper discusses how decision analysis tools and scientific tools can be used hand-in-hand to help support sound decisions.

■ MA04

Hilton-San Carlos II

Data Mining Methods

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Xiaoming Huo, Georgia Institute of Technology, Professor, Atlanta, GA, 30332, USA, xiaoming@isye.gatech.edu

1 — Scaling Up Decision Trees Using Sufficient Statistics
Xiaobai Li, University of Texas at Dallas, Assistant Professor, Richardson, TX, 75083, USA, lixbob@utdallas .edu.

We propose a new decision tree algorithm that is capable of handling massive data. In this algorithm, the information required to build a decision tree is summarized into a set of sufficient statistics, which can be gathered incrementally from the data, by reading a subset of the data from storage space to main memory one at a time. With this property, the algorithm can effectively handle a dataset whose size is beyond the limit of a computer's memory.

2 — Fraud Detection by Customer Behavior Profiling in Mobile Telecommunication
Jianjun Shi, University of Michigan, Ann Arbor, MI, 48109 , USA, shihang@umich.edu., Jing Li, Huiyong Zheng, Xiao Wang

Cellular fraud and handset theft have caused lots of losses in telecommunication industry. To gain business intelligence and perform good customer relationship management, we continuously keep tracking of massive transactional data---- call detail records (CDRs) in order to profile the customer calling behavior, by which we can identify fraud effectively.

3 — A Graph-based Tree Pruning Method
Xiaoming Huo, Georgia Institute of Technology, Professor, Atlanta, GA, 30332, USA, xiaoming@isye.gatech.edu.

A graph based tree pruning algorithm is proposed. The new method is computationally comparable with existing ones, but it provides a full spectrum of information regarding a tree pruning. Simulations illustrate the usefulness of this approach. This ethod can be incorporated in many tree-building techniques, e.g. cross validation, boosting, just name a few.

■ MA05

Fairmont-Sacramento

Entrepreneurship II

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: M. Levesque, Case Western Reserve University, Cleveland, OH, 44106-7235, USA, moren.levesque@weatherhead.cwru.edu

1 — Optimal Policies in Inventory, Marketing and Component Portfolio to Maximize Survival Probabilities of Small Firms
Lyn C. Thomas, University of Southampton, Highfield, SO17 1 BJ, UK, l.thomas@soton.ac.uk., E. Possani, T. W. Archibald

The objective of small firms is as much to maximize their probabilities of survival as to maximize their expected profit. It is useful to compare the optimal operating policies that maximize survival probabilities with those that maximize expected profit in a number of areas. This talk looks at this in the case of how mush inventory to hold, how many different types of components to hold, and how to split spending between stock purchase and advertising. The problems are modeled as Markov decision processes in each case.

2 — Gain and Loss Experiences in Decision and Game Theoretic Contexts
A. Schroder, Humboldt Universitat zu Berlin, Berlin, 10178, Germany, C. Schade

Prior gain and loss experiences heavily influence decision making behavior. This has been analyzed several times in the context of stock investments and entrepreneurial decisions. A formalization of these findings which utilizes Prospect Theory's value function has been undertaken in the so called starting point concept. Important results from an experimental study which has been conducted to test this concept will be presented. Then, the influence of these starting points' effects on equilibria in a game theoretical context will be demonstrated for the situation of a simultaneous market entry.

3 — Intuitive Optimizing for Time Allocation Decisions in Newly Formed Ventures
C. Schade, Humboldt-Universitat zu Berlin, Berlin, 10178, Germany, schade@wiwi.hu-berlin.de., M. Levesque

We analyze a time allocation situation typically faced by entrepreneurs in new ventures: how to allocate time between a newly formed enterprise and a wage job. First, we formulate a formal model and derive predictions on optimal behavior in different decision situations. Second, we test these predictions with real decision makers using simple questionnaire experiments. Finally, we compare model's predictions to experimental data and provide behavioral interpretations of discrepancies.

4 — Optimal Time for Market Entry Learning from Participation and Others' Experiences
M. Levesque, Case Western Reserve University, Cleveland, OH, 44106-7235, USA, moren.levesque@weatherhead.cwru.edu., D. A. Shepherd

This article uses a decision-theoretic approach to characterize a firm's optimal time to enter a market, and to assess how this entry time is influenced by changes in key model parameters, including those that characterize the friendliness of the learning environment. This concept of the friendliness of the learning environment influences the ability of firms to learn from the experiences of others and from participating in the industry and, consequently, impacts both dimensions of entry performance - - profit potential and mortality (bankruptcy) risk.

■ MA06

Fairmont-Atherton

Organizational Knowledge Management

Contributed Session

Chair: Aimee A. Kane, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, aak@andrew.cmu.edu

1 — On the Corporate Knowledge Flows: Measuring as a Matrix and Analyzing as a Network
Yong-Tae Park, Seoul National University, Seoul, Korea, parkyt@cybernet.snu.ac.kr., Jun-Seouk Shin, Gwang-Man Park

We propose a framework for measuring a analyzing knowledge flows in a corporate setting. We first classify knowledge flow patterns. Then we identify knowledge elements and, for each type , develop knowledge flow matrix. Finally, by employing knowledge flow matrix, we suggest to apply network analysis.

2 — Knowledge Transfer Between Groups via Personnel Rotation: Effects of Social Identity and Knowledge Quality
Aimee A. Kane, Carnegie Mellon University, Pittsburgh, PA , 15213, USA, aak@andrew.cmu.edu., Linda Argote, John M. Levine

Results from this study of 144 students working in 3-person task-performing groups indicate that knowledge is more likely to transfer from a rotating member to a recipient group when they share a superordinate social identity and when the rotating member's knowledge is superior to that of the recipient group.

3 — A Model of Knowledge Employee Motivation
a. d. amar, seton hall univ, professor, so roange, nj, 07079, usa, amaramar@shu.edu.

Grounded in premise that motivation in knowledge work environment is a planned outcome of existence of certain antecedents that are responsive to the dynamics of motivation process in such environment, this work develops a conceptual model synthesizing the "what" and "how" of motivation. The model embodies these dynamics into five drivers of motivation practice and then recognizes three sources of motivation into which its antecedents should be loaded for motivating knowledge employees.

4 — Knowledge Management: An Argument for Centralized Organizational Structures
Yukika Awazu, University of Illinois at Chicago, Chicago, IL, 60657, U. S. A., yawazu1@uic.edu., Kevin C. DeSouza

It is taken for granted that decentralized organizational forms are superior to their centralized counterparts. Drawing on institutional, transaction cost, and resource based theories of the firm, we discuss implications and suggest postula-

tions as to why the traditional i.e. centralized form of organization is far more conducive to knowledge management.

5 — A Model for Knowledge Management through Market Mechanism
Shigetaka Yamakawa, Dentsu Inc. Kansai, Senior Researcher , Osaka, Os, 530-8228, Japan, shigetaka.yamakawa@nifty.ne .jp., Masashi Umezawa

Failures of knowledge management projects in many firms are mainly due to the lack of incentives to participating knowledge suppliers. We propose a knowledge management system where suppliers of knowledge set prices for their documented knowledge, and users pay for their usage. A mathematical model demonstrates that the market mechanism motivates potential suppliers to produce knowledge and suppresses unnecessary production of similar knowledge which can be substituted by the existing knowledge.

■ MA07

Fairmont-Piedmont

Perspectives on New Product Development Research: State of the Art and Future Directions (Panel)

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Vish Krishnan, University of Texas, Austin, TX, 78712, USA, vish.krishnan@bus.utexas.edu

1 — Perspectives on New Product Development Research: State of the Art and Future Directions (Panel Discussion)
Vish Krishnan, University of Texas, Austin, TX, 78712, USA, vish.krishnan@bus.utexas.edu., Steven Eppinger, Christoph Loch, Karl Ulrich

In this session, we plan to discuss the last decade's progress in research in the area of product design, development, and introduction with a view towards new opportunities, directions, publication and discussion outlets. Also of interest in this session is the relationship of product development to business schools, doctoral programs, and other areas of research (such as supply chain operations management, technology management).

■ MA08

Center-Ballroom A2

Quantitative Modeling - A Profit Enhancement Machine

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Rajiv Saxena, Menlo Worldwide Technologies, Redwood City, CA, 94065, USA, saxena.rajiv@menlolog.com

1 — Supply Chain Redesign to Achieve Asset Reduction
Steve Hill, Menlo Worldwide Technologies, hill .steve@menlolog.com.

Tight credit markets and short product life cycles make it more important than ever to minimize inventory investments. This presentation will describe techniques for redesigning supply chains to make them asset light, yet responsive to requirements for product variety and short order cycles.

2 — Planning Pharmaceutical Manufacturing Strategies in an Uncertain World
William C. Brastow, Jr., Standard and Poor's, Menlo Park, CA, 94025, USA, wbrastow@earthlink.net., Craig Rice

We describe a model characterizing the impact of pharmaceutical development, demand and manufacturing uncertainties on a given manufacturing strategy using a hierarchical simulation with embedded heuristic optimization. We also discuss how the model was used at a major biotech company to increase executive confidence in various manufacturing capacity expansion strategies .

3 — Sense and Respond Supply Chain Management
Markus Ettl, IBM, Yorktown Heights, NY, 10598, USA, msettl@us.ibm.com., Kaan Katircioglu, Steve Buckley, Grace Lin

We describe a sense and respond supply chain management system applicable to a variety of enterprise supply chains. The system provides event monitoring, situation management, proactive analysis of global supply chain information, and the ability to assess the risk and reward of proposed responses for best supply chain performance. We discuss the performance prediction and risk assessment models that provide real-time decision support at key points in the supply chain, and a software architecture for implementing such a system using an innovative event-driven solution management system currently being developed by IBM Research.

■ MA09

Center-Ballroom A3

e-Business Research

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Michael J. Shaw, University of Illinois, Urbana-Champaign, IL, 61801, USA, m-shaw2@ux1.cso.uiuc.edu

1 — Improving Ability to React to Forecast Variation through Product Design in a Highly Customized Product Environment
Suresh Chandar Kalathur, Motorola, Inc., James Shen, John Liang

Product designs with higher level of commonality at core functions, sub-assemblies separated from customizable software and cosmetic functions enable the manufacturers to react better to variations in forecasts. Forecasting demands in a highly customized consumer product environment is extremely difficult due to lack of history and data for predicting customer behavior. Product designs with high commonality of core functions through high level of commonality in sub-assemblies, component parts, along with postponable processes enable manufacturers to customize products deliver to consumers with benefits of reduced cycle time, higher fill rate at lower inventory levels. Developing metrics to measure product complexity helps the product design process to focus on enabling the benefits.

2 — Modularized Interoperability in Supply-chains: A Co-adoption Study of RosettaNet's XML-based Inter-organizational Systems
Matthew L. Nelson, University of Illinois, mlnelsn1@students.uiuc.edu., Michael J. Shaw, Mary Schoonmaker

The factors that influence an organization's decision to begin using a certain type of technology have come under much study. Several theoretical models, commonly referred to as technology diffusion models, have been developed to better understand the role of these factors in the adoption, diffusion and infusion of certain types of technology. A theoretical framework is proposed to assess the influential factors leading toward adoption and internal diffusion of the target technology. The factors under study include compatibility, relative advantage, environment and three control variables (seller versus buyer, technology conversion type, and location in supply chain).

3 — The Value of The Mobile Technologies to Enhance Business-to-Business Applications
Judith Gebauer, University of Illinois, Urbana-Champaign, IL, USA, gebauer@uiuc.edu., Michael J. Shaw, Dean Haacker

In this paper, we propose a two-step framework to advance our knowledge of how to identify and evaluate opportunities presented by emerging information technologies (IT). As a first step, we match the features and limits of the IT innovation with the requirements of the application areas in question, typically on the business process level. As a second step, we sketch out guidelines to evaluate these windows of opportunity in a quantitative way. To further explain the framework and showcase its applicability, we provide a proof-of-concept case study, reporting on the application of wireless technologies to enhance an electronic procurement application at Motorola, Inc.

■ MA10

Center-Ballroom A7

Project Scheduling

Cluster: Scheduling
Invited Session

Chair: Moshe Dror, University of Arizona, Tucson, AZ, 85721, USA

1 — Resource Management In Grids — A New Challenge In Scheduling
Jan Weglarz, Poznan University of Technology, Poznan, Poland, jan.weglarz@cs.put.poznan.pl.

The idea of the Grid, introduced in 1999 by C. Kesselman and I. Foster, and generalizing the idea of metacomputing, is presently attracting a great attention of researchers and practitioners in the field of computational technologies. The general Grid problem is a flexible, secure and coordinated resource allocation among dynamic collections of individuals and/or institutions, in order to enable them to share geographically distributed resources as they pursue common goals. In this presentation we describe the specificity of Grids from the viewpoint of resource management, and identify some key issues which have to be addressed in this context.

2 — Graph Topology Rules for Agent-based Large-scale Project Scheduling
Anna Segurson, University of Arizona, Tucson, AZ, 85721, USA, segurson@cs.arizona.edu., Moshe Dror, Kurt Fenstermacher

Multimodal large-scale project scheduling is ordinarily accomplished by implementing one particular priority rule by which activities are scheduled. In this work activities are viewed as independent agents and their activation (schedule) is based on their local network topology and intelligent mode selection. A com-

putational study is conducted with regard to a number of topology based activation strategies on large networks with up to 10,000 activities.

3 — Selection and Scheduling of Multiple Resource Constrained Projects
Ron Askin, University of Arizona, Tucson, AZ, 85721, USA, ron@sie.arizona.edu.

Design groups are faced with selection of projects for introducing new products and upgrading existing products. These design projects share common capital and human resources. Revenue is highly dependent on completion time. We develop a decision model for this environment and propose solution approaches.

■ MA11

Center-Room C1

Single Machine Scheduling

Contributed Session

Chair: Joseph P. Geunes, University of Florida, Gainesville, FL, USA, geunes@ise.ufl.edu

1 — A Heuristic Approach for Minimizing Total Tardiness and Overtime Costs in Single Resource Scheduling
Bibo Yang, University of Florida Dept. of Industrial and Systems Eng., Gainesville, FL, 32611, USA, yangbibo@ufl .edu., Joseph P. Geunes, William J. O'Brien

We consider scheduling on a single resource that processes jobs during regular or overtime (without preemption) to minimize weighted tardiness plus overtime costs. We present an algorithm for finding an optimal schedule for a fixed job sequence and discuss priority rules and local search for finding a good job sequence.

2 — Hard Instances of the One-Machine Sequencing Problem
Yunpeng Pan, University of Wisconsin-Madison, IE Dept., 1513 University Ave., 53706, USA, yunpeng@cs.wisc.edu., Leyuan Shi

The min-max lateness problem has been thought to be easy to solve via Carlier's algorithm. However, we found moderate-size, hard instances. We introduce a powerful lower bound and several techniques, and propose an algorithm, substantially faster than the best one to date and much less susceptible to hard instances.

3 — Applying DOE in Genetic Algorithm Parameters Determination
Mazen Arafeh, Engineering Science & Mechanics, Virgina Tech., Blacksburg, 24061, USA, amazen@vt.edu., Svestka A. Joseph

This work implements statistical techniques of Fractional Factorial Design and Analysis of Variance to determine the Genetic Algorithms parameters applied in the generation process of new populations. The performance of the algorithm improved significantly and proved to be more stable, when using the parameters determined by DOE technique.

■ MA12

Fairmont-Regency 1

Modeling in the Acute Care Setting

Sponsor: Health Applications Section
Sponsored Session

Chair: Michael Carter, University of Toronto, Professor, Toronto, ON, M5S 3G8, Canada, carter@mie.utoronto.ca

1 — A Simulation of Coronary Heart Disease to Evaluate Prevention and Treatment Strategies
Ruth Davies, School of Management, Senior Lecturer, Southampton, UK, SO17 1BJ, UK, rmd@socsci.soton.ac.uk., Keith Cooper, Paul Roderick

A discrete event simulation describes the transitions between health states, investigations and treatments in people with coronary heart disease. Age and disease history influence progress through the system. Parameters were derived from publications, routine data sources and patient database and sensitivity analysis has been applied to them. Results compare the cost-effectiveness of revascularisation, secondary prevention , improving the ambulance services and the provision of thrombolysis.

2 — The Use of Simulation to Analyze Demand for Dialysis Treatment in Ontario
Kevin Leonard, University of Toronto, Professor, Toronto, ON, M5S1A8, Canada, k.leonard@utoronto.ca.

In this paper, we present a simulation model that depicts the patient flow to and from a dialysis unit within a large Academic Health Science Center in the Province of Ontario. This paper will provide a description of the simulation including some background on the Nephrology patient system, and the results and implications.

3 — Short Term Hospital Census Prediction
Mark W. Isken, Oakland University, Asst. Professor, Rochester, MI, 48309, USA, isken@oakland.edu., Steven J. Littig

Fluctuating hospital occupancy impacts staffing costs, ambulance diversions, medical errors in understaffed patient areas, quality of care, and job satisfaction for the dwindling nursing pool. We describe our experience with developing a computerized decision support system for predicting short-term patient occupancy at a nursing unit level over 32-hour time horizons.

■ MA13

Center-Room D

Nonlinear Programming I

Contributed Session

Chair: David Fuller, University of Waterloo, Waterloo, ON, N2L 3G1, Canada, dfuller@engmail.uwaterloo.ca

1 — A Cutting Plane SDP Method for the Maxcut Problem
Kartik Krishnan, Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, NY, 12180, USA, kartis@rpi .edu., John E. Mitchell

We investigate solution of the maximum cut problem using a semidefinite programming approach. The dual of the well-known Goemans-Williamson SDP relaxation of maxcut is formulated as a semi-infinite linear programming problem, which is solved with a cutting plane algorithm. Cutting planes based on the polyhedral theory of the maxcut problem are then added to the primal problem in order to improve the SDP relaxation. Computational results are provided.

2 — Convex Optimization Problems Involving Entropy Rate Functions
Brien F. Alkire, UCLA, Woodland Hills, CA, 91367, USA, brien@alkires.com.

We consider convex optimization problems involving entropy rate functions and autocorrelation sequences. Entropy-rate functions involve an infinite sequence of variables, and typically we have constraints on a finite window of the sequence. We develop efficient interior-point methods of solution and use results of Lagrange duality to compute the optimal cost.

3 — A Parallel Conjugate Reduced-Gradient Code for Large-Scale Nonlinear Optimization
Jo„o Lauro D. Faco', Federal University of Rio de Janeiro , Rio de Janeiro, 22611-100, Brazil, jldfaco@acd.ufrj.br., Luiz Antonio Oliveira

Efficient numerical solutions for practical problems can be computed by Nonlinear Programming methods. Decision support models usually have a large number of variables. A parallel conjugate reduced-gradient method is presented, and a code based on Lasdon's LSGRG2 has been designed. Main modifications are a LU procedure for solving linear systems of equations, and a conjugate gradient procedure for generating the search directions in the superbasic variables manifold. Numerical experiments are showed.

4 — Decomposition of a Class of Variational Inequalities
David Fuller, University of Waterloo, Waterloo, ON, N2L 3G1, Canada, dfuller@engmail.uwaterloo.ca.

Many variational inequalities have many constant elements in the orthogonal vector, and a feasible region defined by linear constraints -- e.g. economic equilibrium with LP supply and strictly antitone demand. Dantzig-Wolfe and Benders decomposition can be extended to this class of model, with provably asymptotic convergence, under fairly general conditions .

5 — Quasi-Variational Inequalities, Generalized Mash Equilibria, and Multi-Leader-Follower Game
Masao Fukushima, Kyoto University, Professor, Kyoto, 606-8501, Japan, fuku@amp.i.kyoto-u.ac.jp., Jong-Shi Pang

The noncooperative multi-leader-follower game can be formulated as a generalized Nash equilibrium problem where each player solves an MPEC. In order to obtain a viable formulation that is amenable to practical solution, we introduce a model for the multi-leader-follower game that can be formulated as a generalized Nash game. The latter problem can be formulated as a quasi-variational inequality for whose solution we develop an iterative penalty method.

■ MA14

Center-Room E

Mathematical Programs with Complementarity Constraints (MPEC)

Sponsor: Optimization Section-Linear Programming and Complementarity
Sponsored Session

Chair: Mihai Anitescu, Argonne National Laboratory, Pittsburgh, PA, 15260, anitescu@math.pitt.edu

1 — The Hitch-hikers Guide to Solving Mathematical Programs with Equilibrium Constraints
Sven Leyffer, Argonne National Laboratory, Jorge Nocedal, Roger Fletcher

Many practical optimization problems contain equilibrium constraints. Over recent years, it has been argued hat equilibrium constraints cannot be solved satisfactorily with standard techniques for Nonlinear Programming (NLP). We re-examine this assertion and give some startling numerical and theoretical evidence to show that many equilibrium constraints can be solved using standard solvers. We also comment on a new less degenerate formulation of equilibrium constraints.

2 — MPEC Formulations in Chemical Engineering
Arvind Uppili Raghunathan, Carneggie-Mellon University, Lorenz T. Biegler

This talk highlights a number of applications in chemical engineering that can be represented as MPECs. These include equilibrium stage separations, both in steady state and dynamic modes as well as parameter estimation problems for metabolic networks. To solve these problems, we describe a variant of a Newton-based barrier approach with a filter line search strategy. Moreover, convergence properties of this approach will be outlined for a general MPEC problem. A number of examples drawn from chemical engineering will be presented to demonstrate the effectiveness of this approach.

3 — Nonlinear Programming Approaches to MPEC.
Mihai Anitescu, Argonne National Laboratory, Pittsburgh, PA, 15260, anitescu@math.pitt.edu.

We discuss local and global convergence issues appearing in the resolution of MPEC. In particular we show that certain nonlinear programming algorithms, based on succesive relaxation of the complementarity constraints, converge globally to a C-stationary point of an optimization problem involving a parameterized mixed P variational inequality.

■ MA15

Center-Room B4

Network Optimization Algorithms and Software

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Richard Barr, Southern Methodist Univ, Chair, EMIS Dept., Dallas, TX, 75275, USA, Barr@engr.smu.edu

1 — Discrete Optimization via Netforms and Dynamic B&B
Mohammad M. Amini, University of Memphis, Memphis, TN, 38152, USA, mamini@memphis.edu., Fred Glover, Gary Kochenberger

Many discrete optimization problems, especially network-related, can be captured by Netform models as discrete generalized networks. We introduce the first solution method for such problems, based on Dynamic B&B. Computational results on fixed-charge networks, satisfiability problems and others show the promise of the new approach.

2 — Extensible Markup Language (XML) for Network Optimization
Gordon Bradley, Naval Postgraduate School, GBradley@monterey.nps.navy.mil.

The Extensible Markup Language (XML) is a platform and language independent technology to represent structured data. XML based products have been developed for network optimization problems. XML and its supporting technologies are used to develop standards for representation, data validation, presentation, and transmission of network topology and node and arc properties.

3 — A Tabu Search Heuristic for the Uncapacitated Facility Location Problem
Minghe Sun, University of Texas at San Antonio, San Antonio, TX, 78249, USA, MSun@utsa.edu.

A tabu search heuristic is developed and implemented to solve uncapacitated facility location problems. The heuristic can easily find optimal solutions for test problems from the literature. Computational results with randomly generated test problems show that the heuristic completely dominates the Lagrangian relaxation method in solution quality and computation time.

4 — Solving Large-scale Constrained Shortest-path Problems for Mission Planning with Time-critical Targets
Richard Barr, Southern Methodist Univ, Chair, EMIS Dept., Dallas, TX, 75275, USA, Barr@engr.smu.edu., Thomas McLoud

We describe algorithms for solving large constrained shortest-path problems and exploring the efficient frontier for the one-to-all bicriterion variant. An application to the simultaneous routing of multiple aircraft in a high-threat environment with limited decision time is demonstrated.

■ MA16

Center-Room C4

Integer Programming III

Cluster: Discrete Optimization
Invited Session

Chair: Jon Lee, IBM, Yorktown Heights, NY, 10598, USA, jonlee@us.ibm.com

1 — Packing T-joins
Francisco Barahona, IBM, Yorktown Heights, NY, 10598, USA , barahon@us.ibm.com.

Given a graph G=(V,E), a set of nodes labelled by T, and a set of edge-weights, it is known that the weight of a maximum packing of T-joins is equal to the weight of a minimum T-cut. However Padberg-Rao's algoruthm for minimum T-cuts does not give a T-join packing. We present a combinatorial algorithm to find an optimal packing of T-joins.

2 — Solving Lexicographic Multiobjective MIP with Column Generation
Laszlo Ladanyi, IBM, TJ Watson Research Center, Yorktown Hts, NY, 10598, USA, ladanyi@us.ibm.com., Marta Eso, David Jensen

We present a method to solve lexicographic multiobjective MIPs (find the solution among the ones optimal wrt. a primary objective that is the best wrt. a secondary objective) using column generation without combining the two objective functions. Limited computational results on auction related data will be presented.

3 — An Exact Solution Approach to the Cutting-stock Problem
Robin Lougee-Heimer, IBM, Yorktown Heights, NY, 10598, USA, robinlh@us.ibm.com., Laszlo Ladanyi, Jon Lee

We present a new approach for solving the cutting-stock problem to optimality and report on our computational experience. Our method utilizes open-source software components available in the COIN-OR repository at www.coin-or.org. Joint work with Laszlo Ladanyi and Jon Lee.

■ MA17

Center-Room B1

Scheduling Wafer Fabrication I: Industrial Applications of Operational Modeling and Simulation for Semiconductor Manufacturing

Cluster: Manufacturing Systems
Invited Session

Chair: John W. Fowler, Arizona State University, Associate Professor, Tempe, AZ, USA, john.fowler@asu.edu

1 — The Shifting Bottleneck Procedure for Complex Job Shops
Scott Mason, University of Arkansas, Assistant Professor, Fayetteville, AR, 72701, USA, mason@uark.edu., John W. Fowler

Semiconductor wafer fabrication facilities are characterized by reentrant or recirculating product flow through a number of different tool groups (one or more machines operating in parallel). These tool groups typically contain batching machines , as well as machines that are subject to sequence-dependent setups. A modified Shifting Bottleneck heuristic are presented for obtaining "good" solutions to this complex job shop scheduling problem.

2 — Rescheduling Complex Job Shops
S. Jin, University of Arkansas, jin@uark.edu., Michele Pfund, Scott Mason

Semiconductor wafer fabs are characterized by specific job process routings, recirculating product flow, batching tool groups, and the existence of sequence-dependent setups. In addition to these unique difficulties, wafer fabs must also contend with random tool failures, shift changes, preventive maintenance, and "hot" orders. Any one of these events may render a schedule obsolete and necessitate rescheduling. We explore different techniques for rescheduling this complex job shop.

3 — Reticle Management within Photolithography
Matthew Carlyle, Arizona State University, Tempe, AZ, 85044, USA, mcarlyle@asu.edu., Ravi Abraham, John W. Fowler
Abstract not supplied

4 — Minimizing Total Weighted Tardiness on Parallel Batch Machines with Incompatible Job Families
Hari Balasubramanian, Arizona State University, Tempe, AZ , 85281-4057, USA, hari.balasubramanian@asu.edu., Matthew Carlyle, Michele Pfund, Amit Gadkari, John W. Fowler, Lars Moench

We consider the batching and scheduling problem found in the diffusion area of a semiconductor wafer fabrication facility. Diffusion steps are modeled as parallel batch machines with incompatible job families to minimize total weighted tardiness. We combine genetic algorithms with dispatching and scheduling rules to solve these problems.

■ MA18

Center-Room J2

Daniel H. Wagner Prize Competition, Session I

Sponsor: CPMS, The Practice Section of INFORMS
Sponsored Session

Chair: Joseph Discenza, , jpd7@alumni.cwru.edu

1 — Optimally Configuring Transponders to Maximize Satellite Revenues
Rajesh Tyagi, GE Global Research Center, Decision Scientist, Niskayuna, NY, 12309, USA, tyagi@research.ge .com., Srinivas Bollapragada

SES Americom Inc. is using a pricing and contract management system developed by GE Global Research Center (GRC) to maximize revenues generated by SES-1i, the first of its new generation satellites, which will be launched in January 2003. The tool tracks signed contracts and projected demands over the life of the satellite, and recommends optimal configurations of the satellite's twenty-four transponders on a monthly basis. Each of these highly sophisticated transponders can serve up to three markets simultaneously from certain combinations of twenty-one possible markets. We modeled the transponder configuration problem as a mixed-integer program and developed efficient heuristics for solving the problem. We implemented our algorithms in a Microsoft Excel-based system with a Visual Basic user interface. The system is currently being used to mange over $2 billion in revenues. We plan to adapt the system for use in other satellites with similar technology that will be launched at future dates.

2 — Bitwise Fractional Airline Optimizer
Chris Martin, Bitwise Solutions Inc., Ft. Worth, TX, 76180, Pinar Keskinocak, David Jones

Fractional ownership programs have revolutionized the corporate aviation industry and created an exciting and rapidly growing market by oÄering the comfort and convenience of a full time flight department at a fraction of the cost. Fractional management com- panies (FMCs) have bridged the gap between impersonal and inconvenient airlines and extremely costly, full time flight departments. The growth of this industry has created immense opportunities for cost conscious FMCs. We have developed a flexible and completely integrated decision support system to ensure that this market will continue to see great successes in the future.

■ MA19

Fairmont-Regency 2

Electric Power Market Design

Sponsor: Energy/Natural Resources/Environment Section - Electricity Markets and Energy Modeling
Sponsored Session

Chair: Hung Po Chao, EPRI/Stanford Univ., Sr.Tech. Leader/Consult. Prof., Palo Alto, CA, 94303, USA, hchao@epri.com

1 — Models of Two Settlement Electricity Markets with Congestion Uncertainty
Rajnish Kamat, Financial Engineering Associates, Berkeley , CA, rajnish@fea.com., Shmuel Oren

We analyze a two period duopoly model where sellers make forward commitments at forward prices and then offer adjustment quantities at spot market prices against the residual demand. We examine the effect of congestion when the forward market does not recognize all the real time constraints. The two period Nash equilibrium is evaluated with and without arbitrage between forward and spot prices.

2 — The Effect of Forward Markets on Electricity-Market Equilibria
Frederic Murphy, fmurphy@surfer.sbm.temple.edu., Yves Smeers

We examine the effect on an electricity market from having a forward market versus only a spot market in the context of closed-loop oligopoly games. We show that forward markets increase production in off-peak periods but may not increase production in peak periods. The presence of a forward market can increase capacity additions. The forward market creates the possibility for multiple equilibria and an equilibrium does not necessarily exist when capacity expansion is taken into account.

3 — Market Simulation as a Design Tool
Robert Entriken, EPRI, Palo Alto, CA, rentrike@epri.com.

This presentation describes a benchmarking exercise to test the performance of the Short Term Electricity Market Simulator (STEMS), an agent-based computer simulator. We compared our own simulation results with a variety of experimental and theoretical results from other published sources, and we concluded that the simulator performs reasonably well as a source of insight into market behavior. Its current level of performance is appropriate for applications in electricity market design.

■ MA20

Fairmont-Hillsborough

Auction Theory

Cluster: Auctions
Invited Session

Chair: Michael Rothkopf, Rutgers University, Piscataway, NJ, 08854, USA, rothkopf@rutcor.rutgers.edu

1 — Optimal Pricing Mechanisms with Unknown Demand
Ilya Segal, Stanford University, ilya.segal@standford.edu .

The profit-maximizing multi-unit auction with buyers' valuations drawn from a known distribution intersects the submitted demand with a reservation supply curve. With unknown distribution, however, a preset supply curve cannot maximize profits. The optimal mechanism prices to each buyer using the demand distribution inferred from others' bids. With many buyers, this attains the monopoly profit with known demand.

2 — Monotone Bidding in Common-Value Auctions
Vlad Mares, Washington School of Business, MARES@olin .wustl.edu.

We attempt to characterize the entire set of equilibrium bidding strategies in second price common-value auctions. We show that in the two-bidder problem best-response functions are monotone and characterize all outcomes supported by equilibrium bids. In problems involving more than three bidders we show that, in general, non-monotone equilibrium bidding can not be ruled out. The analysis includes multi-dimensional signal models.

3 — Choices Among Basic Auction Polices
Ilia Tsetlin, Duke University, imt@duke.edu.

Three auction-design policies in a multi-item unit-demand common-value framework are analyzed: uniform vs. discriminatory pricing; whether to release the number of bidders; determining the number of objects for sale. The conclusions differ from those in the private-value framework, indicating that assessing private value and common value contributions is essential.

4 — A Field Test of the Revenue Equivalence Theorem
John Morgan, University of California, Berkeley, CA, USA, morgan@haas.berkeley.edu.

Using eBay, we tested the revenue equivalence theorem by auctioning pairs of identical item. Some auctions had a high opening bid and a low shipping charge; others, the reverse. In all, the sum of the two were equal, so they should average the same revenue. However, the former yielded systematically less revenue than the latter.

■ MA21

Fairmont-Glen Ellen

OR Models in Finance

Contributed Session

Chair: Winston C. Yang, University of Wisconsin-Madison, Madison, WI, 53715, USA, winston@cs.wisc.edu

1 — Optimal Polyiamonds with Applications to Domain Decomposition
Winston C. Yang, University of Wisconsin-Madison, Madison , WI, 53715, USA, winston@cs.wisc.edu., Robert R. Meyer

Motivated by the domain decomposition problem in parallel processing, we give formulas and algorithms for the min perimeter of an n-polyiamond (set of n congruent equilateral triangles), and for the max number of triangles in a polyiamond with perimeter at most p. Similar results hold for polyhexes (sets of hexagons).

2 — Mean Square Optimal Hedges using Higher Order Moments
Yuji Yamada, Graduate School of Business Sciences, University of Tsukuba, Tokyo, 112-0012, Japan, yuji@gssm .otsuka.tsukuba.ac.jp., James A. Primbs

In this work, we first solve a mean square optimal hedge which takes higher order moments (or cumulants) into account using Markov theory. Then we analyze the effect of higher order moments in the underlying asset on the price of derivative securities.

3 — Scenario Generation for Multivariate Financial Data using the Nearest Neighbor Bootstrap
Haiyan Huang, Rensselaer Polytechnic Institute, Troy, NY, 12180, USA, huangh4@rpi.edu., Thomas R. Willemain

This research aims to develop a methodology to convert one historical multivariate time series into an unlimited number of scenarios that mimic the underlying data generating process. This method, based on a bootstrap technique first used in stochastic hydrology, can be used for scenario-based risk assessment or asset pricing model test in finance.

4 — An Algorithm to Optimize Portfolio Weights for the First Degree Stochastic Dominance

Choonho Ryu, Department of Business Administration, Hong-ik University, Professor, Seoul, 121-791, Republic of KOREA, ryuch@wow.hongik.ac.kr.

Unlike the mean-variance approach, the stochastic dominance approach is to form a portfolio that first-degree stochastically dominates a predetermined benchmark portfolio, e.g. KOSPI. Analytically defining the first derivative of the objective function, an optimal algorithm was developed to search a set of optimal weights systematically and tested with promising results against Korean and US stock market data sets.

■ MA22

Fairmont-Paseo

OR/MS in Forestry V

Sponsor: Energy/Natural Resources/Environment Section - Forestry
Sponsored Session

Chair: Stephanie Snyder, USDA Forest Service, St. Paul, MN, 55108, USA, stephaniesnyder@fs.fed.us

1 — National Projections of Forest and Rangeland Condition Indicators
John Hof, USDA Forest Service, Ft. Collins, CO, 80526, USA, jhof@fs.fed.us., Curtis Flather, Tony Baltic, Stephen Davies

This presentation will summarize the development and results from an econometric model designed to project indicators of environmental condition. This model emphasizes the independence of ecological systems from human control, and a broad spatial scale. Model results are summarized with projected "hotspots" of environmental stress.

2 — Scheduling Transport in Forest Operations Planning
Jorge Valenzuela, Auburn University, Auburn, AL, 36830, USA, jvalenz@eng.auburn.edu., Tim McDonald, Hakan Balci

Transportation costs represent a significant portion of the operating cost of a forest company. The main difficulty in finding an optimal transport schedule is dealing with task precedence and project due dates. We propose a simulated annealing algorithm that interacts with a network simulation model of the forest system.

3 — Evaluating Landscape-scale Fuel Treatments for Biomass-based Energy Generation
Jeremy Fried, USDA Forest Service, Forest Inventory and Analysis, Research Forester, Portland, OR, 97208, USA, jsfried@fs.fed.us., Roger Fight, Jamie Barbour

FIA BioSum is a simulation framework of models that evaluates the economic feasibility of sites for woody biomass processing facilities, provides economic analysis of treatments, and predicts the likelihood of treatments reducing fire hazard and attaining desirable stand structure. Analysis of a two-state region found that only a fraction of the land could be treated via operations that generate positive net revenue, but that this fraction could be expanded with cost subsidies.

■ MA23

Center-Room L

Airline Operations II

Sponsors: Transportation Science Section, Aviation Applications Section
Sponsored Session

Chair: William D. Hall, Draper laboratory, Cambridge, MA, 02139, whall@draper.com

1 — Evaluating Airline Schedules and Schedule-Recovery Procedures for Improved Operational Dependability
Tuell Green, American Airlines, DFW Airport, TX, 75261, tuell.greeen@aa.com.

We present a multi-phased approach to evaluate the operational dependability of a planned schedule at American Airlines. The objective is to understand relationships between schedule attributes and dependability that can be incorporated into the schedule-optimization tools to explicitly account for dependability and improve operational performance. A valuable bi-product of this effort is a simulation-based environment in which many other issues (OSO recovery procedures, crew pairing strategies, resource allocation strategies, etc.) can be addressed and evaluated.

2 — Operations Research, Airspace Infrastructure, and Airline Operations
Michael Mederer, Deutsche Lufthansa AG, Frankfurt, Germany, Michael.mederer@dlh.de.

While airspace and airport infrastructure become a major bottleneck for flight operations, optimized flight schedules tend to be increasingly tight. This paper introduces an analytic modeling approach to evaluate schedule robustness and economic impact of different airline stochastic schedule optimization methods, focusing on setting block times, ground times, buffers, etc.

3 — Optimization Tool to Ensure Crew Feasibility During Schedule Development Process
Ilhan Ince, U S Airways, ilhan_ince@usairways.com.

When flight schedules change the block hour requirements by aircraft type change. The pilots bid for work assignments and get retrained to the new aircraft type. This presentation desribes an optimization based proactive approach to plan training capacities and/or adjust block hours to ensure crew feasibility of a flight schedule.

■ MA24

Hilton-Pacific

Enhancing the Communication Skills of Undergraduates

Sponsor: Education
Sponsored Session

Chair: Christopher Zappe, Bucknell University, zappe@bucknell.edu

1 — A Writing Intensive Course in Statistics and Operations Research
Jill R. Hardin, Virginia Commonwealth University, Richmond, 23284, U.S.A., jrhardin@vcu.edu., W. Scott Street, IV

The development and content of a writing intensive course in the Department of Statistical Sciences and Operations Research will be discussed. The course was developed based on surveys of students and faculty and on conversations with industry professionals. Examples of course content include writing executive summaries and conducting literature reviews.

2 — Emphasizing Communication Skills in Industrial Engineering
Bryan Norman, University of Pittsburgh, Pittsburgh, PA, 15261, USA, banorman@engrng.pitt.edu., Kim LaScola Needy

At the University of Pittsburgh Department of Industrial Engineering, assuring that our undergraduates receive a strong education in communications skills is of great importance. Specific courses at all levels have components designed to teach, strengthen, and allow students to practice communications skills. Other courses throughout the curriculum provide further reinforcement.

3 — Integrating Workplace Communication into Undergraduate Courses
Judith S. Norback, Industrial and Systems Engineering, GA Tech, Atlanta, 30332, U.S.A., jnorback@isye.gatech.edu., Alexander B. Quinn

Workplace research is used to better prepare graduating students for workplace communication. Results of interviews with senior executives and industrial engineers will be discussed. Criteria for communication excellence and tools used in communication instruction will be described as well as a prototype web-based system affording access to workplace data.

■ MA26

Hilton-San Carlos I

Personnel Scheduling

Contributed Session

Chair: Sydney Chu, University of Hong Kong, Hong Kong, 00000, China, schu@hku.hk

1 — Planning, Scheduling and Rostering for Fixed-length Duties
Sydney Chu, University of Hong Kong, Hong Kong, 00000, China, schu@hku.hk.

Realistic manpower operation planning involves steps from planning to scheduling to rostering. Stage-wise decomposition is proposed for a class of problems with fixed-length shift duties. Its flexible optimization modeling approach also handles planning for extended duties such as over-time and part-time.

2 — A Consulting Firm uses Mathematical Modeling to Plan Its Personnel Review Meetings
Robert M. Saltzman, San Francisco State University, San Francisco, CA, 94132, USA, saltzman@sfsu.edu., Jennifer L. Meyer

We describe how annual personnel review meetings of consultants by partners at a medium-sized consulting firm are efficiently planned using a mathematical model developed in OPL Studio. Running the model has saved partners from unnecessarily attending meetings and significantly reduced the time required to develop a desirable meeting plan.

3 — A New Cut for Solving the PBS Problem
Michel Gamache...cole Polytechnique de MontrÈal and GERAD , Montreal, Qc, H3C 3A7, Canada, michel.gamache@polymtl .ca., Heykel Achour, Francois Soumis

The PBS problem in the airline industry consists in constructing for each employee the best feasible schedule according to his/her seniority rank. The problem is

solved sequentially, based on the seniority order of employees, using a column generation approach imbedded in a branch-and-bound algorithm. Sometime, for solving the linear relaxation of the problem associated to one employee, cuts are needed.

4 — Is Bidline-generation an Optimization Problem?
Stefan E. Karisch, Carmen Systems Ltd, Montreal, H3A3J6, Canada, stefan.karisch@carmensystems.ca., Tomas Gustafsson

The bidline-generation problem at airlines aims at constructing crew rosters that are productive and satisfy quality criteria such as regularity, robustness and a certain degree of fairness. We challenge a common belief that bidline-generation does not require optimization, and describe different approaches for modeling and solving the problem. Computational results are also presented.

■ MA27

Center-Room C2

Reverse Production System Design and Analysis

Cluster: Reverse Supply Chain
Invited Session

Chair: Matthew Realff, Georgia Institute of Technology, Atlanta, GA, 30332-0100, USA, matthew.realff@che.gatech.edu

1 — Retail Reverse Logistics Outsourcing
Ronald S. Tibben-Lembke, University of Nevada, Reno, Reno , NV, 89557, rtl@unr.edu., Dale S. Rogers

We present a number of recent research findings, including an estimate of 3PL RL activity, and a discussion of the "secondary market," those firms involved in buying and selling goods that have been returned or have been removed from the primary sales channel for some other reason.

2 — Modeling and Simulation of a Reverse Supply Chain in an Uncertain Environment
Markus Biehl, York University, Asst Prof, Toronto, ON, M3J 1P3, Canada, mbiehl@schulich.yorku.ca., Edmund Prater, Matthew Realff

Previously, reverse supply chains have been modeled mostly using mixed integer linear programming. In this paper we use chaos theory since it allows us to reflect uncertainty regarding the take-back rate, a major factor influencing the profitability of a reverse logistics network.

3 — Priority Decisions in Hybrid Manufacturing/Remanufacturing Systems
Vedat Verter, McGill University, Montreal, Canada, verter@management.mcgill.ca., Necati Aras, Tamer Boyaci

Companies with joint manufacturing and remanufacturing facilities face the challenge of coordinating these two operations. We compare alternative strategies for finished goods inventory replenishment in such hybrid systems. Using simulation-based optimization, we investigate the conditions under which either remanufacturing or manufacturing should be given priority to minimize operational costs.

4 — Robust Reverse Production System Design
Jane Ammons, Georgia Institute of Technology, Atlanta, GA , 30332, Tiravat Assavapokee, Reema Bhakta, Devon Oudit, Matthew Realff, Juan Martin Vannicola

Growing attention is being given to the problem of efficiently designing and operating systems to handle the return flows of production wastes, packaging, and end-of-life products. This paper develops a mathematical programming approach to support infrastructure design for reverse production systems (RPS). We present a robust framework for strategic decision making in reverse production systems when uncertainty greatly affects the outcomes of the decisions. The application of the approach will be illustrated using a case studies from the electronics and carpet industry.

■ MA28

Center-Ballroom A1

Collaboration and Cooperation in the Supply Chain

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Michael Fry, University of Cincinnati, Assistant Professor, Cincinnati, OH, 45221, USA, mike.fry@uc.edu

1 — Optimizing the Supply-chain Configuration for New Products
Sean Willems, Boston University, Assistant Professor, Boston, MA, 02215, USA, willems@bu.edu., Stephen Graves

We present a model that determines what suppliers, parts, processes and transportation modes to select at each stage in a new-product supply chain. Each of these different options is differentiated by its lead-time and direct cost added. We illustrate the problem and its solution with an industrial example.

2 — Coordination of Proactive and Reactive Capacity to Optimize Profit Mean and Risk under Demand Uncertainty
Uday Rao, University of Cincinnati, Associate Professor, Cincinnati, OH, 45221, USA, uday.rao@uc.edu., Sunder Kekre, Jinxin Yi

Based on supply contracting at McDonald's, we consider single-product capacity management with a long-term choice z (number of production lines to install before demand is known) and short-term recourse actions (production, inventory, and subcontracting). We use a scenario-based model to examine expected profit and risk (variance / mean downside risk).

3 — Supply Chain Coordination with Overtime and Premium Freight
Eric Huggins, Fort Lewis College, Durango, CO, 81301, USA , huggins_e@fortlewis.edu., Tava Lennon Olsen

We consider a two stage supply chain where demand is always met by the upstream facility, using one of two methods of expediting when necessary. We discuss two contracts that coordinate the supply chain. One is optimal but may be impractical, the other is nearly optimal and more easily implementable.

4 — Cooperating on Demand Forecasts and Inventory Replenishment with Multiple Retailers and Outsourcing
Michael Fry, University of Cincinnati, Assistant Professor, Cincinnati, OH, 45221, USA, mike.fry@uc.edu., Roman Kapuscinski, Tava Lennon Olsen

We present a periodic model and analysis of a situation involving multiple retailers subject to a vendor-managed inventory contract and forecast updating. We show that the optimal policies, under some assumptions, are up-to policies and that savings over traditional scenarios can be significant.

■ MA29

Center-Ballroom A5

Inventory Models

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Saifallah Benjafaar, University of Minnesota, Minneapolis, MN, 55455, USA, saif@me.umn.edu

1 — Optimal Component Stocking Policy for Assemble-To-Order Products with Leadtime-Sensitive Pricing
Rick So, University of California, Irvine, rso@uci.edu., Vernon N. Hsu, Chung-Yee Lee

The problem is to determine the optimal stocking quantities for n components for an assemble-to-order customized product. The order quantity is unknown and the unit price depends on the delivery leadtime of the order. Procurement leadtimes of the components are different. Unused components can suffer severe price erosion.

2 — Centralized Ordering Policies in Multi-Echelon Systems Under Correlated Demands and Advance Demand Information
Holly Lutze, Stanford University, hlutze@stanford.edu., Ozalp Ozer

For two level warehouse-retailer systems with deterministic leadtimes and correlated demands across time and retailers, we show how advance demand information affects base-stock policies and demonstrate when myopic policies are sufficient. We address the effects of correlation, depot location, distribution leadtimes and risk pooling on system costs and average inventories.

3 — More on Pooling in Make-to-stock Systems
William L. Cooper, University of Minnesota, Minneapolis, MN, 55455, billcoop@me.umn.edu., Saifallah Benjafaar, Joon-Seok Kim

We describe the effects of inventory pooling in make-to-stock production systems. The talk includes discussion of absolute and relative measures of the benefits of pooling, and an analysis via stochastic orderings of how variability influences pooling effects. We compare predictions that arise from the make-to-stock-production setting with those from other models.

4 — The Value of Progress Information in Supply Chain
Honggeng Zhou, Fisher College of Business, zhou.68@osu .edu., W. C. Benton, Nicholas Hall

Decisions About Sharing Information are Critical to the Efficiency of Supply Chains. Our study considers sharing production progress information. Analytical models demonstrate that a supplier's total inventory cost decreases as a result of receiving progress information from other suppliers. A simulation model generalizes the environment of the analytical models and confirms their findings.

■ MA30

Center-Ballroom A6

Empirical Operations Management

Sponsor: Manufacturing and Service Operations Management Society

Sponsored Session

Chair: Aleda V. Roth, University of North Carolina, Chapel Hill, NC, 27599, Aleda_roth@bschool.unc.edu

1 — Effect of Product Variety and Technology on Product Variety: Evidence from the Semiconductor Industry
Murat Kristal, University of North Carolina, Aleda V. Roth, Jayashankar Swaminathan

In this study, we empirically explore the effects of product variety, product and process complexity on manufacturing performance, in semiconductor industry. We specifically emphasize how these components influence manufacturing strategy for a clock speed industry like high-tech manufacturing. Counter to conventional wisdom, our results reveal that product variety can be used as a competitive weapon, if product and process complexities are handled accordingly.

2 — Navigating Business-to-Business (B2B) Marketspaces: A Model for Seller Competence and Performance
Eve D. Rosenzweig, Emory University, Atlanta, GA, 30322, United States, Eve_Rosenzweig@bus.emory.edu., Aleda V. Roth

Internet-based B2B marketspaces enable the development and exchange of goods and services among businesses. In the context of three distinct types of B2B marketspaces, we develop a theory-based model of operations strategy that links seller competence to performance. The model is empirically tested using data collected from a web-based survey.

■ MA31

Center-Room J3

Advances in Computational Optimization

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: John Chinneck, Carleton University, Professor, Ottawa, On, K1S 5B6, Canada, chinneck@sce.carleton.ca

1 — Faster MIP Solutions Through Better Variable Ordering
John Chinneck, Carleton University, Professor, Ottawa, On , K1S 5B6, Canada, chinneck@sce.carleton.ca., Jagat Patel

Variable ordering can dramatically affect the speed of a MIP solution. We propose a dynamic variable ordering scheme based on the effect that candidate variables have on the active constraints in the LP relaxation, rather than their effect on the objective function as in traditional methods. Empirical results are presented.

2 — Delivery of Optimization Tools and Solutions in OSP
Gautam Mitra, Brunel University, Professor, Uxbridge, UB8 3PH, United Kingdom, gautam.mitra@brunel.ac.uk., Patrick Valente

OSP (Optimization Service Provider) adopts an ASP model to provide analysts and end users with access to optimization software tools and optimization-based vertical decision support systems. We present out latest developments, including provision of modelling systems and solvers, as well as application in finance agriculture and supply chain management.

■ MA32

Center-Room J4

Managing and Operating Large-scale Data Centers

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Dirk Beyer, Hewlett-Packard Compnay, Palo Alto, CA, 94304, USA, dirk_beyer@hp.com

1 — Economic Model of Capacity Planning for Computing Service Providers
Kyle D. Chen, Almaden Research Center, Research Staff Member, San Jose, CA, 95120-6099, U.S.A., kylechen@almaden.ibm.com.

Based upon a Quality of Service optimization scenario in a queueing system, we present a capacity planning model that produces the maximum income over time for the service provider while maintaining the best-effort Quality of Service promised to customers. The model demonstrates the trade-offs between capacity and Quality of Service.

2 — Combinatorial Problems in Storage Networks
Julie Ward, Hewlett-Packard Laboratories, Project Scientist, Palo Alto, CA, 94304, USA, jward@hp.com., Troy Shahoumian, Rick Rosenthal, John Wilkes, Michael O'Sullivan

HP Labs is mining a rich vein of combinatorial problems that arise in storage networking. Among these are the design of SAN fabrics and the compact racking and wiring of SANs. We will describe our results in these areas.

3 — A Mathematical Optimization Approach for Resource Allocation in Large-scale Data Centers
Xiaoyun Zhu, Hewlett-Packard Laboratories, Palo Alto, CA, 94304, USA, xiaoyun_zhu@hp.com., Cipriano Santos, Harlan Crowder

Intelligent resource provisioning becomes increasingly important for large-scale data centers. We formulate the Resource Allocation Problem (RAP), a combinatorial optimization problem, and develop a mathematical programming (MP) approach that is robust, scalable and efficient. Computational results demonstrate the MP methodology is superior to other methods for solving RAP.

■ MA33

Hilton-University

Stochastic Network Interdiction

Sponsor: Optimization Section-Stochastic Programming
Sponsored Session

Chair: David Morton, University of Texas, Austin, TX, 78712-1063, USA, morton@mail.utexas.edu

1 — Interdiction and Hardening of Computer Networks
David Woodruff, University of California, Professor, Davis, CA, 95616, USA, dlwoodruff@ucdavis.edu., Raymond Hemmecke, Jesus De Loera, Ruriko Yoshida

Reliance on computer networks gives rise to the problem of allocating resources to the task of hardening them against interdiction. In this talk we describe models for optimal hardening against an optimal network interdiction that can involve attacks on both arcs and nodes. Preliminary computational results are presented.

2 — The BEST Algorithm to Solve Stochastic Integer Programs
Susan Sanchez, Naval Postgraduate School, Monterey, CA, 93940, USA, ssanchez@nps.navy.mil., Kevin Wood

We solve stochastic integer programs through successively restricted deterministic bounds and Monte Carlo sampling: Bound, Enumerate, Sample and Test. An advantage over other techniques is that only single-scenario models need be solved. Computational results are presented for a stochastic network-interdiction problem with uncertain interdiction success.

3 — Models and Methods for Interdiction of Nuclear Material Smuggling
Feng Pan, University of Texas, Austin, TX, 78712-1063, USA, fpan@math.utexas.edu., William Charlton, David Morton

We describe a stochastic network interdiction model designed to help select sites for installing equipment to detect smuggling of nuclear materials in the former Soviet Union. Multiple variants of our basic stochastic integer program are developed to handle smugglers with different levels of information.

■ MA34

Hilton-Plaza

DA Arcade

Sponsor: Decision Analysis Society
Sponsored Session

Chair: John Aloysius, University of Arkansas, Fayetteville, AR, 72701, USA, aloysius@comp.uark.edu

1 — Improving Corporate Performance Using Consumer Preferences
Ralph Keeney, Duke University, Fuqua School of Business, San Francisco, CA, 94111, USA, keeneyr@aol.com., Robert Oliver

Designing new products and introducing product features is critical to establishing and maintaining a competitive advantage. This presentation illustrates how to create win-win alternatives better for the company and its customers. The key is to use consumer preferences for price and quality and company preferences for profits and market share.

2 — Evolutionary Analysis of Risk Aversion in Simulated Competitive Environments
Jayavel Sounderpandian, University of Wisconsin, Kenosha, WI, 53141-2000, USA, sounderp@uwp.edu.

No theory of decision-making is capable of specifying the "correct" level of risk aversion in a given situation. This presentation considers the evolution of risk aversion among several players in a simulated, competitive, risky environment.

3 — A Behavioral Model of Intertemporal Decision Making under Risk
John Aloysius, University of Arkansas, Fayetteville, AR, 72701, USA, aloysius@comp.uark.edu.

When faced with multiple plays of a gamble, experimental evidence shows that decision makers violate utility theory. Many subjects who reject repeated play of a gamble, will accept it when shown the explicit distribution of outcomes. This study investigates the cognitive process, and behavioral factors that influence this preference reversal.

4 — Valuing Stock Options from the Employee's Perspective
Cade Massey, Duke University, Durham, NC, 27708, USA, cade.massey@duke.edu.

I combine survey responses and archival option exercise data to investigate how employees of a Fortune 100 firm value employee stock options. I find that factors neglected in traditional valuation models, such as exercise experience and mental accounting, significantly influence valuation and exercise. I also find that these factors vary systematically in the organization.

■ MA35

Hilton-Almaden II

Recent Advances in Six-Sigma Quality Tools

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Fugee Tsung, Hong Kong University of Science & Technology, Kowloon, Hong Kong, season@ust.hk

1 — Recent Advances in Quality Function Deployment
Kwang-Jae Kim, Pohang University of Science & Technology, Kyungbuk, 790-784, Korea, kjk@postech.ac.kr., Hyun-Woo Cho, In-Jun Jeong, In-Gyu Lim

Quality function deployment (QFD) is a useful tool for identifying a project topic, called a critical-to-quality, in the early stage of a six sigma project. In this talk, we first review the limitations of the existing QFD framework, and then present some recent extensions from the methodological perspective to enhance its usefulness in practice. In particular , the validation of the information contained in a house of quality chart and the effective use of the collected information will be discussed.

2 — Multivariate Capability Indices, a Review
Philippe Castagliola, Ecole des Mines de Nantes, Nantes Cedex, BP 20722, France, philippe.castagliola@emn.fr., Jose-Victor Garcia-Castellanos

Capability Indices are widely used today in many companies in order to evaluate the capability of a machine or a process to produce in a specified tolerance interval. The most popular CI's are the Cp and the Cpk, but many other CI's have been proposed and studyied in the literature. The goal of this talk is to present a review of existing methods dedicated to the evaluation of CI's in the case of multiple quality caracteristics.

3 — Contemporary Quality Activities in Japan — TQM, Six Sigma and Other Trends
Yamada Shu, Tokyo University of Science, Tokyo, 162-8601, Japan, shu@ms.kagu.tus.ac.jp.

There are various quality activities in the last couple of decades, such as Total Quality Management, ISO 9000, Six Sigma and so on. This talk presents the contemporary quality activities in Japan, in particular application of statistical techniques, popularity of Six Sigma and so forth.

4 — The Selection of Six Sigma Cook-book Approaches
James Brady, LaBarge, Inc., Theodore Allen, Chaitanya Joshi

One of the key contributions of the six sigma movement is the creation of cookbook approaches for process development to be used a "green belt" class of workers. This paper rigorously defines the component sub-methods such as cause and effect matrices, failure modes and effects analysis, and design of experiments. Then, we discuss the optimal selection of the methodology for particular business contexts.

5 — Process and Product Improvement in Manufacturing Systems with Correlated Stages
Paul Zantek, University of Maryland, College Park, MD, 20742, USA, pzantek@rhsmith.umd.edu., Gordon Wright, Robert Plante

This research develops a procedure for determining the optimal investment in quality improvement for each stage of a multistage manufacturing system. We measure the impact of each stage's performance on variation in product quality and incorporate this information in an economic model that is optimized with respect to quality-improvement investments.

■ MA36

Center-Room F1

Topics in Queueing Networks

Sponsor: Applied Probability Society
Sponsored Session

Chair: Sunil Kumar, Stanford University, kumar_sunil@gsb.stanford.edu

1 — Discrete Proportional Processor Sharing Service Policies for Multiclass Queueing Networks
Jim Dai, Georgia Institute of Technology, dai@isye.gatech .edu.

We introduce a family of scheduling policies, called discrete proportional processor sharing (DPPS) policies. These policies maximize throughput in a multiclass queueing network that models, for example, complex semiconductor wafer fabrication facilities, and can be implemented using only local queue length information. We present their performance in simulated wafer fabrication facilities using SEMATECH data sets.

2 — Functional Differential Equation Models for Congestion Control
R. Srikant, University of Illinois, rsrikant@uiuc.edu., Supratim Deb, Sanjay Shakkottai

We consider a stochastic model of the Internet congestion control , where the randomness represents uncontrolled sources (popularly known as web mice). We will show that, if a deterministic system is stable, then the trajectory of the stochastic system approaches that of the deterministic system when the number of users is large.

3 — Queueing Networks with Customer Choice in Routing
Sunil Kumar, Stanford University, kumar_sunil@gsb .stanford.edu., Ali Parlakturk

We study self-interested routing in stochastic networks, taking into account the discrete stochastic dynamics of such networks. We show that a stochastic network can be unstable in Nash equilibrium. We also design a scheduling rule that negates the performance degradation due to self-interested routing in a simple network.

4 — An LP Algorithm for Computing the Stationary Distribution of RBM
Peter W. Glynn, Stanford University, Stanford, CA, USA, glynn@stanford.edu., Assaf Zeevi

We will describe a linear programming-based algorithm for computing the stationary distribution of positive recurrent reflected Brownian motion on the nonnegative orthant. The algorithm takes advantage of a priori Lyapunov bounds to enforce tightness of the approximations, and can be shown to be suitably convergent.

■ MA37

Center-Room J1

Queueing Systems: Analysis and Control III

Sponsor: Applied Probability Society
Sponsored Session

Chair: Mark Lewis, University of Michigan, Ann Arbor, MI, 48109-2117, USA, melewis@engin.umich.edu

1 — Customer Allocation Policies in a Two Server Network: Stability and Exact Asympototics
Robert Foley, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, rfoley@isye.gatech.edu., Jerome Coombs-Reyes

Consider a two-node queueing network where each node has a single server with an infinite capacity waiting area. Each node has a dedicated stream of arrivals and, in addition, there is a stream of arrivals that may join either queue. For the customer that may join either queue, we investigate several different policies. For each policy, we first determine the stability conditions for the queueing network. Then, we find asymptotic expressions for the probability of a large deviation of the queue length. As in McDonald (1998), the emphasis here is on exact asymptotics, not rough asymptotics as in large deviation theory.

2 — The Dynamic Price Competition of Mark-to-Order Firms with Finite Capacity
John P. Bowman, University of California at Berkeley, bowman@ieor.berkeley.edu., Hyun-soo Ahn

We consider the dynamic price competition of make-to-order firms with finite capacity where the pricing decision is made before knowing the type of an order. We formulate the problem as a Markov game and analyze the structure of the equilibrium. The result shows, among other things, that capacity expansion may decrease the firm's long-run profit. We discuss the managerial insights obtained from this model

3 — Optimal Pricing for a Bandwidth Loss Model with Quality of Service Constraints
William Massey, Princeton University, Princeton, NJ, 08544, USA, wmassey@princeton.edu., Robert Hampshire, Qiong Wang

We construct a dynamic pricing scheme for customers of real-time bandwidth services to maximize the total revenue. It is an approximate algorithm that is based on the exact analysis for this problem when we assume that an unlimited amount of bandwidth is available for all customers. We then modify this exact solution by 'raising prices' during periods of congestion in an optimal manner.

4 — A Quasi Birth and Death Process with an Infinite Sublevel
Wayne S. Horn, University of Western Ontario, whorn@stats .uwo.ca., David Stanford, Guy Latouche

We consider a three-layer QBD model with both an infinite level and "sub-level". In many settings, at sub-level 0, service resources are freed up to augment those usually assigned to customers whose state variable is the level. This leads to a special structure for which we prove structural results, and postulate an asymptotic form for the joint probabilities.

■ MA38

Center-Room N

Joint Session with TSS: Rail and Intermodal Applications

Sponsors: Railroad Applications Section, Transportation Science Section
Sponsored Session

Chair: Dave Hunt, , dhunt@wilbursmith.com

1 — Arc-based Formulations for Coordinated Drayage Operations
Christopher D. Neuman, Northwestern University, Evanston, IL, cneuman@northwestern.edu., Athanasios K. Ziliaskopoulos, Karen Smilowitz

The movement of loaded and empty equipment (trailers and containers) between rail yards and shippers/consignees is a costly part of intermodal shipping. These drayage costs are exacerbated by the lack of coordination among parties. We investigate strategies to coordinate these movements, with a focus on the Chicago region.

2 — Modeling Truck-Rail Interaction at Intermodal Yards
Bhuwan Bhaskar Agrawal, Northwestern University, Evanston , IL, 60208, b-agrawal@northwestern.edu., Peng Duan, Athanasios K. Ziliaskopoulos

This presentation deals with modeling issues that lie in the interface between modes of intermodal freight operations, as well as interactions among stakeholders. An important interaction is between truck and train, which happens in intermodal years. The efficiency of yard operations is critical for the whole industry. This not only affects the commercial vehicle operators and the railroads, but also most of the other stakeholders in the freight industry. We discuss an effort to build a yard simulation model that will not only help in understanding the operations in the yard, but also in testing various scenarios and impacts of possible changes/improvements in the yard operations and commercial vehicle operator reactions. Emphasis will be given to data issues, modeling tools, validation and finally issues related to evaluating the impact of changes in the yard operations to improve the efficiency.

3 — Rail Car Distribution Under Uncertainty Using the Separable, Projective Approximation Routine (SPAR)
Huseyin Topaloglu, Cornell University, Professor, Ithaca, NY, USA, topalglu@princeton.edu., Warren Powell, Sanjay Melkote, Selcuk Avci

We have developed a method for allocating rail cars which takes forecasting uncertainties into account. The method, which is an adaptation of the SPAR algorithm for two-stage stochastic resource allocation problems, handles multiple car types, provides integer solutions and easily scales to very large scale problems. Numerical results are reported.

4 — Empty Repositioning Costs: Who's to Blame?
Erick Wikum, Schneider National, Inc., Green Bay, WI, 54313, USA, wikume@schneider.com., Gifford Ted, Jeff Day

We consider how to allocate empty repositioning costs among the loads and lanes of a transportation network, a problem that can arise in pricing, profitability analysis, and operations. We examine a variety of approaches based on standard accounting techniques, linear programming duality, and game theory.

■ MA39

Center-Room K

Real-Time Route Guidance and Dynamic Traffic Assignment

Sponsor: Transportation Science Section
Sponsored Session

Chair: Georgia Perakis, MIT, Associate Professor of Operations Research, Cambridge, MA, 02139, USA, georgiap@mit.edu

1 — Using an Online Routing Profile Updating Automata Scheme for Robust Real-time Hybrid Dynamic Traffic Assignment
Yi-Chang Chiu, University of Texas at Austin, Austin, TX, 78712, USA, y-chiu@mail.utexas.edu., Hani S. Mahmassani

An Online Routing Profile Updating Automata Scheme is proposed to provide robust dynamic traffic assignment (DTA) in real-time. Through the performance competition between the centralized and the decentralized DTA agents, the routing profile is adaptively adjusted in order to maintain satisfactory system performance under various uncertain input scenarios.

2 — Adaptive Traffic Flow Relations for Real-time Dynamic Traffic Assignment Operation
Nathan Huynh, University of Texas at Austin, Austin, TX, 78712, Hani S. Mahmassani

We investigate the use of adaptive traffic flow relations in a dynamic traffic assignment system. The motivation is to better estimate prevailing speeds of the actual network and improve the accuracy of the system’s predictions and quality of the resulting control actions.

3 — The Anticipatory Route Guidance Problem: Formulations, Analysis and Computational Results
Soulaymane Kachani, MIT, Cambridge, MA, 02139, USA, kachani@mit.edu., Jon Bottom, Georgia Perakis

The anticipatory route guidance problem (ARG) consists of providing messages, based on forecasts of traffic conditions, to assist drivers in their path choice decisions. We design a framework for the analysis of the problem based on a fixed-point as well as a variational inequality formulation and establish the existence of a solution. Finally, we describe a fixed-point solution approach based on averaging methods and provide some preliminary computational results.

■ MA40

Center-Room G

Panel Discussion - Agent-based Models: New Challenges for Military Simulations

Sponsor: College on Simulation Section
Sponsored Session

Chair: Thomas M. Cioppa, , tmcioppa@nps.navy.mil

1 — Agent-Based Models: New Challenges for Military Simulations
Thomas M. Cioppa, tmcioppa@nps.navy.mil.

The military analyst has many tools and techniques to assist in providing relevant and credible analysis to senior decision-makers. Proven techniques evolve over time and new ones are sometimes developed. One recent development is agent-based models. The main advantages of these models are that they are relatively easy to formulate and that run very fast. This offers the opportunity to examine a wide range of potential scenarios. The main disadvantages of these models are that they offer only a simple, low-resolution view on the desired experimental space and they usually lack the fidelity of high-resolution general purpose military simulations. The purpose of the panel discussion is to address the following key questions: 1) Assuming agent-based models can be used for military analysis, what sort of research or study questions are they best able to address? 2) How can agent-based models be used, in conjunction with other military simulations, to assist the military analyst? 3) What analytical techniques are useful to examine the results of agent-based models? 4) What is a suggested methodology, which includes the use of agent-based models, to address a military research or study issue?

■ MA41

Center-Room M

Location Analysis V

Sponsor: Section on Location Analysis
Sponsored Session

Chair: Dmitry Krass, University of Toronto, Associate Professor, Toronto, ON, M5S 3E6, Canada, krass@rotman.utoronto.ca

1 — Risk Management In Location Models
Stephen Peng, California State University, Hayward, CA, 94541, USA, speng@csuhayward.edu., Joy Bhadury

We consider a bi-objective location problem in which demand at each customer site is probabilistic and potentially correlated with demands at the other sites. The organization's objectives are profit maximization and risk management respectively. We begin with one facility case and then extend to the multi-facility version.

2 — Ambulance Location Considering Stochastic Availability and Response Times
Susan Budge, University of Alberta, Edmonton, AB, T6G 2R6 , Canada, sbudge@ualberta.ca., Armann Ingolfsson

We present a nonlinear integer program for locating and allocating ambulances to stations. We incorporate stochastic ambulance availability, chute times and travel times into a set covering formulation and include a chance constraint on the service level provided. We present alternative solution methods and illustrate model results, using operational data.

3 — Optimal Facility Location with Multipurpose Trip Making
Tsutomu Suzuki, Institute of Policy and Planning Sciences , The University of Tsukuba, Professor, Tsukuba, Ib, 305-8573, Japan, tsutomu@sk.tsukuba.ac.jp., John Hodgson

Our model locates two different types of facilities where users may use either type of facility singly or may use both types in multipurpose trips. Facility pairs tend to cluster even when the proportion of multipurpose trips is small.

4 — A New Approach to Location of Mobile Servers Under Congestion
Seokjin Kim, University of Toronto, Toronto, ON, M5S 3E6, Canada, skim@rotman.utoronto.ca., Dmitry Krass, Oded Berman

Problems in this class frequently arise in location of emergency service facilities. We review the available models this area and show that they often fail to provide a feasible solution. We develop a new approach that guarantees feasibility while avoiding excessive number of servers. Possible extensions will be discussed.

■ MA42

Fairmont-Belvedere

Advertising and Promotion

Contributed Session

Chair: Metin Cakanyildirim, University of Texas at Dallas, Assistant Professor, Richardson, TX, , 75083, USA, metin@utdallas.edu

1 — An Empirical Study of Marketing Environment, Strategy and Performance in the Property Market
Chih-Wen Wu, University of Glasgow, Ph.D. student, Glasgow, ST, G20 6UL, UK, 9807524w@student.gla.ac.uk.

The objective of the research is to explore the dynamic relationship among marketing environment, strategies and performance dimension. The study develops a model of property marketing from adapting industrial organization (IO), resource based view (RSV) and contingency theories. Using the mail survey and panel regression methodology, the model is estimated with data from a survey of marketing managers in the Taiwan property market.

2 — Sufficient Characteristics of Market Response in Coupon Rationing
Uri Ben Zion, Ben Gurion University, Beer Sheva, Israel, benzionu@bgumail,bgu.ac.il., Aharon Hibshoosh, Uriel Speigel

A firm simultaneously decides its coupon discount and the limit on the number of items per coupon. We identify sufficient characteristics of the market response function that enable insightful factoring of effects in the related inquiries of a) interdependence of the feasibilities of conditional and non-conditional rationing, b) optimal profitability, and c) comparative statics.

3 — Using Demonstration to Promote Information Products
Metin Cakanyildirim, Uiversity of Texas at dallas, Assistant Professor, Richardson, TX, 75083, USA, metin@utdallas.edu., Tevfik Dalgic

Vendors allow customers to evaluate information products via demonstration. Either they make products available to customers for free for a limited amount of time or they hand out a limited version of the product without any time limitation. We study vendor profits as a function of demonstration parameters.

4 — HIPAA: Microdata De-Identification
Moshe B. Rosenwein, Medco Health Solutions, Franklin Lakes, NJ, 07417, USA, moshe_rosenwein@merckmedco.com., Edward S. Binkowski, Andrew Rosenberg

Privacy Standards adopted under the 1996 Health Information Portability and Accountability Act (HIPAA) are concerned with the use and disclosure of individually identifiable health information. We present statistical methods that can be used to measure and limit disclosure risk of microdata consistent with the de-identification provisions in the Privacy Standards.

5 — The Behavior of Technology Suppliers in the Presence of Network Externalities: Offering a Cheap Low-Quality Product
Soheil Yousef-Sibdari, Virginia Polytechnic Institute and State University, Ph.D Student, Blacksburg, VA, 24060, USA, ssibdari@vt.edu.

We study the behavior of firms operating in a market where network externalities interact with other quality dimensions that the firms can control. We introduce the strategy of offering a cheap and low-quality product as a competing strategy to promote more customers to the ultimate network Upon developing a model of a two-stage game we will determine the product quality levels, the ultimate network size and the prices strategy.

■ MA43

Center-Room H

Dynamic Pricing/Revenue Management

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: David Simchi-Levi, MIT, Professor, Cambridge, MA, 02139, USA, dslevi@mit.edu

Co-Chair: Julie Swann, Georgia Tech, Assistant Professor, Atlanta, GA, 30332-0205, USA, julie.swann@isye.gatech.edu

1 — Evaluating Long-term Contracts for Airlines
Guillermo Gallego, Columbia University, Professor, New York, NY, USA, ggallego@ieor.columbia.edu., Youyi Feng

We evaluate a simple long-term contract that gives priority booking to a specific stream of demand taking expected revenues and risk into account. Accepting the contract expands the customer base and makes revenues more certain but cannibalizes demand from the highest fare classes. We determine whether or not a contract is beneficial and extend the analysis to lower priority contracts.

2 — Optimal Auctioning and Ordering in an Infinite Horizon Inventory-pricing System
Garrett van Ryzin, Columbia University, New York, NY, 10027, USA, gvanryzi@research.gsb.columbia.edu., Gustavo Vulcano

We consider a joint inventory-pricing problem in which buyers act strategically and bid for units over an infinite horizon. The firm must decide how to conduct its auctions and how to replenish its stock over time to maximize its profits. We show that the optimal auction and replenishment policy for this problem is quite simple, consisting of running a standard first-price or second-price auction with a fixed reserve price in each period and using an order-up-to (basestock) policy for replenishing inventory. Numerical comparisons with list pricing are presented.

3 — Coordinating Inventory Control and Pricing Strategies with Random Demand and Fixed Ordering Cost
David Simchi-Levi, MIT, Professor, Cambridge, MA, 02139, USA, dslevi@mit.edu., Xin Chen

We analyze a finite horizon, single product, periodic review model in which pricing and production/inventory decisions are made simultaneously. Demands in different periods are random variables that are independent of each other and their distributions depend on the product price.

4 — Nobody Pays Retail Anymore: Supply Chain Coordination and the Role of Manufacturer Suggested Retail Prices
Nicholas C. Petruzzi, University of Illinois, Urbana-Champaign, IL, USA, petruzzi@uiuc.edu.

We develop insight from a supply-chain coordination model in which a manufacturer sells to a retailer who then faces uncertain demand that is sensitive both to prices and to price promotions. Coordination issues and the role of a pre-emptive price announcement by the manufacturer (to the consumer market) are explored.

■ MA44

Center-Room B2

Complexity and Model Validation

Sponsor: Military Applications Society
Sponsored Session

Chair: Steven P. Wilcox, Northrop Grumman Information Technology, Arlington, VA, 22204, USA, swilcox@northropgrumman.com

1 — Meaningful V&VA
Al Brandstein, Northrup Grumman, Arlington, VA, 22209, algebra@northropgrumman.com.
Abstract not supplied

2 — Some Validation Challenges in Multi-Agent Simulation
Douglas A. Samuelson, InfoLogix, Inc., Annandale, VA, 22003-3807, samuelsondoug@netscape.net.

Multi-agent simulation models have become popular recently because they enable us to model much more complex and realistic behavior. This added power creates new challenges in validation, as it is more critical and more difficult to check the implications of assumptions. I illustrate with a few simple but intriguing examples.

3 — Managing Model Complexity
Steven P. Wilcox, Northrop Grumman Information Technology , Arlington, VA, 22204, USA, swilcox@northropgrumman.com.

Complexity in manpower models potentially allows greater model fidelity, validity, and analytical or predictive power, but the outcome may be mixed. In this tutorial we will examine how model complexity arises in the application of important manpower modeling techniques, illustrate how it creates problems, and discuss how to manage it.

■ MA45

Center-Room B3

Telecom Capacity and Pricing

Contributed Session

Chair: Haim Mendelson, Stanford University, GSB, Stanford, CA, 94305, USA, haim@stanford.edu

1 — Internet Peering, Conduit and Content
Shiri Shneorson, Stanford University, Stanford, CA, 94305 , USA, shiri@stanford.edu., Haim Mendelson

We analyze the markets for conduit and content using a game-theoretic framework, incorporating peering agreements and network delays. We study the backbones' optimal pricing and capacity strategies and how they relate to the market for content , addressing the problem of setting the optimal inter-network access charge.

2 — Capacitated Network Management through Pricing
Madiagne Diallo, Laboratoire PRiSM-Universite de Versailles, M. Sc., Versailles, Ce, 78035, France, Madiagne.Diallo@prism.uvsq.fr., Laura Wynter, Mustapha Bouhtou

We present numerical analysis on a mathematical model handling management of capacitated networks through pricing. This model, characterized as a simplified

bi-level model, permits to acheive simultaneously two goals. On the one hand, it allows to maximize the network users satisfaction. On the other, it maximizes the network operators profits. These goals are managed through a general congestion avoidance goal.

3 — Quality-Contingent Differentiated Pricing for Broadband Services
Daewon Sun, Penn State University, State College, PA, 16801, USA, daewons@psu.edu., Hemant Bhargava

We propose a definition of QoS for throughput rate in a broadband network, present a measurement of the proposed QoS, and discuss its implementability. Further, we show that the idea of contingency pricing can in fact be applied meaningfully to broadband services to assure customers for higher throughput rate . This paper presents our initial work towards a proposal for broadband pricing that addresses the dimension of QoS uncertainty in the context of QoS based pricing.

4 — Implications of Decreasing Bandwidth Price on Allocating Traffic between Transit and Peering
Pedro Ferreira, Carnegie Mellon University, Pittsburgh, PA, 15232, USA, pferreira@cmu.edu.

ISPs rely increasingly on transit and peering agreements to interconnect. The objective of this paper is to understand under what conditions providers prefer peering to transit and vice-versa and to what extent it is optimal for them to deploy mixed solutions. An engineering-based cost model is used to answer this question. The model shows that the best strategy is to peer with the largest 3 providers and that no peering connection taking less than 8% of the ISP's traffic is worth establishing.

5 — Modeling Regulatory Regimes for Last-Mile Broadband Connections: A Multi-Model Approach
Richard Curry, Londo Business School, PhD Student, London , NW1 4SA, UK, rcurry@london.edu.

We analyze the adoption of consumer broadband under various regulatory regimes using multi-model simulation. Regulatory policies affect three user communities voice, narrowband data and broadband. For each policy, we simulate the periodic pricing and investment activities of a service provider and the migration of consumers between services. We model the UK market and show that adoption is path dependent and policies that expand the market for broadband are superior to those controlling price.

■ MA46

Center-Room C3

Benchmarking & Performance Testing of Optimization Software

Cluster: State of the Art in Optimization Software
Invited Session

Chair: Hans D. Mittelmann, Arizona State University, Professor, Department of Mathematics, Tempe, AZ, 85287, USA, mittelmann@asu.edu

1 — Automated Performance Testing and Analysis
Armin Pruessner, GAMS Development Corporation, Washington , DC

In context with Performance World, http://www.gamsworld .org/performance, we discuss reproducible benchmarking, performance testing, and performance analysis automation. Using various performance metrics, our tools simplify performance measurement collection, allow efficient performance analysis and automate visualization, while testing both for solver efficiency and robustness and correctness.

2 — Benchmarking Large-Scale Optimization Software
Hans D. Mittelmann, Arizona State University, Professor, Department of Mathematics, Tempe, AZ, 85287, USA, mittelmann@asu.edu.

The talk will give a current update on our efforts to evaluate both commercial and free software for large-scale problems. This includes LP, QP, SDP, and NLP problems. Both, continuous and discrete cases will be considered. We also report on our activities to facilitate software evaluation by others through implementation of web-based optimization solvers.

3 — Testing and Tuning a new Solver Version using Performance Tests
Arne S. Drud, ARKI Consulting and Development, Denmark

A new version of an NLP Solver such as version 3 of CONOPT should be beneficial for almost all users of previous versions. We discuss use of performance measures with particular emphasis on degradation and failures. Both standard test sets (GAMS Performance World) and models from important users are considered .

■ MA47

Center-Ballroom A8

Software Demonstration Session 05

Cluster: Software Demonstrations
Invited Session

1 — River Logic Group — Enterprise Optimizer 4.1 Guerilla Modeling-Creating Value in Two Weeks or Less
Eric Kelso, River Logic, Inc., Beverly, MA, 01915, USA, ekelso@riverlogic.com., Phil Clarke

River Logic Group - This session is highly recommended for anyone even remotely interested in optimization software! Find out how, with Enterprise Optimizer, you can build and deliver optimization models quickly using a strong, yet flexible visual modeling metaphor without the need for any programming! Learn how Enterprise Optimizer differes from all other common approaches, and why the need to capture vital oganization knowledge and link business processes to financial results is critically important. A case study is described revealing how a compnay, by using Enterprise Optimizer, went from losing $10 million per year to profitability. Emphasis is placed on features and capabilities as well as methodology.

Monday 10:00 - 11:30am

■ MB01

Center -Ballroom A4

TutorialCombinatorial Optimization in Bioinformatics and Computational Biology

Invited Session

1 — Combinatorial Optimization in Bioinformatics and Computational Biology
Dan Gusfield, dmgusfield@ucdavis.edu.

The areas of bioinformatics and computational biology have exploded in recent years with a huge growth of interest and activity. There have been many applications of combinatorial optimization in those fields. The most widely applied such method is dynamic programming, which arises in may diverse applications in bioinformatics and computational biology. But applications of graph theory are also common, and there have also been a few applications of network flow, matroid theory and integer programming. In this tutorial I will survey some of these applications. The in-depth examples will come mostly from my own work, for convenience in preparing this tutorial, but I will also mention work of others in order to illustrate the range of applications and techniques that have appeared. The underlying message is that bioinformatics and computational biology is a productive arena for combinatorial optimization.

■ MB02

Fairmont-Cupertino

Case: Engineering Optimization Model Applications

Cluster: Practice Track
Invited Session

Chair: Janos Pinter, Pinter Consulting Services, Halifax, NS, B3M 1J2, Canada, jdpinter@hfx.eastlink.ca

1 — Global/Nonlinear Optimization: Illustrative Applications and Case Studies
Janos Pinter, Pinter Consulting Services, Halifax, NS, B3M 1J2, Canada, jdpinter@hfx.eastlink.ca.

We review the use of global optimization techniques and software in various engineering and scientific applications. The presentation is primarily based on recent and ongoing joint projects with several research groups. Examples will be presented from the following areas: global/nonlinear optimization test problems and open challenges, cancer therapy, chemical/civil engineering, laser equipment design, sonar transducer design and possibly others, with references also to general and specific areas of applications.

■ MB03

Fairmont-Fairfield

Tutorial: Risk Management in Electricity Markets

Cluster: Practice Track
Invited Session

Chair: Robert Entriken, EPRI, Palo Alto, CA, rentrike@epri.com

1 — Risk Management in Electricity Market Design
Robert Entriken, EPRI, Palo Alto, CA, rentrike@epri.com., Art Altman

The goal of this tutorial is to introduce the audience to practice of risk management in electricity markets, both from the perspective of a market participant and a market designer. The tutorial begins with a review of the basic techniques for valuation and risk in energy markets. This review will be conducted via a series of simple and transparent examples. Following this, a specific example of from the design of electricity markets will be presented that builds on the basic techniques.

■ MB04

Hilton-San Carlos II

Panel: Collaboration of Academia, Industry and Government in Data Mining Research

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Kwok Tsui, School of ISyE, Professor, Atlanta, GA, USA, ktsui@isye.gatech.edu

1 — Panel: Collaboration of Academia, Industry and Government in Data Mining Research
Kwok Tsui, School of ISyE, Professor, Atlanta, GA, USA, ktsui@isye.gatech.edu.,
Panelists: Tom Au, AT&T; Trevor Hastie, Stanford University; Janet Twomey, National Science Foundation; Kwok Tsui, Georgia Institute of Technology.

The objective of the panel is to address general issues in data mining research, such as future directions of important research, implementation of research results in industry, collaboration between university, industry and government. In this session, professionals from academia, industry, and government funding agency will share their experience.

■ MB05

Fairmont-Sacramento

Best Dissertation Award

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Jeffrey Liker, University of Michigan, Ann Arbor, MI, 48109, USA, liker@umich.edu

■ MB06

Fairmont-Atherton

Organizational Theory I

Contributed Session

Chair: Sampsa P. Samila, Columbia University, New York, NY, 10027, USA, sampsa.samila@columbia.edu

1 — Governance and Performance Erosion
Dale E. Zand, New York Univ., Stern Schl Bsns, New York, 10012, USA, dzand@stern.nyu.edu.

This paper presents a behavioral model of CEO and board actions and relationships during extended performance decline. A longitudinal case study of a major firm is used to illustrate the model. The paper examines the ability of a rational, independent board to forestall decline in an uncertain environment.

2 — Dynamic Management of Strategic and Organizational Misfits
Borge Obel, Department of Organization and Management, University of Southern Denmark, Odense, Dk-5230, Denmark, boe@sam.sdu.dk., Richard M. Burton

We discus a dynamic theory of strategic and organizational misfits management to cope with the new fast paced, complex and uncertain environments in the context of 7 case companies. We show how misfits evolve. In the 7 case companies the use of event based and time based adaptation are examined.

3 — Identity-based Model of Organizational Competition
Sampsa P. Samila, Columbia University, New York, NY, 10027, USA, sampsa.samila@columbia.edu.

Building on theories of population ecology, new institutionalism, and status-based competition, we develop a conceptual model of organizational competition based on identities. The model is able to account many key findings of the above theories, and also makes new predictions. The implications of the model are especially relevant for new businesses.

4 — Authenticity & Competency Disciplines for Managing Disruptive Technologies
Preston D. Probasco, San Jose State University, San Jose, CA, 95192, USA, probasco_p@cob.sjsu.edu.

Reluctantly admitted incompetency in any one of the three disciplines needed for new product development triggers identity, character, and attitudinal leadership issues. Sustainable excellence and authenticity involves additional disciplines.

■ MB07

Fairmont-Piedmont

Information Based Extended Product Development II

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Steven Eppinger, MIT, Prof., Cambridge, MA, 02139, USA, eppinger@mit.edu

1 — Information Technology, Learning Networks and Product Customization
Thomas Roemer, MIT, Cambridge, MA, 02142, USA, troemer@mit.edu., Ali Yassine

We investigate to what extent the integration of organizations and customers through IT leads to higher levels of product customization. An information exchange and knowledge creation model is tested in the context of Korean OEMs and 1st tier suppliers. A survey instrument is introduced and preliminary findings will be presented.

2 — Optimal Management of Backlog and Staffing in Product Development Supply Chains
Edward Anderson, University of Texas, Austin, TX, 78712, USA, edward.anderson@bus.utexas.edu., Douglas Morrice

We investigate supply chains in which product design work is outsourced and each individual firm must manage backlog solely through resource adjustments. We study the impact of different management interventions under both myopic and centralized strategies. Non-intuitive results include that lead-time reduction at one stage can degrade other stages' performance.

3 — Divide and Conquer: Task Partitioning, Design Modularity and Process Throughput
Nitin Joglekar, Boston University, Boston, MA, 02459, USA , joglekar@bu.edu., Erol Pekoz, Ali Yassine

We model the effect of task partitioning on the through put of a process where a segment of design tasks are performed remotely by a development partner. The model is used to develop insights about the value of estimating modularity precisely during the early phase of a software development process.

4 — Planning Design Iterations for Effective Product Development
Darian Unger, MIT, Cambridge, MA, 02139, USA, unger@alum .mit.edu., Steven Eppinger

Product development (PD) processes can be designed to address various types of risk. Several styles of iteration can be built into PD processes in order to manage these risks. We use case studies to explore alternative processes and create a framework to suggest how companies can select appropriate PD processes.

■ MB08

Center-Ballroom A2

Optimization Models in e-Marketplaces

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Gyana Parija, IBM, Yorktown Heights, NY, 10598, USA, parija@us.ibm.com

1 — Online Haggling and Price-Discrimination in a Name-your-own-price Channel: Theory and Application
Sergei Savin, Columbia University Graduate School of Business, New York, NY, 10027, US, svs30@columbia.edu., Il-Horn Hann

The emergence of the Internet and its extensive usage for electronic commerce has given companies the opportunity to experiment with a number of innovative pricing models. A well-known example of these new pricing models is the concept of name-your-own-price models. Based on detailed transaction data of a large reverse buying site, we compare different decision rules for the seller and compare their financial implications.

2 — e-Marketing to Physicians: Online Targeting and ROI and Its Role in Marketing Mix Decisions
Jaswinder Chadha, marketRx, Inc., President & CEO, Bridgewater, NJ, 08807, US, jchadha@marketrx.com.

Physicians receive promotion from pharmaceutical companies from many channels such as Sales Representative detailing, teleconferences, prescription coupons and e-detailing. Online sales force automation and other tracking tools allow these contacts to be recorded in real-time and therefore tactical and marketing mix optimization can be calculated on-line and in real-time.

3 — End-to-End Cost Optimization Models for Trans-border e-Commerce
Vipul Bansal, Adobe Systems, Noida, India, vbansal@adobe .com., Abhinanda Sarkar, Sanjeev Kapoor

Various cost elements such as transportation costs and taxes can be significant in the context of a transaction spanning large geographical and international boundaries. A typical online marketplace determines matches without taking such costs into consideration which may result in sub-optimality for buyers or sellers or both. We propose a framework where such costs can be factored into the allocation and pricing decisions and provide formulation for some of the resulting optimization problems.

■ MB09

Center-Ballroom A3

Adaptive Enterprise Business Model and Technology

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Grace Lin, IBM, Yorktown Heights, NY, 10598, USA, gracelin@us.ibm.com

1 — Adaptive Enterprise Business Model and Technologies
Grace Lin, IBM, Yorktown Heights, NY, 10598, USA, gracelin@us.ibm.com.

The business environment is becoming increasingly more dynamic and challenging. Many companies are starting to move from the rigid command and control models to more adaptive models. In this talk, scenarios rooted in standard business models will be investigated for the level of sense and respond, and intelligence . In addition, we will take a deeper look into areas where sense and respond has the biggest effects, as well as the adaptive technologies required to support them

2 — Building a Sense and Respond Supply Chain for IBM Microelectronic Division
Markus Ettl, IBM, Yorktown Heights, NY, 10598, USA, msettl@us.ibm.com., Ken Fordyce
Abstract not supplied

3 — Solution Management for Adaptive Enterprise
Steve Buckley, IBM, sbuckley@us.ibm.com., Henry Chang, Josef Schiefer, Shubir Kapoor, J. J. Jeng
Abstract not supplied

4 — New Opportunities for Business Process Simulation
Steve Buckley, IBM, sbuckley@us.ibm.com., Bala Ramachandran, Young Lee, Sugato Bagchi

Business process simulation is a well-known practice due to the popularization of tools such as ARIS and Holosofx. We have identified some new opportunities for business process simulation . These new opportunities include operational models that are integrated with daily business execution and IT-level simulation of workflows, screenflows and applications.

■ MB10

Center-Ballroom A7

Project Management I

Cluster: Scheduling
Invited Session

Chair: Willy Herroelen, K. U.. Leuven, Leuven, Belguim, Willy.Herroelen@econ.kuleuven.ac.be

1 — Project Scheduling under Uncertainty: Survey and Research Potentials
Willy Herroelen, K. U.. Leuven, Leuven, Belguim, Willy .Herroelen@econ.kuleuven.ac.be., Roel Leus

We provide a categorization and review of the fundamental approaches for project scheduling under uncertainty: reactive scheduling, stochastic project scheduling, stochastic network scheduling, fuzzy project scheduling, robust (proactive) scheduling and sensitivity analysis. We discuss the potentials of these approaches and offer suggestions for future research.

2 — A New Approach for Analyzing Projects with Uncertain Structures and Durations
Bruce Pollack-Johnson, Villanova University, Philadelphia , PA, 19119, USA, bruce.pollack-johnson@villanova.edu., Matthew J. Liberatore

In this paper, we present a new, non-simulation approach to analyzing project networks which involve uncertain network structures and possibly uncertain durations as well. We will present new notation for this situation, present a general method , and give several examples, involving loops, probabilistic scenarios, and uncertain durations.

3 — A Method for the Construction of Stable Project Baseline Schedules by Anticipation of Disruptions.
Roel Leus, K. U. Leuven, Leuven, Belgium, Roel.Leus@econ .kuleuven.ac.be., Willy Herroelen

We present models to develop project baseline schedules that can absorb a small predetermined number of disruptions in activity durations without affecting the planning of other activities, such that co-ordination of resources and material procurement can be performed as smoothly as possible. We report on computational experience on a benchmark dataset.

■ MB11

Center-Room C1

Flow Shop Scheduling

Contributed Session

Chair: Selcuk Karabati, Koc University, Istanbul, 80910, Turkey, skarabati@ku.edu.tr

1 — Hybrid Flow Shop Scheduling with Bottleneck Production Stages
Vera L. Castilho, University of Sao Paulo, Sao Carlos, 13566-590, Brasil, VLCastilho@aol.com., Joao V. Moccellin, Marcelo S. Nagano

This paper introduces heuristics for the minimal makespan hybrid flow shop scheduling with bottleneck configurations, i.e. at some production stage the number of machines is decreased, compared to other stages, while maintaining, at all stages, the same job processing time distribution. Results from computational experience are discussed.

2 — The Two-Machine Flowshop Total Completion Time Problem: Improved Lower Bounds and a Branch-and-Bound Algorithm
Selcuk Karabati, Koc University, Istanbul, 80910, Turkey, skarabati@ku.edu.tr., Can Akkan

We present a branch-and-bound algorithm for the two-machine flowshop scheduling problem with the objective of minimizing the sum of completion times. The main feature of the algorithm is a new lower bounding scheme that is based on a network formulation of the problem.

3 — Sequencing Mixed-Model Assembly Line Under an Andon System
Timothy Flynn, University of Alabama, Hoover, AL, 35244, usa, tflynn@cba.ua.edu., John Mittenthal

In this job sequencing decision problem, the andon system results in additional constraints beyond those present in a basic flow shop with blocking. A constructive-improvement heuristic is presented. The construction phase relies on problem properties; the improvement phase is based upon Simulated Annealing. Algorithm performance is compared against lower bounds.

■ MB12

Fairmont-Regency 1

Applications of OR in the Prevention and Treatment of Cancer

Sponsor: Health Applications Section
Sponsored Session

Chair: David Sherman, Northeastern University, Boston, MA, 02115, USA, h.sherman@neu.edu

1 — Evaluation of Risk Management Strategies for Breast Cancer Prevention
Elissa Ozanne, UCSF Medical Center, Research Scientist, San Francisco, CA, 94115, USA, elissa.ozanne@ucsfmedctr .org., Laura Esserman

A Markov model was developed to estimate the cost effectiveness of identifying women at increased risk for breast cancer using the ductal lavage procedure. The developed model serves as a platform to evaluate the impact of prevention interventions. Insights from the model can guide the development and use of risk assessment tools and prevention interventions.

2 — An Optimization Approach for Radiosurgery Treatment Planning
Jinho Lim, University of Wisconsin, Madison, WI, 53706, USA, jin-ho@cs.wisc.edu., David M. Shepard, Michael C. Ferris

We consider a treatment planning problem for a specialized device known as the Gamma Knife, that is used for the treatment of tumors and vascular malformations within the head. A series of optimization problems are solved to produce a treatment plan. We present several modeling decisions that result in more efficient and robust solution. We also present a new approach for determining starting points for the nonlinear programs, based on a skeletonization of the target volume.

■ MB13

Center-Room D

Optimization Algorithms and Applications

Sponsor: Optimization Section - Nonlinear Programming
Sponsored Session

Chair: Michael Saunders, Stanford University, Professor, Stanford, CA, 94305-4026, USA, saunders@stanford.edu

1 — Stabilizing MINOS
Michael Friedlander, Argonne National Laboratory, Argonne , IL, 60439, michael@mcs.anl.gov., Michael Saunders

For optimization problems with nonlinear constraints, linearly constrained Lagrangian (LCL) methods sequentially minimize a Lagrangian function subject to linearized constraints. These methods converge rapidly near a solution but may not be reliable from arbitrary starting points. The well-known example MINOS has proven effective on many large problems. Its success motivates us to propose a globally convergent variant. Our stabilized LCL method possesses two important properties: the subproblems are always feasible, and they may be solved inexactly. These features are present in MINOS only as heuristics. The new algorithm has been implemented in Matlab, with the option to use either the MINOS or SNOPT Fortran codes to solve the linearly constrained subproblems. Only first derivatives are required. We present numerical results on a nonlinear subset of the COPS and CUTE test-problem sets, which include many large examples. The results demonstrate the robustness and efficiency of the stabilized LCL procedure.

2 — An Interior-Point Decomposition Algorithm using Low-Cost Subproblem Solutions
Angel-Victor DeMiguel, London Business School, Assistant Professor, London, United Kingdom, avmiguel@london.edu., Francisco Nogales

Decomposition algorithms break an optimization problem into a set of subproblems. Then, a master problem is used to coordinate the subproblem solutions and find the overall problem minimizer. Unfortunately, most decomposition algorithms require solving the subproblems accurately. We propose a decomposition algorithm that only performs one iteration of an interior-point method when solving the subproblems. We show that the decomposition algorithm converges locally at a superlinear rate.

3 — Efficient Algorithms for Costly Global Non-convex Optimization
Kenneth Holmstrom, Malardalen University, Professor, Vasteras, SE-721 23, Sweden, hkh@telia.com.

Response surface methods are promising for global optimization of costly non-convex objective functions. We implement the method by Powell and Gutmann based on radial basis functions (RBF) and the Efficient Global Optimization (EGO) method by Jones et al. Global optimization subtasks are solved with the DIRECT method in Matlab using the Tomlab optimization environment, http://tomlab.biz. Results for standard test problems, industrial and financial applications are presented.

4 — A New Algorithm for the Optimal Siting of Electrical Substations
Vinayak Shanbhag, Stanford University, PhD student, Stanford, CA, 94305-4026, USA, udaybag@stanford.edu., Walter Murray

The optimal siting of substations (SSO) problem determines the optimal siting of new substations on a rectangular electrical grid subject to load flow, capacity and voltage constraints. The original problem is NP-hard. The proposed algorithm uses a novel relaxation approach that requires the solution of a sequence of quadratic programs. Moreover, the computational effort is not sensitive to the number of substations.

■ MB14

Center-Room E

LP Complexity

Sponsor: Optimization Section-Linear Programming and Complementarity
Sponsored Session

Yinyu Ye, Stanford University

1 — A Comparative Evaluation of the Complexity of Interior-point Methods and the Ellipsoid Method for Conic Convex Optimization and Non-conic Convex Optimization.
Robert Freund, MIT Sloan School, Cambridge, MA, 02142, rfreund@mit.edu.

We attempt a formal comparison of the theoretical complexity of an interior-point method and the ellipsoid method (and other volume-reducing cutting plane methods) as applied to different formats for convex optimization and for different assumptions about initialization information, stopping criteria, and under different complexity measures.

2 — A Variant of the Vavasis-Ye Layered Least Squares Step Interior Point Method for Linear Programming
Renato Monteiro, Georgia Tech, Professor, Atlanta, GA, 30332, USA, monteiro@isye.gatech.edu., Takashi Tsuchiya

We present a variant of Vavasis and Ye's LLS-step primal-dual interior-point algorithm for LP. As opposed to their alogorithm, we show that ours do not require knowledge of the condition number of the LP constraint matrix. Moreover, our method retains the same complexity as theirs.

3 — Improved Complexity Results on Solving Real-number Linear Feasibility Problems
Yinyu Ye, Stanford University, Stanford, CA, 94305-4026, yinyu-ye@stanford.edu.

We present complexity results on solving real-number standard linear programs $LP(A,\b,\c)$, where the constraint matrix $A\in \R^{m\times n}$, the right-hand-side vector $\b\in \R^m$ and the objective coefficient vector $\c\in \R^n$ are real. In particular, we present a two-layered interior-point method and show that $LP(A,\b,\bz)$, i.e., the linear feasibility problem $A\x=\b$ and $\x\ge \bz$, can be solved in in $O(n^{2.5}c(A))$ interior-point method iterations. Here $\bz$ is the vector of all zeros and $c(A)$ is the condition measure of matrix A defined in \cite{VavasisYe}. This complexity iteration bound is reduced by a factor n from that for general $LP(A,\b,\c)$ in \cite{VavasisYe}. We also prove that the iteration bound will be further reduced to $O(n^{1.5}c(A))$ for $LP(A,\bz,\bz)$, i.e., for the homogeneous linear feasibility problem.

■ MB15

Center-Room B4

Network Optimization 3

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Dorit Hochbaum, University of California at Berkeley, Professor, Berkeley, CA, 94720, USA, dorit@hochbaum.IEOR.berkeley.edu

1 — A Practical Algorithm for Enumerating Near-min s-t Cuts in a Graph
Kevin Wood, Naval Postgraduate School, Monterey, CA, 93940, USA, kwood@nps.navy.mil.

This talk describes a pivoting algorithm, based on max flows, for enumerating all s-t cuts whose capacity is within epsilon of minimum. The algorithm has polynomial complexity per cut enumerated for non-trivial epsilon > 0. It runs quickly even when there are millions of cuts to enumerate.

2 — An Efficient Algorithm for Set Cover with Circular Ones
Dorit Hochbaum, University of California at Berkeley, Professor, Berkeley, CA, 94720, USA, dorit@hochbaum.IEOR .berkeley.edu., Paul Tucker

We describe the set cover problem with circular ones as equivalent to a network flow problem with a bound on the sum of flows on several arcs. We provide an algorithm solving the problem more efficiently than any network flow algorithm.

3 — Finding Near Optimal Solutions in Large Scale DP Networks Through Nested State Aggregation
Matthew Bailey, University of Missouri-Rolla, Rolla, MO, 65409, USA, mdbailey@umr.edu., Robert L. Smith

We introduce an error-bounded technique that accelerates the solution of large-scale dynamic programming networks through sequential nested partitioning of the network. We provide an easily implementable forward reaching technique and illustrate its computational effectiveness.

■ MB16

Center-Room C4

Discrete Optimization

Cluster: Discrete Optimization
Invited Session

Chair: Hanif Sherali, Virginia Tech, W. Thomas Rice Chaired Professor, Blacksburg, VA, 24061, USA, hanifs@vt.edu

1 — Enhanced Formulations and Solution Strategies for Optimal Facility
Hanif Sherali, Virginia Tech, W. Thomas Rice Chaired Professor, Blacksburg, VA, 24061, USA, hanifs@vt.edu., Barbara Fraticelli, Russell Meller

We present an improved MIP model and solution strategies for the facility layout problem. We develop a novel polyhedral outer approximation scheme, symmetry-breaking techniques, valid inequalities, partial convex hull representations, and branching variable selection schemes. These enhancements are demonstrated to produce more accurate solutions while also dramatically decreasing solution effort.

2 — Semi-continuous Cuts for Mixed-integer Programming
Ismael de Farias, CORE, Louvain-la-Neuve, 1348, Belgium, defarias@core.ucl.ac.be.

A variable is called semi-continuous if it belongs to the union of two intervals. Besides being interesting in their own, semi-continuous variables are a relaxation of general integer variables. We study the semi-continuous knapsack polyhedron, and we present computational results on general mixed-integer programming.

3 — Segment LLL Reduction of Lattice Bases Using Modular Arithmetic
Zhifeng Li, Northwestern University, Evanston, IL, 60208-3119, USA, z-li1@northwestern.edu., Sanjay Mehrotra

The lattice basis reduction algorithm of Lenstra, Lenstra, Lovasz {LLL, 1982} transforms a given integer lattice basis into a reduced basis. We modify a recently developed Segment LLL Algorithm by Koy and Schnorr to improve its complexity by O(n^{0.5}). This is an overall O(n^{1.5}) improvement over the LLL algorithm.

■ MB17

Center-Room B1

Facility Planning and Design I

Cluster: Manufacturing Systems
Invited Session

Chair: Brett Peters, Texas A&M University, College Station, TX, 77843, USA, bpeters@tamu.edu

Co-Chair: Ignacio Castillo, University of Alberta School of Business, Edmonton, AB, Canada, ignacio.castillo@ualberta.ca

1 — The U-Line Balancing Problem with Stochastic Task Times
Wen-Chyuan Chiang, University of Tulsa, Associate Professor, Tulsa, OK, 74104, USA, wen-chiang@utulsa.edu., Timothy Urban

The purpose of this paper is to establish solution procedures for the stochastic U-line balancing problem. A chance-constrained, piecewise-linear, integer program is formulated to find the optimal solution for small problem instances. To solve moderate to large problems, an efficient heuristic is developed. Computational results are presented.

2 — Layout Optimization Considering Demand and Routing Uncertainty
Bryan Norman, University of Pittsburgh, Pittsburgh, PA, 15261, USA, banorman@engrng.pitt.edu., Sadan Kulturel, Alice Smith

One factor that complicates facility layout and design is uncertainty. In this talk we consider uncertainty both in product demand and in product routings and how they affect layout decisions. We propose a tabu search methodology for solving these problems and demonstrate its effectiveness on test problems.

3 — The Dynamic and Stochastic Distributed Layout Problem
Maher Lahmar, University of Minnesota, Minneapolis, MN, 55414, USA, maher@me.umn.edu., Saifallah Benjafaar

We consider the problem of designing distributed facility layouts in settings with multiple periods and stochastic demand. Distributed layouts refer to layouts where functional departments can be disaggregated into smaller subdepartments and distributed strategically throughout the plant floor. We discuss models, solution procedures and managerial insights.

4 — Open Queuing Network for Performance Analysis of a Manufacturing System
Gang Meng, Rensselaer Polytechnic Institute, Troy, NY, 12180, USA, mengg@rpi.edu., Sunderesh Heragu, Henk Zijm

In this paper, we employ an open queuing network model to analyze the performance of manufacturing systems. This model is suitable in evaluating the effects of changing a layout on the operational performance of a manufacturing system. The model is based on Whitt's open queuing network analyzer which estimates the performance measures based on the first two moments of inter-arrival and service times. The core of Whitt's model involves solving a system of linear equations to calculate the first moments of effective arrival rate and service time and then calculating their second moments. In this paper, we consider batch size and modify the set of linear equations accordingly. The concept of relative batch size is proposed for modeling the effects of batch size. Preliminary experiments results are shown to illustrate the effectiveness of the method.

■ MB18

Center-Room J2

Daniel H. Wagner Prize Competition Session 02

Sponsor: CPMS, The Practice Section of INFORMS
Sponsored Session

Chair: Joseph Discenza, jpd7@alumni.cwru.edu

1 — GE's Energy Rentals Business Automates its Credit Assessment Process Authors
Srinivas Bollapragada, GE Global Research Center, Niskayuna, NY, 12309, USA, bollapragada@research.ge.com., Prasanthi Ganti, Mark Osborn, James Quaile, Kannan Ramanathan

E Energy Rentals, a business unit of the General Electric Company's (GE) Power Systems division, uses an automated web based application to assess customer credit worthiness. GE's Global Research Center developed the system using quantitative business modeling and decision support system design methodologies. The system uses a credit decision model that captures the thought process used by expert credit analysts to assign credit lines to customers. In addition, it also presents the user with the analytics and reasons underlying a credit decision. The system has enhanced business productivity and operating efficiency by removing potential delays in the sales process caused by the credit approval process. In addition, by providing a standard platform for credit approvals, it ensured consistency in the credit assessment and approval process. More tangibly, the system has generated cost savings of over 60% per credit decision. We are currently working on adapting this approach for other Power Systems business units.

2 — Credit Line and Price Management for Bank One Card Services
Margaret S. Trench, Bank One Card Services, Margaret_trench@bankone.com., Shane Pederson, Edward T. Lau, Stephanie Wang, Suresh K. Nair

This paper describes a methodology developed and implemented to manage characteristics of the cardholder portfolio in an optimal manner. The annual percentage rate (APR) and credit line of an account are critical factors that influence card usage and bank profitability. Lower APRs and higher credit lines are more attractive to consumers. However, APRs that are too low may reduce bank profitability, while indiscriminate line increases may dramatically increase credit loss exposure. The PORTICO (Portfolio Control and Optimization) system is designed to pick the price points (APRs) and credit limits for each cardholder that maximize Net Present Value (NPV) for the portfolio, given constraints on quantities such as risk of default. Portico was developed using Markov Decision Process (MDP) methodology. This model applies account level historical information on purchases, payments, profitability and delinquency risk to determine pricing and credit limit changes. In competitive benchmark tests over more than a year, our model outperforms both the current methodology and a competing approach.

■ MB19

Fairmont-Regency 2

Electric Power and Gas Market Modeling I

Sponsor: Energy/Natural Resources/Environment Section - Electricity Markets and Energy Modeling
Sponsored Session

Chair: Benjamin Hobbs, Johns Hopkins University, Professor, Baltimore, MD, 21218, USA, bhobbs@jhu.edu

1 — Pool-based Electricity Market Equilibrium under Locational Marginal Pricing
Antonio Conejo, Univ. Castilla-La Mancha, Professor, Ciudad Real, 13071, Spain, Antonio.Conejo@uclm.es., Raquel Garcia-Bertrand

This paper addresses the equilibrium of a pool-based electricity market where producers and consumers are paid and pay, respectively, their corresponding locational marginal prices. The equilibrium is defined as the transaction levels for which each participant maximizes its profits. Network congestions and losses are modeled. Demand elasticities are considered. The equilibrium is obtained solving a linear complementary problem.

2 — Market Structure Evolution In Restructured Electricity Markets
Fernando Oliveira, London Business School, London, NW1 4SA, UK, foliveira@london.edu., Derek Bunn

Agent-based simulation with computational learning has achieved some successes in modelling the daily repetitions of electricity auctions for understanding the behaviour of market prices. In this paper we propose a new methodology that enables the study of market structure evolution as an endogenous variable, by analysing how companies trade generation and supply assets among themselves. This new methodology is based on the Finite Automata Dynamic Game that is used to mimic how firms learn and adapt in evolutionary systems.

3 — A Two-Level Model of Producer-Trader Oligopoly in the European Gas Market
Benjamin Hobbs, Johns Hopkins University, Professor, Baltimore, MD, 21218, USA, bhobbs@jhu.edu., Maroeska Boots, Fieke Rijkers

GASTALE is a two-level model of European gas market in which producers engage in competition a la Cournot, and each producer is a Stackelberg leader with respect to traders, who may be monopolists, Cournot oligopolists, or perfect competitors. Analyses explore the effect of price discrimination, trader entry , and vertical integration.

■ MB20

Fairmont-Hillsborough

Auctions Research in Marketing

Cluster: Auctions
Invited Session

Chair: Atanu Sinha, University of Colorado, Assistant Professor of Marketing, Boulder, , CO, 80309-0419, USA, Atanu.Sinha@colorado.edu

1 — The Effects of Minimum Prices on Consumers' Product Valuations in Auctions
Gerald Haeubl, University of Alberta, Professor, Edmonton , AB, T6G 2R6, Canada, gerald.haeubl@ualberta.ca., Peter Popkowski Leszczyc

This paper examines how two common forms of minimum prices, fixed price components and reserve prices, affect consumers' product valuations in open ascending bid (English) auctions. The results of three experiments suggest that,

although via different mechanisms, both types of minimum prices have a positive effect on bidder's product valuations.

2 — Contextual Influences in Digital Auctions: The Role of Adjacent Listings
Utpal Dholakia, Rice University, Assistant Professor of Management, Houston, TX, 77005-1892, USA, dholakia@rice .edu.

In three studies, I investigate the contextual influence of adjacent listings on a focal listing's success in digital auctions. Adjacent listings are found to positively influence the focal listing's success after controlling for focal listing characteristics. These effects are moderated by bidder experience --- bidders become less susceptible with increasing experience.

3 — Seller Valuation and Attraction in Auctions
Atanu Sinha, University of Colorado, Assistant Professor of Marketing, Boulder, CO, 80309-0419, USA, Atanu .Sinha@colorado.edu.

Auction houses need to attract sellers in order to attract buyers . Seller valuation and attraction are theoretically studied for a multi-item auction where each seller consigns one item, and buyers self-select the items to bid and the latter are heterogeneous in terms of their interests and valuations for the items.

■ MB21

Fairmont-Glen Ellen

Financial Markets

Contributed Session

Chair: Jussi Keppo, University of Michigan, Ann Arbor, Assistant Professor, Ann Arbor, , MI, 48109-2117, USA, keppo@umich.edu

1 — Artificial Software Agents on Thin Markets — A Human Trader Experiment
Jens Grossklags, UC Berkeley, SIMS, PhD Student, Berkeley , CA, 94720-4600, USA, jensg@sims.berkeley.edu., Carsten Schmidt

The aim of the paper is to study how software agents influence the market behavior of human traders. In an experimental setting incorporating human traders and programmed traders that represent active as well as passive strategies alike we are interested in measures of market efficiency, and behavioral aspects of the human traders.

2 — The Distribution of Hedging Errors Caused by Discrete Trading
James A. Primbs, Stanford University, Stanford, CA, 94305-4026, USA, japrimbs@stanford.edu., Yuji Yamada

In this work, we analyze the accuracy of hedging various options under standard and mean square optimal hedges, where an efficient algorithm is developed and is used to compute the moments of the hedging error caused by discrete trading.

3 — Estimation of large agent effect from option prices
Jussi Keppo, University of Michigan, Ann Arbor, Assistant Professor, Ann Arbor, MI, 48109-2117, USA, keppo@umich .edu., Xu Meng

In this paper we calculate the market implied large agent effect from option prices. According to the market data our large agent parameter is significant and, therefore, the option volume affects option prices.

4 — Real Switching Option and Equilibrium in Global markets
Nagesh N. Murthy, Georgia Institute of Technology, Atlanta, GA, 30332, USA, nagesh.murthy@mgt.gatech.edu., Milind Shrikhande, Ajay Subramanian

This paper proposes and investigates an equilibrium model in continuous time to analyze the strategic behavior of an economic entity in relationships with multiple economic agents. Specifically , we consider the problem of a domestic firm and two suppliers in a foreign market.

5 — Dynamic Mean--Variance Portfolio Selection with Constrained Portfolios
Andrew Lim, IEOR Dept, Assistant Professor, Berkeley, CA, 94720, USA, lim@ieor.berkeley.edu.

We consider the problem of dynamic mean--variance portfolio selection in the case portfolios are constrained to a cone. (This class of constraints includes the important case of `no short selling'). Closed form expressions for the optimal portfolio and efficient frontier are derived in terms of a Riccati-type equation.

■ MB22

Fairmont-Paseo

OR in Advanced Technologies

Contributed Session

Chair: Ani P. Velo, University of San Diego, San Diego, CA, USA, avelo@sandiego.edu

1 — A Novel Branch and Bound Algorithm for Determining Secondary Structures of Proteins
Metin Turkay, Koc University, College of Engineering, Istanbul, 80910, Turkey, mturkay@ku.edu.tr., Ozlem Yilmaz, Eda Kaya, Sibel B. Sonuc, Selcuk Savas, Mustafa Emrah Coskun, Ozlem Keskin

A fundamental problem in bioinformatics is the determination of structures of a protein. Every protein is structurally composed of secondary elements such as helices and sheets. A novel branch and bound algorithm has been developed to probabilistically determine the secondary structures of a protein using information available in structure databases.

2 — Stress Wave Propagation and Optimal Designs of a Two-layered Strip Subjected to Transient Loading
Ani P. Velo, University of San Diego, San Diego, CA, USA, avelo@sandiego.edu., George A. Gazonas

The control of the stress within a structure is a very important issue since large values of stress can generally lead to structural failure. In this paper we investigate the stress wave propagation in a two-layered elastic strip subjected to free-fixed boundary conditions. The benefit of this work is the validation of purely numerical schemes using finite elements, as well as general practical observations for manufacturing of multilayered armor.

■ MB23

Center-Room L

Air Traffic Applications

Sponsors: Transportation Science Section, Aviation Application Section
Sponsored Session

Chair: William D. Hall, Draper laboratory, Cambridge, MA, 02139, whall@draper.com

1 — The FAA National Airspace System Strategy Simulator
Dave Chien, Federal Aviation Administration, Washington, DC, 20591, USA, dave.chien@faa.gov.

The FAA is moving toward a PBO concept to make the Air Traffic Control (ATC) system more responsive to the Nation. The purpose of the NAS Strategy Simulator is to provide a decision support system to augment current efforts in Business Planning, Portfolio Management, and System Architecture.

2 — Strategic Resource Rationing for the En Route Environment
Mike Ball, Robert H. Smith School of Business, College Park, MD, 20742, USA, MBall@rhsmith.umd.edu., Jason Burke, Robert L. Hoffman

The extension of resource allocation methods used successfully for ground delay program to the enroute environment represents a major challenge. We compare candidate algorithms with respect to equity, efficiency, and adverse side effects, by performing a series of resource allocation experiments using historical air traffic data.

3 — Analysis of Auction Approaches to Airport Slot Allocation
Eric Cholankeril, Draper Laboratory, Lincoln, MA, echolankeril@draper.com.

Auction continues to be considered in official and academic circles as a method for allocation airport resources. We discuss shortcomings of some of the more obvious approaches to airport slot auction, and describe an optimization-based framework we are using to analyze auction performance.

■ MB24

Hilton-Pacific

The Changing Accredidation Environment and its Impact on OR/MS (Panel)

Sponsor: Education
Sponsored Session

Chair: James Cochran, Louisiana Tech University, Ruston, LA, 71272, USA, jcochran@cab.latech.edu

1 — The Changing Accreditation Environment and its Impact on OR/MS
James Cochran, Louisiana Tech University, Ruston, LA, 71272, USA, jcochran@cab.latech.edu.
Panelists: Michael Leonard, Clemson University; Udatta Palekar, University of Illinois at Urbana-Champaign; Gary Williams, University of San Francisco; Ronald Wright, LeMoyne College.

Academicians whose colleges have recently completed either an AACSB or ABET reaccreditation review discuss their experiences. Particular emphasis is given to the approach their school used to prepare for the accreditation process; how the accreditation process proceeded; how Management Science, Operations Research, Production and Operations Management, and Statistics were treated in the review process; and difficulties experienced (particularly with respect to

Management Science, Operations Research, Production and Operations Management, and Statistics).

■ MB25

Center-Room F2

Specifying and Selecting Variables in Data Envelopment Analysis

Cluster: Data Envelopment Analysis
Invited Session

Chair: Pekka Korhonen, Helsinki School of Economics, Professor, Helsinki, 00101, Finland, korhonen@hkkk.fi

1 — Translation Invariance Results for DEA Models with Constant Returns to Scale
Tarja Joro, University of Alberta School of Business, Edmonton, AB, Canada, tarja.joro@ualberta.ca.

An approach to deal with negative output data in constant returns to scale Data Envelopment Analysis is presented. We show that in the presence of negative outputs the CCR model has the same translation invariance properties as BCC model as long as the origin is translated as well.

2 — Workforce Scheduling with Multiple Objectives: A DEA Based Approach
Yongyue Li, University of Alberta, School of Business, Edmonton, AB, T6G 2R6, Canada, yongyue@ualberta.ca., Ignacio Castillo, Tarja Joro

In workforce scheduling, the optimal schedule has traditionally been determined by minimizing costs subject to acceptable service level. Measures such as average waiting time and reneging / balking behavior have been used as service level indicators. We propose an alternative approach where cost minimization and service level maximization are considered simultaneously by using DEA and FDH. This opens a new application area for efficiency analysis and broadens the traditional scheduling approach.

3 — On Analyzing Efficiency of Non-homogeneous Decision Making Units in Data Envelopment Analysis
Mikko Syrjanen, Helsinki School of Economics, Researcher, Helsinki, 00101, Finland, Mikko.Syrjanen@hkkk.fi., Pekka Korhonen, Anu Polvinen

We consider efficiency analysis within a framework of DEA, when a basic assumption of decision-making units being homogeneous is violated. The problem is well known in a DEA-literature, and many approaches are proposed for dealing with this problem. We will compare various approaches. The problem played a key role in an application, in which we evaluated efficiency of electricity distribution companies in Finland. We will use this application as a tool to illustrate our considerations.

4 — On Linear Transformation of Input and Output Variables in DEA
Pekka Korhonen, Helsinki School of Economics, Professor, Helsinki, 00101, Finland, korhonen@hkkk.fi.

Sometimes there is a need to reduce the number of input/output variables in DEA. At the first glance, statistical multivariate methods like principal component analysis and multivariate regression analysis seem to provide good tools. However, we need to apply these methods with care. In this paper, we discuss the requirements of possible transformations and show that those statistical multivariate methods can be modified such that they can be used in DEA to reduce the output and input dimension.

■ MB26

Hilton-San Carlos I

Pricing and Designing Technology-based Service Contracts

Contributed Session

Chair: Juan-Carlos Ferrer, M.I.T., Cambridge, MA, 02142, U.S.A., jferrer@sloan.mit.edu

1 — Price Volatility in Bandwidth Trading Markets with Liquidity
Joshua L. Mindel, Dept. of Engineering & Public Policy, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, joshua.mindel@cmu.edu., Marvin A. Sirbu

We investigate price volatility due to supply/demand shocks by simulating a series of network equilibrium periods in bandwidth trading markets with liquidity. Markets consist of two layers. Trading market layer is one in which bandwidth services are traded. Supplier-network layer refers to supplier networks that physically implement bandwidth services.

2 — Token Bucket Pricing Scheme for Computer Services
Opher Baron, MIT, Sloan School of Management, Cambridge, MA, 02142, USA, obaron@mit.edu., Gabriel Bitran

We present and analyze a Token Bucket scheme that we developed for pricing outsourced computer services. We approximate the service level using a doubly reflected random walk and the Theory of Large Deviations. We provide a closed form solution to the buyers' problem when demand is normally distributed.

3 — Pricing Service-Bundle Contracts with High Setup Cost
Juan-Carlos Ferrer, M.I.T., Cambridge, MA, 02142, U.S.A., jferrer@sloan.mit.edu., Gabriel Bitran

We address the problem of pricing contracts of IT services bundles when there is a high setup cost. The company finances the hardware while the services is paid in a monthly basis out of the fee. The solution approach computes the monthly fee to be charged for every offered bundle, taking into account that customers may defect before the end of the contract. The dynamics of the system account for defection of current customers and arrival of new ones. Optimal pricing policies are characterized.

4 — Pricing Strategy — A Technology Perspective
Madhukirana Reddy Timiri, Manugistics Group Inc., San Carlos, CA, 94070, USA, mreddy@manu.com., Rahul Bhaskar, Ph.D.

Pricing Strategy captures the long term focus in terms of using pricing to improve profitability. Integrating technology into the Pricing Strategy process has its benefits. Decision Support Systems aimed at the pricing problem primarily focus on arriving at and managing prices, and end up relegating Pricing Strategy to a marginal role. We discuss the need to better synergize IT efforts solving operational and tactical pricing problems with the firm's pricing strategy.

■ MB27

Center-Room C2

Supply Chain Coordination

Contributed Session

Chair: Fernando Bernstein, Fuqua School of Business, Durham, NC, 27708, USA, fernando@mail.duke.edu

1 — Coordinating Supply Chains with Constraints
Fernando Bernstein, Fuqua School of Business, Durham, NC, 27708, USA, fernando@mail.duke.edu., Ashok Srinivasan

We examine the role of constraints in supply chains. These constraints could be on shelf-space, leftovers, returns, and service levels. Of interest is supplier competition in the presence of such constraints. Also of interest is the role of return policies.

2 — Supply Chain Coordination with Risk Neutral and Averse Players
Xianghua Gan, University of Texas at Dallas, Richardson, TX, 75080, USA, ganxh@utdallas.edu., Houmin Yan, Suresh P. Sethi

We investigate how a supply chain formed by risk neutral and risk averse agents, can be coordinated with supply contracts. We demonstrate that these popular supply contracts namely wholesale, buy-back and revenue-sharing contracts, do not coordinate the channel consisting of risk averse agents. By offering a downside protection, we show that the risk-sharing contract provides channel coordination as well as an arbitrary division of the channel profit among the supply chain agents. Moreover, the contract is easy to implement.

3 — Risk Control for Supply Chain Coordinating Buyback Policy
Tsan-Ming Choi, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, tmchoi@se.cuhk.edu.hk., Duan Li, Houmin Yan

Many studies have shown that a buyback policy can achieve an optimal supply chain by maximizing the system's expected profit. However, there is no mention of the resulting system's risk and there's no control for it. This paper addresses this issue and provides a scientific framework for the risk analysis.

4 — Remanufacturing Economics: Product, Process, and Contract Design
Baris Yalabik, University of Illinois at Urbana-Champaign , Champaign, IL, 61820, USA, yalabik@uiuc.edu., Dilip Chhajed, Nicholas C. Petruzzi

We develop an economic model investigating the interrelationships between the optimal product, process, and contract design decisions of a remanufacturer. We establish the optimal product and process design for the remanufacturer along with the optimal sales contract to be offered to the market so that profits are maximized.

5 — Inventory Coordination in a Contract Manufacturing Environment
Murat Erkoc, University of Miami, Assistant Professor, Coral Gables, FL, 33124, USA, merkoc02@yahoo.com., S. David Wu

We explore the issue of inventory coordination in the emerging environment of contract manufacturing. We examine base-stock inventory policies for an equipment supplier who has supply agreements with an OEM customer, but is obliged to on-time delivery to the OEM's contract manufacturers. We analyze the cost tradeoff for centralized vs. distributd inventory strategies in this setting and design inventory reservation contracts as a means to coordinationg the system.

■ MB28

Center-Ballroom A1

Game Theoretic Models in Operations Management

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Stefanos Zenios, Graduate School of Business, Stanford, CA, 94305, USA, stefzen@stanford.edu

1 — A General Theory of Supply Chain Contracting
Gerard Cachon, The Wharton School, Professor, Philadelphia, PA, 19104, USA, cachon@wharton.upenn.edu.

In recent years numerous contract forms have been identified to coordinate various supply chain settings. Unfortunately, it is difficult to make direct comparisons among these contracts and with other coordination techniques, e.g., internal markets. Furthermore, a number of important questions have not received enough attention: what is the simplest coordinating contract, does the contract yield a unique equilibrium, is the contract robust to asymmetric information. This research addresses these issues.

2 — Advance Booking Discount Programs under Retail Competition
Kumar Rajaram, The Anderson School, UCLA, kumar .rajaram@anderson.ucla.edu., Kevin McCardle, Christopher S. Tang

We consider a situation in which two competing retailers consider launching the `Advance Booking Discount' (ABD) program. In this program, customers are enticed to pre-commit their orders at a discount price prior to the selling season. However, these pre-committed orders are filled during the selling season. While the ABD program enables the retailers to lock in a portion of the customer demand and use this demand information to develop more accurate forecasts and supply plans, the advance booking discount price reduces profit margin. We examine the case in which two competing firms need to decide whether to offer an ABD program or not, and we establish conditions under which the unique equilibrium calls for launching the ABD program at both retailers .

3 — A Dynamic Principal-agent Model with Hidden States
Hao Zhang, Stanford University, Standford, CA, 94305, Stefanos Zenios

We study a dynamic principal-agent model in which the agent's actions affect the transitions of a Markov chain, and in which the actions are observable to both parties but the system's state is only observable by the agent. The model provides a natural abstraction for problems of delegation of control in supply chain management, R&D management, and services operations management, and specific examples will be presented.

4 — Valuation of Options on Capacity
Arnd Huchzermeier, WHU, Otto0Beisheim Graduate School of Management, Vallendar, 56179, Germany, ah@whu.edu., Paul R. Kleindorfer, Stefan Spinler

We propose a game-theoretical framework, taking relevant exogenous uncertainties into account, to value options on capacity for production of dated services. The analytical results for the optimal tariff and the optimal reservation quantity illustrate risk-sharing properties. Comparison with pure forward markets shows that the options contract is Pareto improving.

■ MB29

Center-Ballroom A5

Tools and Strategies to Improve Demand Chain Management

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Julie Swann, Georgia Tech, Assistant Professor, Atlanta, GA, 30332-0205, USA, julie.swann@isye.gatech.edu

1 — Investing in Forecast Quality
Mumin Kurtulus, INSEAD, Fontainebleau, 77305, France, mumin.kurtulus@insead.edu., Beril Toktay

We consider a setting where parties in a supplier-retailer pair can invest in improving the precision of the demand forecast. We investigate conditions that favor efficient investment into forecast quality.

2 — Coordinating Internet and Traditional Channels
Jayashankar Swaminathan, University of North Carolina, Chapel Hill, NC, 27599, U.S.A, swaminaj@bschool.unc.edu., Kyle Cattani, Wendell Gilland

In this paper, we study a model for aggregate demand from both traditional and Internet channels and find the optimal prices and managerial insights for a monopolist under different degrees of autonomy for the Internet operations. We also study a duopoly case where a traditional retailer competes with a pure e-tailer and prove the existence of a Nash equilibrium.

3 — Revenue Maximization Through Demand Learning
Yossi Aviv, Washington University, Saint Louis, MO, 63130 , USA, AVIV@olin.wustl.edu., Amit Pazgal

We study a revenue maximization problem for a retailer selling a finite inventory. Demand is stochastic and some of its parameters are unknown. Customers arrive according to an underlying stochastic process, and their reservation price distribution is unknown to the retailer. The latter is estimated by the retailer through a Bayesian updating mechanism. The retailer's objective is to select an optimal pricing strategy that serves both as a learning tool about demand, as well as revenue-generating activity.

4 — Coordinating Inventory Control and Pricing with Fixed Ordering Cost: The Infinite Horizon Case
Xin Chen, MIT, Cambridge, MA, USA, xchen@mit.edu., David Simchi-Levi

We analyze an infinite horizon, single product, periodic review model in which pricing and production/inventory decisions are made simultaneously. Demands in different periods are identically distributed independent random variables whose distributions depend on the product price. Ordering cost includes both a fixed cost and a variable cost proportional to the amount ordered. We show that a stationary (s ,S,p) policy is optimal for both the discounted and average profit models.

■ MB30

Center-Ballroom A6

Issues in Capacitated Assemble-to-Order Systems

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Jeannette Song, University of California, Irvine, Professor, Irvine, CA, 92697, USA, jssong@uci.edu

1 — Dynamic Control of an Assemble-to-order System
Amy Ward, Georgia Tech, Assistant Professor, Atlanta, GA, 30332, USA, amy@isye.gatech.edu., Erica Plambeck

A system manager dynamically quotes price and lead-time, and sequences orders for assembly. His policies depend upon order backlog and component inventories. Assuming that customers will tolerate long lead-times in return for a small price discount, we obtain a near-optimal policy by solving a diffusion control problem.

2 — Several Performance Bounds for Capacitated Assemble-to-Order Systems
Savas Dayanik, Princeton University, Princeton, NJ, 08544 , USA, sdayanik@princeton.edu., Jeannette Song, S. H. Xu

The key performance measures in an assemble-to-order(ATO) system, such as order fill rates, involve evaluation of multivariate probability distributions, which is computationally demanding if not intractable. Therefore, efficient performance estimates are sought. In this talk, several ideas on approximations for multivariate probability distributions will be discussed, and the most effective ones in the ATO application are identified through theoretical and/or numerical comparisons.

3 — Price Competition of Make-to-order Firms
Hong Chen, University of British Columbia, Professor, Vancouver, BC, Canada, hchen@se.cuhk.edu.hk., Yat-Wah Wan

In recent years, there has been considerable research on the price competition in a market where customers are sensitive to production or service delays. Most of these works assume identical firms with only different service speeds (capacities), and find that the firm with higher speed can usually charge a premium price and take a larger market share. In this paper, we consider the (non-cooperative) competition of two make-to-order firms. In addition to different service capacities, the competing firms may provide different values of service, and have firm-dependent unit costs of waiting.

4 — Performance Analysis of Assemble-to-order System through Strong Approximations
Yingdong Lu, IBM, Yorktown Height, NY, 10549, USA, yingdong@us.ibm.com., Jeannette Song, Weian Zheng

Strong approximation techniques, which are employed successfully in studying queueing networks, are developed to provide foundation for performance evaluation of general assemble-to-order systems: Diffusion processes are identified to provide strong approximations to the state process of the assemble-to-order system; then, effective computational schemes are developed for performance analysis through the study of the approximation process and its stationary distributions.

■ MB31

Center-Room J3

Advances in Algebraic Modeling

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Alex Meeraus, GAMS Development Corp., President, Washington, DC, 20007, USA, ameeraus@gams.com

1 — Who Needs the GAMS World?
Alex Meeraus, GAMS Development Corp., President, Washington, DC, 20007, USA, ameeraus@gams.com., Michael R. Bussieck, Steven Dirkse, Armin Pruessner

GAMS World is a web site aiming to bridge the gap between academia and industry by providing highly focused forums and dissemination services in specialized areas of modeling that are outside the established channels because of its content or form. The subscribers are interested in practical software, testing, comparison, and quality of solvers, research in both solution methods and in good model formulations, and in improving the communication between people interested in these topics.

2 — Novel Problem Types and Algorithms
Arne S. Drud, ARKI Consulting, Bagsvaerd, 2880, Denmark, ADrud@arki.dk.

Recently, general purpose solution algorithms for various model types (GLOBAL,MCP,MPEC,MINLP) have been implemented and have matured into reliable solution systems that can be connected to modeling systems. These new developments make the application of these model types and their methods available to users outside the narrow optimization research community.

3 — Application Languages and General Purpose Modeling Systems
Thomas Rutherford, University of Colorado, Professor, Boulder, CO, 80309-0256, USA, rutherford@colorado.edu.

MPSGE is a small language for representing computable general equilibrium models in a non-algebraic format. MPSGE World is interested in providing introductory material for new users, prototype models, suggestions for solving large scale models. The intent of MPSGE world is to provide a common point of reference for effective modeling with MPSGE.

4 — Performance World: An Online Forum for Perfomance Testing
Hans D. Mittelmann, Arizona State University, Professor, Department of Mathematics, Tempe, AZ, 85287, USA, mittelmann@asu.edu.

Performance World provides information and tools about all aspects of performance testing of solvers for mathematical programming problems. Reproducable performance results may be obtained with the help of model libraries and tools for collecting performance data and analyzing and visualizing test results.

■ MB32

Center-Room J4

Customizable and Configurable Product Design and Selection

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Hemant Bhargava, Pennsylvania State University, University Park, PA, 16802, USA, bhargava@computer.org

Co-Chair: Ching-Hua Chen-Ritzo, Pennsylvania State University, University Park, PA, 16802, USA, chenritzo@psu.edu

1 — Timing The Market Phase-in of a New Product Design With Reused Components
Lifang Wu, University of Iowa, Doctoral Student, Iowa City, IA, 52242-1000, USA, lifang-wu@uiowa.edu., Renato De Matta, Timothy Lowe

Due to shortened product life cycles, firms constantly face decisions regarding the timing and nature of product upgrades. We model the problem of deciding new product design quality and market phase-in. The model is developed at the component level (two components) and considers existing component reuse benefits and costs.

2 — Pricing and Resource Allocation for Customizable and Configurable Products
Ching-Hua Chen-Ritzo, Pennsylvania State University, University Park, PA, 16802, USA, chenritzo@psu.edu., Hemant Bhargava

Configurable products can be customized by presenting customers with a menu of prices for product features from which they can configure their own product. These menus are effective not only as a direct sales mechanism but as a means of steering customers towards certain configurations, based on current component inventory levels. We examine the problem of optimally designing such a menu of product features and prices.

3 — RECO: Representation and Evaluation of Configurable Offers
Jayant Kalagnanam, IBM (TJ Watson), Yorktown Hts, NY, 10598, US, jayant@us.ibm.com., Martin Bichler

This paper describes RECO, a decision support system for the representation and evaluation of configurable offers.

■ MB33

Hilton-University

Stochastic Programming: Theory and Applications

Sponsor: Optimization Section-Stochastic Programming
Sponsored Session

Chair: Lisa Korf, University of Washington, Seattle, WA, 98195-4350, USA, korf@math.washington.edu

1 — Stochastic Equilibrium Models
Roger J-B Wets, University of California, Davis, CA, 95616, USA, rjbw@math.ucdavis.edu.

Suppose a collection of economic agents, endowed with certain goods, wishes to exchange these goods to maximize their utilities . The fundamental, classical equilibrium question is: Can one find prices for these goods so that if the exchanges takes place at these prices, the total demand doesn't exceed the total supply?

2 — Stochastic Decomposition Algorithm for Stochastic Mixed Integer Programming
Suvrajeet Sen, University of Arizona, Tucson, AZ, 85721-0020, USA, sen@sie.arizona.edu., Julia L. Higle

The Stochastic Decomposition algorithm for Stochastic Linear Program (SLPs) has been extended to Stochastic Mixed-Integer Programs (SMIPs). We will discuss the algorithm's design and its analysis. We will also show that many of the computational expedients used in the case of SLPs also carry over into the SMIP realm.

3 — The Scenario Generation Algorithm for Multistage Stochastic Linear Programs
Michael Scott Casey, University of Puget Sound, Tacoma, WA, 98416, USA, mcasey@ups.edu., Suvrajeet Sen

This algorithm aims at producing a small scenario tree which approximates true stochasticity. A multistage program interleaves a stochastic process and a decision process. Most approaches to scenario generation focus on approximating the stochastic process directly; our novel approach approximates the stochastic process by focusing on the decision process.

■ MB34

Hilton-Plaza

Decision Analysis in Military Environment

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Greg Parnell, U.S. Military Academy, West Point, NY, 10996-1779, USA, gregory.parnell@usma.edu

1 — Military Relative Risk Aversion
William Klimack, U. S. Military Academy, West Point, NY, 10996-1779, USA, william.klimack@usma.edu., Jack Kloeber

The relationships between value and utility functions for multidimensional military decisions was examined and found to be complex. Risk attitudes were generally neither constant across the domain of the evaluation measure nor consistent between evaluation measures.

2 — Performance Analysis in the Selection of Imagery Intelligence Satellites
Roger C. Burk, U. S. Military Academy, West Point, NY, 10996-1779, USA, roger-burk@usma.edu., Carolina Deschapelles, Karl Doty, Jonathan Gayek, Thomas Gurlitz

The NRO used quantitative performance analysis in the source selection of a new generation of photointelligence satellites. Techniques used included decision analysis, optimization, simulations, network analysis, and genetic algorithms. The effort incorporated the diverse needs of intelligence users and ensured an affordable system to meet critical national security requirements.

3 — Applying Value Focused Thinking to Information Assurance: From Start to Finish
Stephen Chambals, Department of Operational Sciences, Captain, Wright-Patterson AFB, OH, 45433-7765, Richard Deckro

This study presents a strategy to aid organizations in evaluating information assurance strategies. From defining information assurance to scoring individual alternatives, we take a cradle to grave look at helping organizations trade off information assurance against operational capability and resource costs. The results were applied to a computing network.

4 — Developing a Web-Based DoD Installation Risk Assessment Tool.
Pat Magras, U.S. Military Academy, West Point, NY, 10996, USA, fp5433@usma.edu., Patrick J. Driscoll

This is a web-based vulnerability and risk assessment (V&RA) tool . It is intended to provide high level reporting to support improved system-wide resource allocation, and as a local tool for use by installation commanders for reducing vulnerability to attacks on "soft spots".

■ MB35

Hilton-Almaden II

Panel: Journal Editors' Perspective on Future Trends in Quality, Statistics, and Reliability Research

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Jionghua (Judy) Jin, University of Arizona, Tucson, AZ, 85721-0020, USA, jhjin@sie.arizona.edu

1 — Journal Editors' Perspective on Future Trends in Quality, Statistics, and Reliability Research
Panelists: John English, University of Arkansas; Way Kuo, Texas A&M University; Andrew Kusiak, University of Iowa; Douglas Montgomery, Arizona State University; William Notz, Ohio State University; William Woodall, Virginia Polytechnic Institute.

■ MB36

Center-Room F1

Numerical Methods in Queueing Analysis

Sponsor: Applied Probability Society
Sponsored Session

Chair: John Shortle, George Mason University, Fairfax, VA, USA, jshortle@gmu.edu

Co-Chair: Martin Fischer, Mitretek Systems, Falls Church, VA, USA

1 — The Accuracy of Eigenvalue Solutions in QBD Processes with Tridiagonal Matrices
Winfried Grassman, University of Saskatchewan, Saskatoon, SK, S7N5A9, Canada, grassman@cs.usask.ca.

It can be shown that for QBD processes with tridiagonal matrices, eigenvalue solutions have a lower time complexity than matrix analytic methods. However, questions of numerical stability remain. This talk shows how to assess and, if necessary correct problems in this regard.

2 — Using Symbolic Computation to Derive Moments of the Time to Ruin
Steve Drekic, University of Waterloo, Waterloo, ON, N2L3G1, Canada, sdrekic@math.uwaterloo.ca.

Lin and Willmot (2000) developed an approach to obtain the moments of the time to ruin in the classical insurance risk model . However, obtaining even the first two moments is complicated due to the volume of algebra. We explore using symbolic computation as a tool to automate the algebraic detail.

3 — Analytical Properties of the Waiting Time in Variants of M/D/1 Queue
Percy Brill, University of Windsor, Windsor, ON, N9B3P4, Canada, brill@uwindsor.ca.

We discuss continuity, jump discontinuities, and shape of the PDF and CDF of the waiting time in variants of M/D/1 queues. The service distributions considered are: deterministic, general discrete, and waiting-time dependent. The properties provide accurate benchmarks for rigorously testing computational methods for the waiting time in general queues.

4 — Why Simulating Queues with Pareto Service is So Difficult
John Shortle, George Mason University, Fairfax, VA, USA, jshortle@gmu.edu., Denise Masi

It has been noted in the literature that M/G/1 queues with Pareto service times are difficult to simulate. We investigate causes of this difficulty, and will discuss some implications in practice. It turns out that if the actual Pareto distribution is a truncated one, problems in simulating may still arise.

■ MB37

Center-Room J1

Maintenance and Testing

Contributed Session

Chair: Zimin (Max) Yang, University of Michigan, Ann Arbor, MI, 48109, USA, maxyang@umich.edu

1 — A System Level Maintenance Decision Support Tool
Zimin (Max) Yang, University of Michigan, Ann Arbor, MI, 48109, USA, maxyang@umich.edu.

We present a decision-making framework to find near-optimal maintenance time that maximizes production performance and minimizes maintenance expenses for production systems over a short-term horizon. Decision accuracy is enhanced by real-time assessment of individual components and identification of finite system states. Simulation results confirmed performance margin over traditional maintenance strategies.

2 — Maintenance Policies for the Machine Interference Problem
Michael J. Armstrong, Sprott School of Business, Ottawa, K1S 5B6, Canada, Michael_Armstrong@Carleton.ca.

The Machine Interference Problem has been modeled in numerous papers, but only recently has the use of preventive maintenance been considered, in the traditional form of a singe age policy. We examine the use of a more dynamic double age preventive maintenance policy to determine what performance benefits can result.

3 — A Stochastic Model of Human Error Prone Plant Overhaul
Tony Christer, University of Salford, Professor of OR, Gt . Manchester, na, M5 4WT, UK, a.h.christer@salford.ac.uk.

A stochastic decision model is presented to advise on overhaul practice for an American built high volume manufacturing plant in China . The model developed utilised the Delay Time concept, recognised that defects were being injected as well as repaired at overhauls , and that the inspection process was not perfect. Modelling halted a potentially costly proposed change based on qualitative RCM concepts, and quantified the production losses attributable to various forms of human error .

■ MB38

Center-Room N

Simulation Software/Models

Sponsor: Railroad Applications Section
Sponsored Session

Chair: Roger Baugher, Rail Sciences, Inc., Atlanta, GA, USA, roger@railsciences.com

■ MB39

Center-Room K

Advances in Dynamic Traffic Assignment Modeling Part I

Sponsor: Transportation Science Section
Sponsored Session

Chair: S. Travis Waller, University of Illinois, Urbana, IL, 61801, stw@uiuc.edu

1 — Stochastic Quasi-gradient Algorithm for Off-line Stochastic Dynamic Traffic Assignment
Srinivas Peeta, Purdue University, West Lafayette, IN, 47907, USA, peeta@ce.ecn.purdue.edu.

A stochastic quasi-gradient (SQG) algorithm is proposed to solve the off-line stochastic dynamic traffic assignment (DTA) problem that explicitly incorporates randomness in O-D demand, as part of a hybrid DTA framework for real-time operations. Simulation is used to estimate quasi-gradients that are stochastic to incorporate demand randomness. Simulation experiments highlight the advantages of the proposed algorithm.

2 — System Optimum Diversion in Congested Freeway Traffic
Jorge A. Laval, University of California at Berkeley, Berkeley, CA, 94720, jlaval@uclink.berkeley.edu., Juan Carlos Munoz

We study the system optimum dynamic traffic assignment over a freeway and city streets with a common destination. We formulate the problem and determine graphical solutions based on Newell's cumulative plots, yielding the optimal flow patterns. The following variants are considered: congested and uncongested off-ramps, and deterministic and stochastic demand.

3 — A Combinatorial Approach for Multi-destination Dynamic Traffic Assignment
S. Travis Waller, University of Illinois, Urbana, IL, 61801, stw@uiuc.edu., Hina Golani

This work greatly extends a previous combinatorial approach for the single destination dynamic traffic assignment problem. This presentation deals with the necessary extensions to develop and analyze an approach considering multiple destinations. The Cell Transmission Model is employed for the propagation of traffic, and while the approach is fundamentally a network flow problem, a traffic simulator can be used as a sub-problem for efficiency. Implementation, equilibrium properties, and numerical results will be discussed.

■ MB40

Center-Room G

The Interface of Simulation and Statistics

Sponsors: College on Simulation Section; Quality, Statistics and Reliability Section
Sponsored Session

Chair: Bahar Biller, Carnegie Mellon University, billerb@andrew.cmu.edu

1 — Metamodels: An Overview and Something New
Robert Sargent, Syracuse University, rsargent@syr.edu.

We first give an overview of metamodels by defining what they are , describing what they are used for, presenting the various types of metamodels that are commonly used, and discussing what is unique about them. Secondly, we introduce the use of radial basis functions for metamodeling based on a new algorithm that simplifies the metamodeling process and provides information for making the tradeoff between underfitting and overfitting (bias and variance) metamodels with respect to metamodel complexity.

2 — Efficient Simulation of Cycle Time-Throughput Curves
John W. Fowler, Arizona State University, Associate Professor, Tempe, AZ, USA, john.fowler@asu.edu., Sonia Leach, Jennifer McNeill, Gerald T. Mackulak

Since traditional simulation methodology allows for the evaluation of only one point at a time, efficient and effective tools are needed to generate cycle time-throughput (CT-TH) curves of manufacturing systems. We discuss tools to represent variance and selected percentiles in addition to the mean, especially in regions approaching system capacity.

3 — Roles for Simulation Optimization in the "Next Generation" of Experimental Planning Techniques
Theodore Allen, Ohio State University, Columbus, OH, 43210, USA, allen.515@osu.edu., Mikhail Bernshteyn

A simple real world example is used to illustrate the limitations of the current "paradigm" of experimental planning. Then, one vision is proposed of how simulation optimization can be used to provide information and method options with advantages in conceptual clarity and performance. The implications for teaching are also discussed.

■ MB41

Center-Room M

Facility Location & Routing

Contributed Session

Chair: Arda Gezdur, Koc University, Dept. of Industrial Eng., Istanbul, 80910, Turkey, , agezdur@ku.edu.tr

1 — An Heuristic Approach to Deal with Inventory in Logistics Network Design
Antonio C. Martos, i2 Technologies, Inc., Sao Paulo, 04707-910, Brasil, Antonio_Martos@i2.com., Hugo T. Yoshizaki, Rogerio Aversa

The inventory issues are not directly addressed into the conventional location models, which keep focus mainly on the transportation costs. This paper suggests a heuristic technique to define the facilities location, that join a mixed integer linear programming model with the economic order transportation and consider simultaneously inventory, transportation and location trade-offs.

2 — An MILP Solution for Warehouse Location and Routing Problem
Arda Gezdur, Koc University, Dept. of Industrial Eng., Istanbul, 80910, Turkey, agezdur@ku.edu.tr., Metin Turkay, Selcuk Savas

Warehouse location and routing problem is defined as finding the optimal number of warehouses and vehicle routes from these warehouses in order to minimize the total. An MILP model and solution algorithm is developed to simultaneously solve the location and routing problems. The proposed method is illustrated with test problems.

3 — Multiple Tour Plant Location Problem
Arash Behzad, University of California at Los Angeles, Electrical Engineering Department, Los Angeles, CA, 90035 , U.S.A, abehzad@ee.ucla.edu., Mohammad Modarres

We develop a method to obtain an optimal solution for multiple tour plant location problem (MTPLP), in which the objective is to locate facilities and at the same time to establish delivery routes from these facilities to a set of customers. In our approach we first transform MTPLP into some generalized traveling salesman problems (GTSP) and then by another transformation, each GTSP into a traveling salesman problem (TSP). However, from the computational point of view, it is not required to go through both stages to find the optimal solution of MTPLP and it is derived from the optimal routes of transformed TSPs directly. Thus, the efficiency of the method depends on the method selected for solving TSPs.

4 — Reverse Logistics Network Design: A Queueing Based Approach
Kris L.T. Lieckens, University of Antwerp, Antwerp, 2000, BELGIUM, kris.lieckens@ua.ac.be., Nico J. Vandaele

Concerning the efficient design of reverse logistics networks, we use a mixed integer linear program to determine which facilities to open at minimum overall costs under supply, demand and capacity constraints. We integrate a queueing model to deal with critical factors like lead time, inventories, and the system variabilities.

5 — Logistics Planning For An Edible Oil Company In India
G. Raghuram, Indian Institute of Management, Professor, Ahmedabad, 380015, Indian, graghu@iimahd.ernet.in., Sarang Deo, Sanjay Singh

An edible oil company was setting up a refinery near a port (also owned by the company) with capacity of 600 metric tonnes per day. It planned to sell half of the production as bulk oil and the rest as packed oil. Approximately 70% of the total logistics cost was accounted for by transportation cost. Some of the key decisions that the company faced was the location of the warehouses, mode choice and routing. An integer programming model was developed as an analytical tool.

■ MB42

Fairmont-Belvedere

Panel Discussion on Marketing Models: ROI, Accountability and Implementation

Sponsor: College on Marketing Section
Sponsored Session

Chair: Ed Brody, New York University

1 — Panel Discussion on Marketing Models: ROI, Accountability and Implementation
Howard Finkelberg, BBDO, Inc., New York, NY, 10019, USA, finkelberg@bbdo.com.
Panelists: Gary Lilien, Pennsylvania State Univ.; Jorge Silva-Risso, J.D. Powers and Associates.

Many technically excellent operational marketing models are not used, at least as the developers intended. Each of the panelists will present a short case study involving a marketing problem, a related marketing problem, the justification and ROI of that model and what happened. The session will synthesize issues for academics and practitioners associated with building marketing models that get used and that have organizational impact.

■ MB43

Center-Room H

Pricing and Revenue Management

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: Georgia Perakis, MIT, Associate Professor of Operations Research, Cambridge, MA, 02139, USA, georgiap@mit.edu

1 — Joint Network Pricing and Resource Allocation
Dimitris J. Bertsimas, Sloan School, MIT, Professor of Operations Research, Cambridge, MA, 02139, USA, dbertsim@MIT.EDU., Sanne de Boer

We study the joint dynamic pricing and resource allocation problem in a network. Because of its high dimensionality, we propose several approximate dynamic programming approaches for the problem. We report very encouraging computational results that suggest that it is important to incorporate demand uncertainty.

2 — Strategic Pricing and Inventory Management in Constrained Markets with Repeated Transactions
Guillermo Gallego, Columbia University, Professor, New York, NY, USA, ggallego@ieor.columbia.edu., Robert Phillips

Revenue management has generally focused on maximizing the total revenue (or profitability) achieved from fixed inventories when buyers and sellers will interact only once. If there are repeated transactions then a seller's action today will influence the future behavior of buyers. This paper describes the impact of customer learning and behavior on the optimal pricing of constrained goods in the case of multiple transactions.

3 — Dynamic Pricing for Perishable Products under Competition
Georgia Perakis, MIT, Associate Professor of Operations Research, Cambridge, MA, 02139, USA, georgiap@mit.edu., Anshul Sood

In this talk we discuss a dynamic optimization model for dynamic pricing of perishable products in a competitive and dynamically changing market. We build a general dynamic optimization model that ties together the competitive with the dynamic nature of pricing. The model also allows differential pricing for large customers. We will discuss the model, illustrate the policies we derive and also

establish some results on the equilibrium behavior of the competitors. Our results apply in a number of application areas including the airline, service and retail industries.

4 — A Fluid Model of Dynamic Pricing for Make-to-stock Systems
Soulaymane Kachani, MIT, Cambridge, MA, 02139, USA, kachani@mit.edu., Georgia Perakis

In this talk we present a fluid dynamics model of dynamic pricing and inventory control for make-to-stock manufacturing systems. Instead of considering an explicit demand and price relationship, we consider the delay of price and level of inventory in affecting demand. The model considers a multi-product environment with non-perishable products with shared capacity. In this talk we first introduce and discuss the general model and then consider its solution in some special cases.

■ MB44

Center-Room B2

Panel: Modeling and Simulation of Urban Operations

Sponsor: Military Applications Society
Sponsored Session

Chair: John Willis, TRADOC Analysis Center, Major, Monterey, CA, 93943, USA, john.willis@trac.nps.navy.mil

1 — Panel: Modeling and Simulation of Urban Operations
Panelists: Al Brandstein, Northrup Grumman; Niki Deliman Goerger, ERDC; Mid Self, NVESD; Randall Steeb, RAND.

A panel of experts will conduct an overview and assessment of urban warfare modeling and simulation. The panel will also provide a forum to identify needs, challenges and current efforts in urban M&S and to share various perspectives and proposed solutions.

■ MB45

Center-Room B3

Military Applications - Session 15

Sponsor: Military Applications Society
Sponsored Session

Chair: Rakesh Nagi, State University of New York-Buffalo, Associate Professor, Buffalo, NY, 14260, USA, nagi@buffalo.edu

1 — Cluster Head (Re)Assignment in Ad Hoc Sensor Networks to Maximize Coverage
Rakesh Nagi, State University of New York-Buffalo, Associate Professor, Buffalo, NY, 14260, USA, nagi@buffalo.edu., Dr. Rajan Batta, Dipesh Patel

In an ad hoc network for data fusion or other mission planning activities, cluster heads that cover sensors in a single hop need to be assigned to maximize expected coverage of the sensors under link jamming. Since the sensors themselves may be moving we need to reassign the clusterheads at a possible cost. The presentation will describe a discrete time model for this problem and a column generation solution method to solve this. Numerical results are reported.

2 — Operations Assessment in the Air Operations Center, Summer 2002
Anne Catlin Johnson, University of Arizona, Tucson, AZ, 85721, USA, annej@u.arizona.edu.

The Air Operations Center (AOC) plans air operations, and the Operations Assessment (OA) cell analyzes the results of combat for future strategy. Most AOC exercises are too short for OA to establish a rhythm, but in July 2002, the OA cell in a major USAF experiment performed most key processes over a 3-week period. The team tailored the output to the decision makers and balanced heuristics with quantitative methods, while managing external factors that impacted the assessment.

3 — A Simulation Model For Jet Engine Intermediate Maintenance: An Analysis of Centralized Repair Concep
Mahyar Amouzegar, RAND, Santa Monica, CA, 90407, USA, mahyar@rand.org.

The reorganization of the Air Force into an Expeditionary Aerospace Force (EAF) has required reexamination of many of the combat support areas such as engine maintenance. In this paper we will present a simulation model for analysis of alternative maintenance policy for jet engine maintenance shops.

■ MB46

Center-Room C3

Linear/Quadratic Programming Software

Cluster: State of the Art in Optimization Software
Invited Session

Chair: Stephen Wright, University of Wisconsin, Professor, Madison, WI, 53706, USA, swright@cs.wisc.edu

1 — Implementation Issues for QP Simplex
Zonghao Gu, ILOG, Inc., Mountain View, CA, 94043, USA, Zgu@ilog.com.

We have implemented both primal and dual simplex algorithms for positive semi-definite quadratic programming (QP). We will talk about implementation issues such as starting basis computation, phase I algorithms, pivot selection, ratio test, and basis update methods. Finally, we compare QP simplex and QP barrier for a variety of QP and MIQP models.

2 — Object-oriented Software for Quadratic Programming
E. Michael Gertz, Argonne National Laboratory, Argonne, IL, 60439, USA, gertz@mcs.anl.gov., Stephen Wright

OOQP is an object-oriented software package for solving convex quadratic programming problems (QP) using interior-point algorithms. We describe the design of OOQP, and show how it may be used as a framework for developing custom solvers for problems with exploitable structure or that otherwise use specialized linear algebra.

3 — Successive Linear Programming (SLP) in Xpress-MP
Roger Main, Dash Optimization, Northants, NN7 3BX, UK, roger.main@dashoptimization.com., Bob Daniel

We discuss the design and implementation of a high performance generic SLP optimizer for use in the process, financial, retail and other industries.

■ MB47

Center-Ballroom A8

Software Demonstration Session 06

Cluster: Software Demonstrations
Invited Session

1 — Imagine That, Inc. — Simulation with Extend
Dave Krahl, Imagine That, Inc., San Jose, CA, 95119, USA, davek@imaginethatinc.com.

Simulation with Extend - The Extend simulation environment supports simulation modelers across a wide spectrum of modeling needs and interests. This presentation will show the features and capabilities of Extend as well as some sample models. Specifically, basic model building, simulation optimization, and embedded Excel spreadsheets will be demonstrated.

Monday 1:30 - 3:00pm

■ MC01

Center -Ballroom A4

Tutorial: Logical Analysis of Data

Invited Session

1 — Logical Analysis of Data

Peter L. Hammer, RUTCOR, Rutgers University, Professor of Operations Research, Piscataway, NJ, 08854, USA, hammer@rutcor.rutgers.edu.

One of the most common forms of data analysis requires the extraction of information from a collection of observation records. Such problems appear frequently in practically every area of human activity (business, industry, science, technology, medicine, etc.). The records appear usually as vectors, having as components real numbers, logical symbols (e.g. yes/no), and "nominal" descriptors (e.g. either "round", "green", etc.). An "outcome" is associated to each vector. In most cases the outcome is either binary (e.g. the vector represents a "sick" or "healthy" patient), or numerical (e.g. it shows the level of activity corresponding to the given input values). Numerous approaches are known for handling this type of problems, starting with the classical approach of statistics, and continuing with the newer methodologies of several rapidly developing areas, such as machine learning, neural networks, data mining, etc. The methodology of "Logical Analysis of Data" (LAD) is aimed at analyzing the same type of problems, by using a combination of tools borrowed from combinatorics, optimization, the theory of Boolean functions, etc. LAD was initiated in 1986, with a first paper published in 1988. Since then, numerous studies were dedicated to its mathematical, computational, and applied aspects .

■ MC02

Fairmont-Cupertino

Tutorial: Scenario-based Technology Planning

Cluster: Practice Track
Invited Session

Chair: Chulho Park, SRIC-Business Intelligence

1 — Scenario-based Strategic Technology Planning
Chulho Park, SRIC-Business Intelligence

Since the development of a unique methodology for scenario planning in the 1960s, SRI has extensively used this scenario method to develop strategic planning for hundreds of consulting projects. This presentation will describe a step-by-step scenario planning process with a case example and illustrate the uses of scenarios on strategic planning including business opportunity search and development of technology roadmap.

■ MC03

Fairmont-Fairfield

Practice: Contributed 1

Cluster: Practice Track
Invited Session

Chair: Ron Davis, San Jose State University

1 — Towards A Decision Support System for Procurement Optimization
Ron Davis, San Jose State University, Sevil Korkmaz

We present a zero-one mixed-integer goal-programming model for developing optimal time-cost trade-off curves for procurement optimization in the presence of quantity discount opportunities. The typical context involves multiple plant demands to be satisfied by multiple suppliers, each with its own quantity discount schedule. Studies on realistic data using the MPL OPTIMAX 2000 solver within the EXCEL environment show that there are frequently "virtually free" time saving that can be realized by incorporating a small weight on the time dimension in the objective function. The savings from quantity discount exploitation utilizing demand aggregation can be substantial. Issues in implementing a procurement decision support system as an adjunct to an ERP system are also discussed.

2 — A Framework for Risk Management for Outsourced Information Technology Projects
S. Dhar, San Jose State University, R. Sridar, R. Gangurde

In the recent years, there has been a growing trend among various enterprises to outsource their IT projects. Although some of the factors like lower cost, access to skilled labor are easily measurable, there are a number of potential hidden costs and risks associated with outsourcing. This paper presents the concepts of IT Outsourcing and provides a generalized framework for assessing the risk in undertaking outsourcing ventures under different internal/external environments. A clear definition of outsourcing is provided with the rationale for the need for outsourcing. The focus is on the risk management process of identifying, measuring , monitoring and controlling the risks associated with IT Outsourcing.

■ MC04

Hilton-San Carlos II

Leading Software in Data Mining and Knowledge Discovery

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Wei Jiang, M&JG Enterprise, Statistical Consultant, Morristown, NJ, 07060, USA, wjg@insight.att.com

1 — How Does Data Mining Help to Solve Business Problems?
Jing Shyr, SPSS, jing@spss.com.

The concept of customer relationship management (CRM) arises from the fact that to be successful, business must manage not only the processes of production and distribution but also the customer relationships themselves. CRM has two components-an operational component and an analytical one. SPSS is one of the leading analytical CRM software providers where data mining is the heart of analytical CRM. Here I will give an overview of how our software helps to solve business problems.

2 — The Black Box and Real Data Mining
David Duling, SAS, R & D Software Manager, Cary, NC, 27513, USA, David.Duling@sas.com.

Data Mining vendors often claim full automation. However, data mining excercises most often result in extended campaigns of investigating the data for useful measurements and patterns. SAS research and development led to a collection of statistical tools for large, un-designed data sets. Meanwhile, market analyst reports predict that data mining will increasingly be packaged into solutions for the masses paradoxically encompassing more sophisticated algorithms and more widespread usage.

■ MC05

Fairmont-Sacramento

Entrepreneurship I, Regional & Institutional Policy Milieu and the Development of Innovative Startup Firms

Sponsorr: Technology Management Section
Invited and Sponsored Session

Chair: Sarfraz Mian, State University of New York-Oswego, Oswego, NY, 13126, USA, mian@oswego.edu

1 — The Mexican Innovation Policy Experience and the Development of Innovative Startup Firms
Leonel Corona, National University of Mexico, Mexico City , 20 D.F., Mexico, leonel@servidor.unam.mx.

Theory and practices of innovation are analyzed from the successes and failures in developing technology based firms in Mexico. This regional approach reveals some advantages and obstacles in developing the Mexican innovation poles, which are characterized by their innovative startups, science parks, technology business incubators and other institutional mechanisms established as a result of government science, technology and innovation policies.

2 — Technology Business Incubation and the Universities
Jerome Doutriaux, University of Ottawa, Ottawa, K1N 6N5, Canada, doutriaux@admin.uottawa.ca.

This paper looks critically at Canada's most active knowledge clusters and at the impact of university-industry cooperation on their development. It concludes that Canadian universities are more often a catalyst for development than a driver, government laboratories and industry being the primary reasons for cluster growth and success.

3 — Are Startup Firms Projects to be Managed?
Burton V. Dean, San Jose State University, San Jose, CA, 95192, USA, bvdean@aol.com.

Our project management approach (PMA) is introduced in a sample of Silicon Valley startup firms. Budget, milestone, and timeline variances against plan are measured in the firms' implementation and use. Utility of the PMA is assessed by means of independent and startup management team reviews.

4 — The Emerging North American Science Park Model for Developing Knowledge-based Startups
Sarfraz Mian, State University of New York-Oswego, Oswego , NY, 13126, USA, mian@oswego.edu.

After the dotcom bubble, a newer version of science park is emerging; one in which networking approaches employ sophisticated cutting-edge infrastructure technologies that are combined with a supportive business environment focused on knowledge-based industries. When these parks are designed and implemented properly, they are having positive economic impacts on their host regions.

■ MC06

Fairmont-Atherton

Teams

Contributed Session

Chair: William P. Millhiser, Case Western Reserve University, Cleveland Heights, OH, 44106, USA, wxm29@po.cwru.edu

1 — Mathematical Models for Studying When to Divide a Team
William P. Millhiser, Case Western Reserve University, Cleveland Heights, OH, 44106, USA, wxm29@po.cwru.edu., Daniel Solow

Adapting Kaufman's NK model, we mathematically model the interaction between a leader and a team and the interactions among team members. Computer simulations provide insights as to when to divide the team into two departments and examine the resulting hierarchical structure.

2 — The Human Factor in Production Planning: Added Value or Disturbance?
Jan C. Fransoo, Technische Universiteit Eindhoven, Eindhoven, NL-5600 MB, Netherlands, J.C.Fransoo@tm.tue.nl .

By analyzing system-generated and human-modified plans from a chemical plant we quantify the impact of the human in the planning process. We use techniques from human judgment theory to analyze the data.

3 — A Sociological Approach for the Design of Knowledge Management Systems
Liaquat Hossain, Syracuse University, Assistant Professor , Syracuse, NY, 13244, USA, lhossain@syr.edu.

In this paper, the concept of KS is introduced first. Secondly, use of technology and social networks for sharing explicit and tacit knowledge is provided. Thirdly, an overview of the social dimension of KS is provided. Fourthly, strong ties and weak ties theories are applied here to understand strategies for dealing with structural holes of communication. Finally, a set proposition is proposed with their implication for designing KM in organizations is addressed.

■ MC07

Fairmont-Piedmont

Uncertainty and Complexity in Product Development

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Christoph Loch, INSEAD, Professor, Fontainebleau, 77305, France, christoph.loch@insead.edu

1 — Managing Variety for Assembled Products: Modeling Component Systems Sharing
Kamalini Ramdas, University of Virginia, Charlottesville, VA, 22906, USA, ramdask@darden.virginia.edu., Marshall Fisher, Karl Ulrich

We present a methodology for determining which versions of a set of related components to offer to optimally support a defined finished product portfolio. We use our model to evaluate three conceptually different organizational approaches to component sharing: a coordinated projects approach, a project-by-project approach, and a hybrid partially coordinated approach.

2 — R&D Search Under Competition
Stylianos Kavadias, Georgia Institute of Technology, Atlanta, GA, 30332-0520, USA, stylianos.kavadias@mgt .gatech.edu., Ludo van der Heyden

We develop a model that explores how competition impacts the design and development choices of a new product. The designer has to search exhaustively across multiple discrete design options with different costs, probabilities of success and market return outcomes, in the presence of a competitor that also rushes to get the market. We show that the optimal design choice, in profit terms, may vary depending on the competitor's capabilities to get first to market, and we link the optimal choice to the well-known ci/pi rule that holds in a single decision maker setting.

3 — Project Management Strategies Under Complexity and Ambiguity
Svenja Sommer, INSEAD, Fontainebleau, 77305, France, svenja.sommer@insead.edu., Christoph Loch

Innovations projects facing uncertainty and complexity combine two fundamental strategies: generating variety via independent parallel trials and then choosing the one with the most favourable outcome, and learning, where adjustments are made based on information obtained during the development process. We simulate these development approaches as a search process on a rugged landscape with unknown parameters. We try to identify a priori identifiable circumstances, under which either of the two approaches yield better results.

4 — Modeling the Problem Solving Dynamics in Complex Engineering Projects
Jurgen Mihm, McKinsey & Company, Frankfurt, 60311, Germany, jurgen.mihm@mckinsey.com., Christoph Loch, Arnd Huchzermeier

We present a mathematical model of a complex distributed design project. The model explicitly represents local component decisions, as well as component interactions in determining system performance. The model shows how a rugged performance landscape arises from simple components with single-peaked performance functions, if the components are interdependent. We characterize under which circumstances the dynamic behavior of the system exhibits performance oscillations or divergence to design solutions with low performance. We also derive classes of managerial actions available to improve performance dynamics.

■ MC08

Center-Ballroom A2

Supply and Demand Management

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Feng Cheng, IBM, Yorktown Heights, NY, 10598, USA, fcheng@us.ibm.com

1 — Discount Schedules and Advance Demand Information in a Decentralized Supply Chain
Ozalp Ozer, Stanford University, Stanford, CA, 94305, USA , ozalp.ozer@stanford.edu., Wei Wei

We study a decentralized supply chain in which the manufacturer uses a discount strategy to induce advance orders from the retailers. We establish an optimal policy and characterize the system performance with respect to discount price and forecasts. We conclude by establishing contracts that achieve channel coordination.

2 — Strong Approximation for Multi-Item Product-Inventory System with Batch Arrivals and Inventory Capacity
Yingdong Lu, IBM, Yorktown Height, NY, 10549, USA, yingdong@us.ibm.com.

A set of new strong approximation results are proved for complicated production-inventory systems. Especially, we consider the impact of batch arrival upon the limiting diffusion processes . Computational procedures are proposed for both performance analysis and optimal control policy.

3 — A Semiconductor Manufacturing Model with Multiple Grade Products and Downgrading
Bala Ramachandran, IBM, Yorktown Heights, NY, USA, Guillermo Gallego, Kaan Katircioglu

We present a multi-echelon inventory model of a semiconductor manufacturing process that enables the analysis of drivers of supply chain performance. The model includes consideration of the multiple grades of products produced by the manufacturing process and effects of downgrading inventory.

4 — Optimizing Inventory Performance in a Server Computer Manufacturing Environment
Carlos Rodriguez, IBM Server Group, Feng Cheng, Grace Lin

IBM Server Group has implemented a fabrication and fulfillment center manufacturing strategy to deal with the complex configuration requirements, leading edge server technology issues , margin concerns and increasing pressures for responsive order fulfillment lead times. We present how we used simulation and optimization techniques for establishing optimal inventory levels for given serviceability targets and assessing the impact of various supply chain parameters on inventory levels.

■ MC09

Center-Ballroom A3

Issues in E-Business II

Contributed Session

Chair: Timothy Laseter, University of Virginia, Charlottesville, VA, 22903, USA, lasetert@darden.virginia.edu

1 — eMarketplace Failures: A Discriminant Analysis
Timothy Laseter, University of Virginia, Charlottesville, VA, 22903, USA, lasetert@darden.virginia.edu.

Building upon prior research covering over 2000 B2B eMarketplaces published by the author in 2001, this paper examines the failure rates of those entities one year later. Through discriminant analysis, the research examines differential failure rates based upon service offering mix, ownership model and base of operations .

2 — A Study of E-Commerce Models for Enterprises in China
Bin Ding, University of Science and Technology of China, Ph.D, Hefei, AH, 230026, PR China, dinbin@vip.163.com., Xiaojian Chen

Quite deferent from developed countries in the social environment , economic standard and business background, Chinese enterprises should select their own way of e-commerce. The social environment , little Internet population and backward management restrict the e-commerce. The effective models for e-commerce of Chinese enterprises include 1)large-scale enterprises build their own e-commerce systems. 2)the industrial organizations and enterprise unions build shared e-commerce systems.

3 — The Economics of Supply Chain Management in E-Business Environment
Danny Cho, Brock University, Associate Professor, St Catharines, ON, L2S 3A1, Canada, Danny.Cho@BrockU.CA.

As common assessment tools on supply chain effectiveness rarely exist and supply chain management practices may vary from one industry to another (one company to another), the success or failure of a firm°Øs supply chain management strategy may become unknown until much later date. In this paper, we investigate key issues for supply chain success in various e-business environment and present a model that can be used by a firm to make important decisions on its supply chain management initiatives.

4 — Market Friction in Internet Retailing: Information and Logistics-Based Customer Service
Elliot Rabinovich, Arizona State University, Assistant Professor, Tempe, AZ, 85287, USA, elliot.rabinovich@asu .edu., Rajiv Sinha, Arnold Maltz

Price competition in market transactions mediated by Internet retailers has manifested itself in high failure rates among these market makers. This paper identifies ways in which retailers may amplify friction and profitability, while providing value to other market parties. Accordingly, it evaluates market-friction effects of physical distribution and customer service in the mediation of transactions by Internet retailers in music CD supply chains spanning wholesalers, retailers, and consumers.

■ MC10

Center-Ballroom A7

Project Management II

Cluster: Scheduling
Invited Session

Chair: Abdelghani A. Elimam, San Francisco State University, San Francisco, CA, aelimaam@sfsu.edu

1 — High Technology Project Tracking and Control
Savas Ozatalay, Widener University, Chester, PA, 19013, sxo0001@mail.widener.edu.

High technology projects differ from others by being more complex and therefore interface many other projects that are scheduled concurrently. They lso have fuzzier objectives and more broadly defined performance measurements. This paper proposes a multiple high project tracking and coordination process that enables project leaders and schedulers to monitor milestones in interrelated projects and have early detection of failures or delays.

2 — Maximizing Project Net Present Value with Constant Periodic Cash Flows
Joe Szmerekovsky, Case Western Reserve University, Cleveland, OH, USA, George Vairaktarakis

Consider a project for which associated with each activity is a periodic cash flow experienced until the completion of the activity and a separate cash flow that occurs at activity completion. Algorithms are provided for scheduling the activities to maximize NPV for incapacitated and single resource environments.

3 — Generalizing the Weighted Node Packing Lower Bound
Erik Demeulemeester, Katholieke Universiteit Leuven, Leuven, Belgium, erik.demeulemeester@econ.kuleuven.ac.be.

Numerous lower bound calculations have been presented for the RCPSP. One of the best performing lower bound calculations is the weighted node packing lower bound that was presented by Mingozzi et al. (1998). We will show how this lower bound can be further improved. Extensive computational results will be presented.

4 — Impact of Equipment Planning on Project Scheduling: Computational Results
B. Dodin, Abdelghani A. Elimam

The use of heavy equipment could have a drastic impact on the duration of activities and the project as a whole. In this paper, we show that the cost of equipment setup, transition and idle time could lead to the crashing of non critical activities. Mixed Integer programming models, solution approaches and computational results are.

■ MC11

Center-Room C1

Parallel Machine Scheduling

Contributed Session

Chair: Ayten Turkcan, Bilkent University, Ankara, TR, 06533, Turkey, ayten@bilkent.edu.tr

1 — Heuristics for Parallel Machine Scheduling
Peruvemba S. Ravi, School of Business and Economics, Wilfrid Laurier University, Waterloo, ON, N2L 3C5, Canada , pravi@wlu.ca., Paul Iyogun

This paper considers a situation in which each of n jobs has to be processed on exactly one of m parallel machines. The objective is to minimize weighted flow time. Bounds and heuristics are presented.

2 — Parallel Flowshops with Unrelated Processors
Marcelo S. Nagano, University of Sao Paulo, RIBEIR√O PRETO, 14040-901, BRASIL, drnagano@usp.br., Joao V. Moccellin

This paper deals with the K-stage Hybrid Flow Shop scheduling where, at any stage, there are two unrelated processors. The performance measure is the makespan. We propose alternative improvement heuristics in order to evaluate the effectiveness of a conditional job-move, in the improvement step. Computational results are discussed.

3 — Sequencing Jobs in Flow Shops with Parallel Arbitrary Machines
Joao V. Moccellin, University of Sao Paulo, S√O CARLOS, 13566-590, BRASIL, jvmoccel@sc.usp.br., Marcelo S. Nagano

We deal with the K-stage Hybrid Flow Shop scheduling problem with two arbitrary machines at any production stage. We introduce two heuristic procedures with the objective of minimizing makespan. Computational experience was carried out in order to evaluate the performance of the heuristics. The main results are presented.

4 — A Polyhedral Approach to Scheduling Processors Under Precedence Constraints
Cid de Souza, State University of Campinas, Associate Professor, Campinas, SP, 13084-971, Brazil, cid@ic .unicamp.br., Celso C. Ribeiro, Pablo Coll

We consider the problem of finding an assignment a set of tasks related by precedence constraints to a set of machines while minimizing the makespan. Integer programming models and strong valid inequalities are discussed. Computational experiments with a branch-and-cut algorithm are reported.

5 — Parallel CNC Machine Scheduling with Controllable Processing Times
Ayten Turkcan, Bilkent University, Ankara, TR, 06533, Turkey, ayten@bilkent.edu.tr., M. Selim Akturk, Robert Storer

In this study, we consider the scheduling of nonidentical parallel CNC machines in flexible manufacturing systems. The processing times can be controlled by changing the cutting speed and feed rate. An integer programming model, which minimizes the sum of manufacturing cost, total weighted earliness and tardiness , is proposed. An efficient Lagrangean relaxation and subgradient optimization based algorithm is proposed to solve the model.

■ MC12

Fairmont-Regency 1

Multiple Criteria Decision Making and Health Care

Sponsor: Health Applications Section
Sponsored Session

Chair: Allen Holder, Trinity University, San Antonio, TX, 78212, USA, aholder@trinity.edu

1 — A Planning Tool for Radiation Therapy
Matthias Ehrgott, University of Auckland, Senior Lecturer , Auckland, New Zealand, m.ehrgott@auckland.ac.nz.

The planning of radiation therapy for cancer treatment is a complex optimization problem. We present a tool based on multicriteria optimization, which incorporates the optimal selection of irradiation directions and a search for a treatment plan among efficient solutions of the mathematical program. Some new results for these subproblems are presented.

2 — Models For Primary Health Care Location In The Developing World
John Hodgson, Earth and Atmospheric Sciences, Professor, Edmonton, AB, T6E 2G3, Canada, john.hodgson@ualberta.ca.

The assumptions of traditional location-allocation (LA) models are overly restrictive regarding patron travel behavior in this situation. Incorporating realistic travel behavior introduces difficult non-linearities. I present a brief history of past LA models incorporating travel behavior and suggest a way of resolving this dilemma.

3 — Assessing Physician's Performance using PowerDEA
Jose Dula, University of Mississippi, Associate Professor , University, MS, 38677, USA, jdula@olemiss.edu., Francisco Lopez

Many studies and analyses in the health industry involve comparisons of many entities described by a common set of multiple attributes. This explains the suitability and success of Data Envelopment Analysis (DEA) in this area. We report on an innovative application of DEA to measure physician's performance based on extensive analyses of subsets of the attributes. From this analysis it is possible to obtain robust information about physician's performance and about the model.

■ MC13

Center-Room D

Interior Point Algorithms for Linear and Nonlinear Problems

Sponsor: Optimization Section - Nonlinear Programming
Sponsored Session

Chair: Renato Monteiro, Georgia Tech, Professor, Atlanta, GA, 30332, USA, monteiro@isye.gatech.edu

1 — Practical Interior-point Algorithms for the Maximum Volume Ellipsoidal Approximation of Polytopes
Yin Zhang, Rice University, Houston, TX, 77005, USA, zhang@caam.rice.edu., Liyan Gao

We study solution methods for finding the maximum-volume ellipsoid inscribing a given polytope. We investigate some new formulations for primal-dual type, interior-point algorithms, and provide theoretical justifications for the proposed algorithms. Extensive numerical experiments have shown that one of the new algorithms should be the method of choice.

2 — Computational Experiences with Self-regular Proximity Based Interior Point Methods
Tamas Terlaky, McMaster University, Hamilton, ON, L8S 4L7 , Canada, terlaky@mcmaster.ca., Jiming Peng, Lois Zhu, Guoqing Zhang

Large-update IPMs induced by Self-regular proximities form a new class of primal-dual IPMs with improved complexity bound. Our experiences with implementations of self-regular proximity based IPMs are discussed. Issues, such as, initial solution, pre-and-post-processing, predictor-corrector, dynamic step length , stability are addressed. Comprehensive numerical results are presented.

3 — Convergence of Affine Scaling Algorithm for Nonconvex Quadratic Minimization
Paul Tseng, University of Washington, Seattle, WA, 98195-4350,

USA, tseng@math.washington.edu.

We study convergence properties of Dikin's affine scaling algorithm applied to nonconvex quadratic minimization. We show that, for box constraints and objective Hessian that is rank dominant with respect to maximally psd principal submatrices, the iterates converge to a point satisfying 1st- and 2nd-order optimality.

■ MC14

Center-Room E

Linear Programming I

Contributed Session

Chair: Manuel A. Nunez, University of Connecticut, Storrs, CT, 06269-1041, US, mnunez@sba.uconn.edu

1 — A Variant of Dikin's Affine-Scaling Algorithm for Linear Programming
Ping-Qi Pan, Dept. of Math. Southeast University, Professor, Nanjing, Ji, 210096, P.R. of China, panpq@seu .edu.cn.

The simplex algorithm and interior point algorithm are two diverging and competitive types of algorithms for solving linear programming problems. The former moves on the underlying polyhedron, from vertex to adjacent vertex, along edges until an optimal vertex is reached; in contrast, the latter approaches an optimal point by moving across interior of the polyhedron. The simplex algorithm may be classified into the category of pivot algorithms as it proceeds under some pivoting criteria. This paper derives a novel variant of Dikin's affine-scaling algorithm that may be regarded as a pivot as well as interior point algorithm. It appears to have advantages of both types of algorithms, and can reach a pair of {\it exact} primal and dual optimal solutions, in principle. Computational results with a set of NETLIB test problems are very encouraging.

2 — Data Perturbation and Recovery On Statistical Database Systems Program
Manuel A. Nunez, University of Connecticut, Storrs, CT, 06269-1041, US, mnunez@sba.uconn.edu.

To ensure data confidentiality and recovery on statistical databases, a new perturbation technique is presented. The technique is based on a least-squares model and allows for pre-set margin of errors on the size of the data perturbations. The method preserves statistical measures such as the mean and the correlation.

3 — A Self-Regular Proximity Based IPM: Complexity Analyses and Implementations
Guoqing Zhang, McMaster University, Post Dotoral Fellow, Hamilton, ON, L8S 4L7, Canada, gzhang@cas.mcmaster.ca., Tamas Terlaky

Large-update Interior Point Methods (IPMs) induced by Self-Regular proximities form a new class of primal-dual IPMs. In this talk we present a self-regular proximities based infeasible IPM. The complexity issues of the new algorithm are addressed and computation results of our numerical tests are reported.

4 — Preliminary Results of Some Extensions to Von Neuman's LP Algorithm
Robert Storer, Lehigh University, Professor, Bethlehem, PA, 18015, USA, rhs2@Lehigh.edu.

We present very preliminary results on some extensions to the interior point LP algorithm proposed first by Von Neuman. We will discuss how such algorithms might be used in conjunction with other methods, and present the results of some preliminary testing.

■ MC15

Center-Room B4

Network Optimization 2

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Teodor Gabriel Crainic, U.Q.A.M., Professor, Montreal, QC, H3C 3P8, Canada, theo@crt.umontreal.ca

1 — Causal and Anticipative Models for 3G Multiservice Networks
Brigitte Jaumard, University of Montreal, Professor and CRC Chair, Montreal, QC, H3C 3J7, Canada, jaumard@IRO .UMontreal.CA., Catherine Voisin, Yannick Solari

We compare two models, an anticipative and a causal model, for the dimensioning of a 3G multiservice networks. Both models correspond to 0-1 mixed integer programs that can be solved exactly for moderate size networks that include both a radio and a core component, a WFQ scheduling policy for the core network, and a differentiated QoS (Quality of Service) and GoS (Grade of Service) for all services.

2 — Branch-and-Cut Algorithm for Multicommodity Capacitated Fixed-Charge Network Design Problem
Mervat Chouman, CRT, Universite de Montreal, Montreal, Qc , Canada, mervat@crt.umontreal.ca., Teodor Gabriel Crainic, Bernard Gendron

Efficient cutting-plane procedure are required to strengthen the usual LP relaxation of the multicommodity capacitated fixed-charge network design problem. We propose a branch-and-cut algorithm based on a new cutting-plane procedure. We report on branching rule, fathoming rule and on heuristic used to find feasible solutions.

3 — Parallel Online Search of Concurrent Lines
Patrick Jaillet, MIT, Cambridge, MA, 02139, USA, jaillet@mit.edu., Matthew Stafford

We consider the problem where p searchers explore m>p half-lines, all joined at a common origin. The searchers travel at unit speed and the goal is to find a single object whose location is bounded away from the origin. We propose optimal deterministic on-line strategies for solving the time-competitive problem, and compare with earlier results using distance-competitive ratio.

■ MC16

Center-Room C4

Very Large-Scale Neighborhood Search Algorithms

Cluster: Discrete Optimization
Invited Session

Chair: Ravindra Ahuja, University of Florida, Professor, Gainesville, FL, 32611, USA, ahuja@ufl.edu

1 — Using Constraint Programming to Explore Large Neighborhoods
Michel Gendreau, Universite de Montreal, Professor, Montreal, QC, H3C 3J7, Canada, michelg@crt.umontreal.ca., Gilles Pesant, Louis-Martin Rousseau

Constraint Programming as been used in many context as a powerful neighborhood exploration tool. The constraint propagation features of this paradigm allow an efficient pruning of search trees and thus a rapid exploration of large neighborhoods. This technique as been used to solve Vehicle Routing Problems as well as Physician Rostering Problems.

2 — Advances in Ejection Chain Methods for the Traveling Salesman Problem
Cesar Rego, University of Mississippi, Associate Professor, University, MS, 38677, USA, crego@bus.olemiss .edu., Fred Glover, Abraham Punnen

We investigate an enhanced algorithm for large TSPs using ejection chains. No reliance is made on classical k-opt TSP moves . Computational results show the ejection chain meta-heuristic is competitive with the best existing TSP algorithms, and by investing additional computational time, produces superior quality solutions.

3 — Very Large-scale Neighborhood Search Algorithms for the Quadratic Assignment Problem
Dushyant Sharma, MIT, Cambridge, MA, 02139, USA, dushyant@mit.edu., Ravindra Ahuja, Krishna Jha, James Orlin

The quadratic assignment problem (QAP) is one of the hard nuts in combinatorial optimization. The existing neighborhood algorithms for QAP use two-exchange neighborhoods. We show that using the concept of improvement graphs, we can easily consider multi-exchanges involving up to eight facilities within reasonable computational times. This algorithm gives excellent computational results.

■ MC17

Center-Room B1

Facility Planning and Design II

Cluster: Manufacturing Systems
Invited Session

Chair: Brett Peters, Texas A&M University, College Station, TX, 77843, USA, bpeters@tamu.edu

Co-Chair: Ignacio Castillo, University of Alberta School of Business, Edmonton, AB, Canada, ignacio.castillo@ualberta.ca

1 — A Decomposition Algorithm for the Design of Small Parts Warehousing Systems
Marc Goetschalckx, Georgia Institute of Technology, Associate Professor, Atlanta, GA, 30332-0205, USA, marc .goetschalckx@isye.gatech.edu., Leon McGinnis, Gunter Sharp, Doug Bodner, T. Govindaraj, Kai Huang

We will present a progress report on our effort to develop a design algorithm for warehousing systems. In particular, we will discuss the hierarchical structure of our design procedure. This includes the decisions and parameters used in the master model, the various sub-models, and the decision and data interaction between the various levels in the hierarchy. We will present several sub-models that are specific for a particular function or material handling equipment.

Computational results of the application of the sub-model for small parts warehousing systems will also be shared.

2 — Deciding Between Zone-Picking and Batch-Picking in an Order Fufillment Center
Russell Meller, Virginia Tech, Assoc. Prof., Blacksburg, VA, 24061, USA, rmeller@vt.edu., Kevin Gue

A classic order fulfillment center question is whether to use zone-picking or batch-picking in the forward area. Zone-picking tends to minimize the congestion in the aisles, but requires downstream sortation, and balancing the zones can be an issue. On the other hand, batch-picking eliminates downstream sorting and balancing concerns, but congestion in the aisles can reduce picking efficiency. We develop a model to measure congestion in the aisles and use it to examine this classic question.

3 — Facility Location in the Presence of Congested Regions
Avijit Sarkar, State University of New York at Buffalo, Buffalo, NY, 14260, USA, asarkar@acsu.buffalo.edu., Dr. Rajan Batta, Rakesh Nagi

This work deals with rectilinear facility location problem in the presence of congested regions (closed and bounded areas in ¬2 which prohibit facility location but allow travel at a possible additional cost, denoted by a). We show that the least cost evaluating function between two points in ¬2 in the presence of congested regions is concave in a space. We also prove that a simple "barrier" extension of a grid is inadequate to solve the infinitesimal facility location problem for congested regions.

4 — The Facility Layout Problem with Unequal Areas: Computing Global Optimal Solutions
Ignacio Castillo, University of Alberta School of Business, Edmonton, AB, Canada, ignacio.castillo@ualberta .ca., Tapio Westerlund

In this presentation, we propose a modeling framework for efficiently finding global optimal solutions for the facility layout problem with unequal areas. Our computational results show that the framework consistently yields global optimal solutions on several well-known test problems from the published literature.

■ MC18

Center-Room J2

Daniel H. Wagner Prize Competition Session 03

Sponsor: CPMS, The Practice SEction of INFORMS
Sponsored Session

Chair: Joseph Discenza, , jpd7@alumni.cwru.edu

NOTE: Presentation begins at 2:15pm

1 — Continuing Qualification Training for Pilots at Delta Air Lines
Milind Sohoni, Operations Research, Atlanta, GA, USA, Ellis Johnson, Kristi G. Martin, Glenn Baily, Helen Carter

Cockpit crews at Delta Air Lines undergo periodic continuing qualification training to maintain flight qualification. The new Pilot Working Agreement (PWA) implementation at Delta Air Lines introduces a short and stringent planning cycle and a new training pay structure that impacts operating costs significantly . The post September 11 downturn in airline business forced reduction in work force and significantly affected pilot training requirements. In order to mitigate Delta's cost exposure and automate the scheduling process under a rigid planning timeline we developed and deployed a fully automated optimization system, CQOPT, that builds and assigns training schedules based on individual pilot training requirements with the objective of minimizing the overall operating costs and maximizing training assignments. Shortly after deployment Delta is already beginning to realize substantial operational benefits from CQOPT.

■ MC19

Fairmont-Regency 2

Electric Power Market Modeling II

Sponsor: Energy/Natural Resources/Environment Section - Electricity Markets and Energy Modeling
Sponsored Session

Chair: Shmuel Oren, University of California, Professor, Berkeley, CA, 94720, USA, oren@ieor.berkeley.edu

1 — Design of Restructured Power Markets with Imperfect Competition
Rajkumar Ragupathi, University of South Florida, Tampa, FL, 33620, USA, ragupath@eng.usf.edu., Tapas K. Das

Design flaws in the restructuring of the electric power industry left the generators, in many instances, with significant market power that deprived the consumers of the benefits of competition. The focus of this research is on developing a methodology for design and analysis of restructured power markets by considering realistic market features: combination of POOLCO and Bilateral types, multi-settlement pricing method, demand side bidding, LMP, and transmission network considerations. Our model consists of a multi-player nonzero sum stochastic game for the competitive bidding processes of the generators and the retailers, and a nonlinear program for scheduling and pricing of power by the ISO.

2 — Price-taker Bidding Strategy under Price Uncertainty
Antonio Conejo, Univ. Castilla-La Mancha, Professor, Ciudad Real, 13071, Spain, Antonio.Conejo@uclm.es., Jose Arroyo, Francisco Nogales

This paper addresses the optimal bidding strategy of a price-taker. A forecasting tool is used to estimate the pdfs of next-day hourly market-clearing prices. This information is used to formulate and solve a self-scheduling profit maximization problem. The solution of this problem allows deriving a simple yet informed bidding rule.

3 — Modelling Inter-regional Electricity Competition in Canada: The CIELCOMP model
Scott Rogers, University of Toronto, Professor, Toronto, ON, M5S3G8, Canada, rogers@mie.utoronto.ca., Kit W. K. Wong

This talk describes the Canadian Inter-regional ELectricity COMPetition (CIELCOMP) model that considers 4 regions in Canada and allows bidding from any region into any other region. Gencos are competitive and transcos are minimum cost suppliers.

■ MC20

Fairmont-Hillsborough

Auction Session 6

Cluster: Auctions
Invited Session

Chair: Jayant Kalagnanam, IBM (TJ Watson), Yorktown Hts, NY, 10598, US, jayant@us.ibm.com

1 — Using a Vickrey Share Auction for Allocating Spectrum
Gnana Anandalingam, University of Maryland, College Park, MD, 20742, USA, ganand@rhsmith.umd.edu.

The Vickrey model has lead to bad consequences in many spectrum auctions. We posit some axioms that have to be satisfied for a successful outcome when allocating spectrum, or any resource. We present a new mechanism, the Vickrey "share auction", and prove that it will satisfy many of these axioms.

2 — Auction and Market Mechanisms Embedded in Algorithms
Zhiling Guo, University of Texas at Austin, Austin, TX, 78712, US, zhiling@mail.utexas.edu., Gary J. Koehler, Andrew B. Whinston

A market-oriented, double auction-based, synchronous or asynchronous, decomposition method for decomposable linear programs is developed. The discovery of market-clearing prices is achieved by competitive bidding and the adjustment of demand for shared resources is addressed by direct, wealth improving resource exchanges among agents.

3 — Iterative Multiattribute Auctions
David Parkes, Harvard University, Cambridge, MA, 02138, USA, parkes@eecs.harvard.edu., Jayant Kalagnanam

We present iterative multiattribute reverse auctions with one buyer with many suppliers. These designs are price-directed and a straightforward myopic best-response strategy is in equilibrium for the sellers, assuming consistent buyer strategies. The auctions are efficient for a truthful buyers, and we quantify the maximal gain to a strategic buyer.

■ MC21

Fairmont-Glen Ellen

Financial Engineering, Session 01

Cluster: Financial Engineering
Invited Session

Chair: Erhan Cinlar, , ecinlar@princeton.edu

1 — Liquidity Risk and Arbitrage Pricing Theory
Umut Cetin, Cornell University, ITHACA, NY, 14853, USA, umut@cam.cornell.edu., Robert Jarrow, Philip Protter

Classical theories of markets assume that traders can buy and sell unlimited quantities of a stock at the market price. Such theories fail to account for illiquidities, large traders, and transaction costs. We propose a remedy by hypothesizing a stochastic supply curve for the stock price as a function of trade size. This leads to some interesting mathematics and introduces natural restrictions on hedging strategies.

2 — Swing Options and the Mathematics of Multiple American Exercises
Rene Carmona, Princeton University, rcarmona@princeton .edu.

Some of the swing options traded in the energy markets involve multiple exercises, the times of which are at the discretion of the option holder. The particular case of a single exercise right corresponds to the classical case of American

options. This paper is to extend the mathematical theory of optimal stopping and the Snell envelop to the case of multiple exercise times.

3 — Modeling Credit Risk with Partial Information
Philip Protter, Cornell University, Ithaca, NY, 14853, USA, Umut Cetin, Robert Jarrow, Yildiray Yildirim

We introduce a reduced form credit risk model by constructing an economy where the market sees a reduction of the manager's information set, which reduction makes default a surprise to the market. We provide an explicit formula for the default intensity based on an Azema martingale, and we use the excursion theory of Brownian motion to price risky debt.

4 — Games with Exhaustible Resources
Ronnie Sircar, Princeton University, sircar@princeton.edu .

In an industrial organization problem, two producers of an exhaustible resource engage in a continuous time Cournot-type competition for profits. When the resource is in infinite supply, there is a classical solution. Here, we study the effect of exhaustibility by perturbation and computational analyses of the differential game equations.

■ MC22

Fairmont-Paseo

Power Systems Planning I

Contributed Session

Chair: Septoratno Siregar, Institut Teknologi Bandung, Professor, Bandung, WJ, 40132, Indonesia, ss@tm.itb.ac.id

1 — The Application of Location and Network Theory in the Design of Wind Power Plant Cabling
Bryan Norman, University of Pittsburgh, Pittsburgh, PA, 15261, USA, banorman@engrng.pitt.edu., U. Aytun Ozturk

The problem of connecting wind turbines to the power grid encompasses many issues including the decision of whether or not to use transformers and how to design the transmission cable network. By mathematically modeling the turbine connection problem, optimization methods can

2 — The Impact of Spot Behaviour on Contract Prices in an Imperfect Electricity Market
Steve R. Batstone, Energy Modelling Research Group (EMRG) , Christchurch, New Zealand, srb@mang.canterbury.ac.nz.

Many traditional analyses of electricity firms who operate simultaneously in physical and financial markets only consider the effect that long-term contracts have on spot market behaviour . We investigate the reverse dynamic, where the behaviour of the generation firm, in the spot market, has an effect on consumers' demand for contracts.

3 — Strategic Pricing in Thermal Systems: A Bilevel Programming Approach
Marcia Fampa, Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, 21945-970, Brazil, fampa@cos.ufrj.br.

In recent years the energy industry all over the world has been undergoing some changes in its market and regulatory structure. A basic trend in this restructuring process has been to promote competition in generation, through the replacement of traditional operation procedures, based on centralized optimization, by market-orien dispatch and spot price payment in a wholesale energy market.

■ MC23

Center-Room L

Threats to Life and Limb

Cluster: Aviation
Invited Session

Chair: Arnold Barnett, MIT, Cambridge, MA, 02139-4307, USA, abarnett@mit.edu

1 — ER Overcrowding: Symptom of an Unhealthy Hospital
Linda Green, Graduate School of Business, Professor, New York, NY, 10027, USA, lvg1@columbia.edu.

Since 9/11, ER's have come under closer scrutiny as hospitals' ability to adequately respond to terrorist attacks has become a critical national issue. Yet, even before 9/11, there were reports of increased ER overcrowding and ambulance diversions. We consider whether ER's are capable of effectively dealing with emergencies, large or small, and how to improve their performance .

2 — Emergency Response to a Smallpox Attack
Edward H. Kaplan, Yale School of Management, Beach Professor of Management Sciences, New Haven, CT, 06520-8200, USA, edward.kaplan@yale.edu., David L. Craft, Lawrence M. Wein

We model the number of infections and deaths that would occur in the event of a smallpox bioterror attack in a large city as a function of response policy, and consequently suggest which policies will work best. The operations involved in such policies matter every bit as much as the epidemiology of disease transmission and progression.

3 — Factors Contributing to the Exponential Growth of the US Incarceration Rate
Alfred Blumstein, H. John Heinz III School of Public Policy and Management, PA, 15213, ab0q@andrew.cmu.ed.

After 50 years of impressive stability, the US incarceration rate has quadrupled over the past 25 years. We examine factors contributing to this growth: more crime, more arrests per crime ("police efficiency"), more prison commitments per arrest "prosecutorial/judicial toughness"), or longer time served (longer sentences, tougher parole boards).

4 — The Cost-Effectiveness Of Violence Prevention: Lessons From Uncertainty
Jonathan Caulkins, H. John Heinz III School of Public Policy, caulkins@andrew.cmu.edu.

Cost-effectiveness studies have indicated that prevention might compare favorably with incarceration in terms of crimes averted per program dollar. However, evaluations to date have not addressed the implications of uncertainties inherent in data and methodological limitations. This paper uses OR/MS methods to derive policy implications stemming from that uncertainty.

■ MC24

Hilton-Pacific

INFORM-ED CASE COMPETITION 2002 - Finalists 1&2

Sponsor: Education
Sponsored Session

Chair: Christopher Zappe, Bucknell University, zappe@bucknell.edu

1 — INFORMS 2002 Annual Case Competition

During this special open session, the first two of four finalists in the INFORMS 2002 Annual Case Competition will deliver 30-minute presentations of their entries before a panel of judges . The judges will select the winning entry from the cases presented during this session and the following session.

■ MC26

Hilton-San Carlos I

Planning and Purchasing Service Capacity

Contributed Session

Chair: Abraham Seidmann, Simon School of Business, University of Rochester, Rochester, NY, 14627, United States, seidmannav@simon.rochester.edu

1 — Electricity Capacity Expansion Using the BONUS Algorithm
Kemal Sahin, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, khsahin@andrew.cmu.edu., Urmila Diwekar

Demand uncertainties can result in electricity shortages and blackouts, even in developing countries, as has been seen recently. This work presents a nonlinear capacity expansion problem solved using the BONUS algorithm.

2 — Algorithms for Managing a Portfolio of Long Term Service Agreements (LTSA)
Aparna Gupta, Rensselaer Polytechnic Institute, Troy, NY, 12180, U.S., guptaa@rpi.edu., Srinivas Bollapragada, Chaipat Lawsirirat

Long-term service agreements spanning 10-20 years are becoming popular for the maintenance of capital intensive equipment such as gas turbines and aircraft engines. We develop algorithms to manage a portfolio of such contracts by efficiently planning the maintenance and repair operations to minimize the total maintenance costs.

3 — Forward and Spot Buying: Yield Management of Information Goods
Abraham Seidmann, Simon School of Business, University of Rochester, Rochester, NY, 14627, United States, seidmannav@simon.rochester.edu., Pavan Gundepudi, Nils Rudi

Our paper considers a firm that offers an information good through spot buying, forward buying at a reduced price, or a combination of the two and addresses its yield management problem when it is either a price-taker or a price-setter. The analysis is based on a novel consumer behavior model.

4 — Integer LP Models for Establishing Service Operating Hours
Avi Dechter, California State University, Northridge, Northridge, CA, 91330-8245, United States, adechter@csun .edu.

Establishing operating hours is at once a capacity management decision, as it determines the time availability of capacity, and a demand management decision, as it affects the pattern of the demand. When selecting its operating hours, the organization must consider both the cost of keeping the service open and the loss incurred by leaving it closed. This paper uses integer linear programming formulations to explore these relationships and to help rationalize the operating hours decision.

5 — Solving a Generalized Parallel Replacement Problem
Joseph Hartman, Lehigh University, Bethlehem, PA, 18015, USA, jch6@lehigh.edu.

The parallel replacement problem under economies of scale may be modeled as a fixed charge network problem and solved using flow pack inequalities. We examine a generalized version of the problem in which assets may not contribute equally to demand, complicating the integer programming solution.

■ MC27

Center-Room C2

Competition in Supply Chains I

Contributed Session

Chair: Yue Dai, Department of Industrial Engineering, NC State Univ., Raleigh, NC, , 27606, U.S.A, ydai2@eos.ncsu.edu

1 — Game Theoretic Analysis of a Distribution System with Customer Market Search
Yue Dai, Department of Industrial Engineering, NC State Univ., Raleigh, NC, 27606, U.S.A, ydai2@eos.ncsu.edu., Henry L.W. Nuttle, Shu-Cherng Fang, Xiuli Chao

We consider distribution systems where customers go to other retailers when a stockout occurs at one retailer. Necessary and sufficient conditions are given for the existence of unique Nash equilibrium and a computational method to calculate the Nash equilibrium is given. We also discuss optimal strategies in the Stackelberg game

2 — Dynamic Oligopoly among Competing Suppy Chains
Qiaohai Hu, Case Western Reserve University, Cleveland, OH, 44106, USA, qxh3@po.cwru.edu., Matthew J. Sobel

We model competing manufacturer-retailer supply chains with an infinite-horizon discounted sequential game and characterize some of the resulting equilibrium points. Members within a supply chain are both cooperators and competitors so they have incentives to cooperate, although they are pursuing their own interests.

3 — Pricing Game in Yield Management to Compete for Customers
Yue Dai, Department of Industrial Engineering, NC State Univ., Raleigh, NC, 27606, U.S.A, ydai2@eos.ncsu.edu., Henry L.W. Nuttle, Shu-Cherng Fang, Xiuli Chao

We consider the pricing strategies for a supply chain where retailers sell substitutable products. The demand of each retailer depends on all of the retailers' prices. Game theoretic approach is used to analyze the systems with deterministic and stochastic demand. The existence and uniqueness conditions of Nash equilibrium are given.

4 — Incentive Contracts, Sourcing Decisions and Information: The role of local content requirements
Francisco Veloso, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, fveloso@cmu.edu.

This paper explores the role of local purchasing requirements in the context of asymmetric information. Most literature treats domestic purchasing regulation as a constraint for the profit maximizing agent. This article looks at information properties and characteristics of these policies. First, it presents the contract a government may offer with common knowledge; then it analyses bundles of contracts and rent extraction with asymmetric information. A case for the auto sector is presented.

■ MC28

Center-Ballroom A1

Beyond Coordinating Contracts: Market Entry Games and Incomplete Contracts

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Sudheer Gupta, University of Michigan Business School, Assistant Professor, Ann, Arbor, MI, 48109, USA, sudheer@umich.edu

1 — Market Entry Decisions Under Incomplete Information
Scott Carr, The Anderson School, UCLA, Los Angeles, CA, 90095-1481, USA, scott.carr@anderson.ucla.edu.

New markets often require substantial irreversible investment - e .g., product design costs - prior to the availability of accurate market information. We analyze a model of multiple firms' investment decisions for an uncertain market when information about competitors intentions and beliefs is incomplete.

2 — Property Rights, Multiple Contracting Arrangements and Part Characteristics in Luxury Automobiles
Sharon Novak, Northwestern University, Evanston, IL, 60208-2001, USA, novak@kellogg.nwu.edu.

Contracting between a manufacturing firm and a parts supplier is modeled using an incomplete contracting framework . Asset ownership in product development is analyzed with respect to its effect on investment. The merits of this approach are argued using evidence from an original study of parts contracting in the automotive industry.

3 — Incomplete Contracts as Shared Actions with Different Beliefs
Sudheer Gupta, University of Michigan Business School, Assistant Professor, Ann Arbor, MI, 48109, USA, sudheer@umich.edu.

Contractual incompleteness is typically explained as stemming from transaction costs, complexity of the environment, or indescribable contingencies. We propose an alternative explanation. We argue that incomplete contracts arise because of differences in people's beliefs and views of the world. A game theoretic model and a new solution concept are developed to formalize this notion.

■ MC29

Center-Ballroom A5

New Results for Perishable Inventory Systems

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Steven Nahmias, Santa Clara University, Santa Clara, CA, 95053, snahmias@scu.edu

1 — A Perishable Inventory System with Random Batch Arrivals and Random Batch Demands
Steven Nahmias, Santa Clara University, Santa Clara, CA, 95053, snahmias@scu.edu., David Perry, Wolfgang Stadje

We consider a perishable inventory system in which the shelf life of each item is 1. The model is suggested by the operation of a blood bank, in that the demand and the replenishment processes are assumed to be independent compound Poisson processes. An item that has not been demanded before it reaches age 1 is outdated, and exits the system. We determine analytically several characteristics of the system, including expected on-hand inventory, expected unsatisfied demands, and expected outdating. These characteristics could then be used to optimize the operation of the system.

2 — Estimating the Surrender Value of a Perishable Inventory System with Random Input and Output: An Actuarial Approach
Steven Nahmias, Santa Clara University, Santa Clara, CA, 95053, snahmias@scu.edu., David Perry, Wolfgang Stadje

We consider a perishable inventory system in which each item has unit lifetime, and in which the replenishment and demand processes are independent Poisson processes. Unused items are outdated, and unsatisfied demands are lost. Oldest items are issued first to meet demands (i.e. a FIFO issuing policy). The goal is to estimate the "surrender value" of the system. That is, we assume that after a time, the entire system is sold. The surrender value is the value of the inventory on hand plus the actuarial benefits minus the actuarial costs of system at a future time.

3 — Twenty Years of Perishable Inventory Research: An Update
Steven Nahmias, Santa Clara University, Santa Clara, CA, 95053, snahmias@scu.edu., David Perry, Wolfgang Stadje

Twenty years ago, the first author published a review of the state of the art of perishable inventory theory. Since that time, researchers have taken the field in several new directions. The purpose of this talk is to briefly review the body of work described in the Operations Research piece published in 1982, and discuss some of the directions that the field has taken since that time. This talk is a prelude to monograph that will be developed by these writers.

■ MC30

Center-Ballroom A6

Multi-Echelon Inventory Systems

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Saifallah Benjafaar, University of Minnesota, Minneapolis, MN, 55455, USA, saif@me.umn.edu

1 — Optimal Policies for Multi-Echelon Inventory Systems with a Service Constraint
Kevin Shang, Duke University, khshang@duke.edu., Jing-Sheng Song

We consider a periodic-review, multi-echelon inventory system with random demands. There are constant leadtimes between stages and each stage incurs a fixed plus linear order cost and a linear holding cost. Instead of backorder costs, we consider a fill-rate constraint in each period. Our objective is to minimize the expected total discounted cost for both finite and infinite horizons while satisfying the pre-specified fill-rate target. We show that the structure of the optimal policy is basically the same as in the backorder-cost model.

2 — Inventory and Pricing Decisions in a Two Stage Serial System

with Deterministic Demand
Robin Roundy, Cornell University, robin@orie.cornell.edu., Rachel Zhang, Roman Kapuscinski

We consider joint inventory and pricing decisions in a two-stage system involving a manufacturer and retailer. At any time t, the manufacturer quotes a wholesale price and the retailer then decides the quantity to order and the selling price. We derive the optimal strategies for both the manufacturer and the retailer .

3 — Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Systems
Saifallah Benjafaar, University of Minnesota, Minneapolis , MN, 55455, USA, saif@me.umn.edu., Mohsen Elhafsi

We consider the problem of allocating demand arising from N items to M production facilities with finite capacity and load-dependent manufacturing lead times. We consider two types of demand allocation, one in which we allow the demand for a product to be split among multiple facilities and the other in which demand from each product must be entirely satisfied by a single facility. In each case, we present models and solution procedures to determine the optimal allocation of demand to facilities and the optimal inventory level for products at each facility.

4 — Allocation of Supply Contracts with Service Guarantees
Fernando Bernstein, Fuqua School of Business, Durham, NC, 27708, USA, fernando@mail.duke.edu., Francis de Vericourt

A set of firms wants to establish long-term contracts with a group of suppliers. Each supplier's abilitiy to process the firms' requests is constrained by her production capacity. When specifying the contracts, firms need to stipulate service delivery guarantees. We determine which set of contracts is allocated to each supplier.

■ MC31

Center-Room J3

Open Source Optimization Software

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Brian Borchers, New Mexico Tech, Socorro, NM, 87801, USA, borchers@nmt.edu

1 — The DIRECT Algorithm for Global Optimization
Joerg Gablonsky, The Boeing Company, Seattle, WA, 98124-2207, USA, joerg.m.gablonsky@boeing.com.

We will describe the DIRECT algorithm for global optimization, and some extensions to it. These extensions either improve the applicability of the method, or its performance. We will then describe our implementation, and give performance results both for common test problems, and on some industrial problems.

2 — BonsaiG: Blending LP and Constraint Propagation
Lou Hafer, Simon Fraser University, Burnaby, BC, V5A 1S6, Canada, lou@cs.sfu.ca.

bonsaiG is an open-source MIP code which integrates constraint propagation with standard LP-based branch-and-bound. The talk will discuss implementation and performance, and also provide some comments on open-source development.

3 — lp_solve
Michel Berkelaar, Magma Design Automation, Eindhoven, Netherlands, michel@magma-da.com.

Lp_solve is a free (Mixed Integer) Linear Program solver, released under the Lesser GNU Public License. This presentation will touch the history and planned future development of lp_solve , its capabilies and limitations.

4 — SOSTOOLS — Sum of Squares Optimization Toolbox for MATLAB
Stephen Prajna, California Institute of Technology, Pasadena, CA, 91125, USA, Pablo A. Parrilo, Antonis Papachristodoulou

SOSTOOLS is a free MATLAB toolbox for solving sum of squares optimization programs. It can be used to solve various continuous and combinatorial optimization problems. We present the features of SOSTOOLS and illustrate its usage with some examples. Hands-on experiences with developing and maintaining SOSTOOLS are also addressed.

■ MC32

Center-Room J4

OR and the Internet

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: John Tomlin, IBM Almaden Research Center, San Jose, CA, 95120, USA, tomlin@almaden.ibm.com

1 — Bandwidth Regulation Model in Internet Data Centers (IDC) with Service Gateways
Kyle D. Chen, Almaden Research Center, Research Staff Member, San Jose, CA, 95120-6099, U.S.A., kylechen@almaden.ibm.com.

In Internet Data Centers, each one of the customers sharing the same set of storage resources receives the service through a gateway. We present an optimization queueing model that captures the basic behavioral characteristics of applications and produces an optimal plan (enforced at the gateways) for allocating storage bandwidth resources.

2 — Partially Supervised Taxonomy Generation — Case in Point for Integration of Structured & Unstructure
Shivakumar Vaithyanathan, IBM Almaden Research Center, San Jose, CA, 95120, USA, shiv@almaden.ibm.com., David Gondek

We discuss taxonomy generation where the structure of the taxonomy is known, and must be built from the collection of documents such that it is as close to the original taxonomy as possible. In several applications there exist deterministic hierarchies in structured data. It may sometimes be necessary to decompose the documents into a hierarchy that is consistent with these individual hierarchies. This paper will focus on this problem and presents a minimum relative entropy approach.

3 — Traffic, Entropy and the Web
John Tomlin, IBM Almaden Research Center, San Jose, CA, 95120, USA, tomlin@almaden.ibm.com.

It is reasonable to expect that some of the techniques used in road traffic theory would apply to modeling of traffic on the World Wide Web. We discuss the derivation and use of entropy maximizing models for the traffic distribution problem, which calls for the solution of a matrix balancing problem and then apply a similar approach to estimating traffic on the WWW, which results in a hybrid matrix balancing model.

■ MC33

Hilton-University

Sampling and Robustness in Stochastic Optimization

Sponsor: Optimization Section-Stochastic Programming
Sponsored Session

Chair: Tito Homem-de-Mello, Ohio State University, Columbus, OH, 43210-1271, USA, homem-de-mello.1@osu.edu

1 — A Sample Based Approach for Multistage Stochastic Programs
Anton Kleywegt, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, anton@isye.gatech.edu., Alexander Shapiro
Abstract not supplied

2 — A Cutting Plane Algorithm for Minimax Stochastic Programming
Shabbir Ahmed, Georgia Institute of Technology, Assistant Professor, Atlanta, GA, 30332, USA, sahmed@isye.gatech .edu., Samer Takriti

We describe a decomposition based cutting plane algorithm for a class of problems that involve minimizing an expected value objective, where the expectation is with respect to "worst" possible distribution. An application of this minimax stochastic programming approach in managing short-term power contracts is presented.

3 — Stochastic Programming Duality: Applications and Interpretations
Lisa Korf, University of Washington, Seattle, WA, 98195-4350, USA, korf@math.washington.edu.

Dynamic stochastic programming "control" models need to include formulations in which the controller may respond to information exogenous to the system state, and/or partial state information. This requires scenario trees in which each stage includes a description of how information evolves within it. Such formulations are set forth and analyzed.

4 — Stochastic optimization and the cross-entropy method
Tito Homem-de-Mello, Ohio State University, Columbus, OH, 43210-1271, USA, homem-de-mello.1@osu.edu., Reuven Rubenstein

We study a recently proposed method, called cross-entropy optimization, which applies concepts from rare-event simulation into combinatorial problems. We discuss how ideas from the theory of stochastic optimization can be used to define an algorithm and to show its convergence.

■ MC34

Hilton-Plaza

Security Environment

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Vicki Bier, University of Wisconsin, Madison, WI, 53706, USA, bier@ie.engr.wisc.edu

1 — A Bayesian Analysis of the Reliability of Launch Vehicles

Elisabeth M. Pate'-Cornell, Stanford University, Stanford , CA, 94305-4024, USA, mep@leland.stanford.edu., Seth Guikema

We analyze the reliability of 26 families of rockets that are currently in use in the world to launch space systems. Some have a long statistical record, others a very short one. We use different priors to obtain the failure probabilities of a new rocket and of an existing one given the global history.

2 — Fusing Expert Testimony and Data in Damage Prediction

Nozer Singpurwalla, George Washington University, Arlington, VA, 22207, USA, nozer@research.circ.gwu.edu., Yuling Cui

We discuss here a real life scenario involving the damage inflicted by a mine on a target. There are two sources of inputs; hard data and the output from an engineering physics based model. Our approach shows how to pool (or fuse) these two sources of information for enhanced assessments of probabilistic predictions . The approach involves some subtle manipulations of the likelihood function.

3 — Defending Networked Resources Against Intelligent Attacks

Tony Cox, Cox Associates, Denver, CO, 80218, USA, tony@cox-associates.com.

Information assets stored at network nodes can be attacked directly, or indirectly from adjacent nodes. Attacking node i from node j costs the attacker c(i, j), has success probability p(i, j), and success value v(i). A defender can change these parameters by spending money. We develop optimal attack and defense strategies for this network game.

4 — Game-theoretic Models for Critical Infrastructure Protection

Vicki Bier, University of Wisconsin, Madison, WI, 53706, USA, bier@ie.engr.wisc.edu., Vinod Abhichandani

Security involves protection from an intelligent and adaptable adversary. This makes it different from other types of risk management, since protecting one system may cause adversaries to attack systems that have not yet been "hardened"; We apply game theory to understand optimal defensive investments for networked series/parallel systems.

■ MC35

Hilton-Almaden II

Quality Monitoring with Multivariate and Waveform Data

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Yu Ding, Texas A&M University, College Station, TX, 77843-3131, USA, yuding@iemail.tamu.edu

1 — Wavelet-based Data Reduction for Detecting and Classifying Process Faults

J.C. Lu, Georgia Institute of Technology, Professor, Atlanta, GA, 30332-0205, USA, jclu@isye.gatech.edu., U.K. Jung, M.K. Jeong

Our research developed several wavelet-based data reduction procedures with great potential in capturing essential information in the large-size nonstationary antenna signal images . This presentation will derive the asymptotic distribution of the test statistic for validating systematic data patterns used in our meta-data models for process fault detection and classification.

2 — Development of Multivariate Double Sampling X-bar Control Charts

David He, University of Illinois, Chicago, IL, 60607, USA , david-he@uic.edu., Arsen Grigorian

Up to date, no research on multivariate double sampling (DS) X-bar charts has been reported, although their univariate counterparts have shown statistical advantages over traditional Schewhart charts. In this presentation, the development of multivariate DS X-bar charts for process monitoring and diagnosis is reported.

3 — A Practical Approach in Economical Design of Multivariate Control Charts

Behrad Moeinzadeh, University of Cincinnati

We propose a practical method for cost parameter estimation of economical design of control charts by defining the critical values of the parameter(s) and estimating cost parameters. We compare its effectiveness against the ones based on the product specification limits, and Taguchi cost function.

4 — Mode-based Decomposition of Part Quality Error by Discrete-Cosine-Transform with Implementation to Assembly and Stamping System with Compliant Parts

Wenzhen Huang, University of Wisconsin, Madison, WI, USA, huang@cae.wisc.edu., Darek Ceglarek

A discrete-cosine-transformation (DCT) based decomposition method is proposed for modeling part form quality error, which decomposes the error field into a series of independent error modes. Compression, which ensures a compact model, is achieved by correlation reduction or mode truncation based on good energy compaction property of DCT. The part error related to assembly process (rigid body modes) and part distortion during manufacturing (deformation modes) can be separated and identified . DCT has been proven to be equivalent to least square regression with 2D cosine-base for modeling of part variation pattern. Estimation of these parameters in the model has also been developed. The proposed method was applied to model and evaluate assembly and stamping quality errors at one of the US stamping plant.

■ MC36

Center-Room F1

Stochastic Control of Queues

Sponsor: Applied Probability Society
Sponsored Session

Chair: Karl Sigman, Columbia University, ks20@columbia.edu

1 — Penalty Approach in Revenue Management

Garud Iyengar, Columbia University, USA, garud@ieor .columbia.edu.

In this talk we will discuss a penalty based approach for network revenue management. The goal here is to accept/reject customers that request capacities on a number of resources (e.g. flights that are composed of seats on a number of individual legs) in order to maximize the revenue over a fixed horizon. In this setting, the penalty based approach can be viewed as an approximating the value function of the dynamic program associated with the revenue management problem. We show that the penalty approach is within a prescribed bound of the optimal solution provided the individual requests are small enough when compared to the total available capacity and the time horizon is large compared to the interarrival time.

2 — Performance Bounds for Markov Processes via Lyapunov Function Methods

Assaf Zeevi, Columbia University, New York, NY, 10027, USA, assaf.zeevi@columbia.edu., Peter W. Glynn

We present an elementary approach to deriving upper and lower bounds on the steady-state (and transient) expectations of Markov processes. These bounds are useful in many contexts, in particular, analyzing the performance of stochastic service systems, as well as their ``heavy traffic'' (diffusion approximation) counterparts.

3 — Stochastic Admission Control with Queueing

Jan Cosyn, Columbia University, USA, jan.cosyn@columbia .edu., Karl Sigman

Abstract not supplied

4 — Workload Minimization in Re-entrant Networks

Ger Koole, Vrije Universiteit Amsterdam, koole@cs.vu.nl.

The minimization of the total expected workload in re-entrant systems is a challenging problem. The main reason is the high dimensionality of the problems. We propose a method based on policy iteration in which we approximate the values of the optimality equation using the power series algorithm. This gives an efficient and accurate method for systems with up to 10 production nodes. This is considerably more than what is achievable using a direct optimization method such as value iteration or policy iteration. We show this using numerical results. At the same time we were able to speed up the power series algorithm through a number of improvements.

■ MC37

Center-Room J1

Modeling Failure Distributions

Contributed Session

Chair: Rong Li, School of Industrial Engineering, Purdue University, West, Lafayette, IN, 47907, USA, li25@purdue.edu

1 — Renewal Approach to Waiting Times for Exchangeable Events

Thomas Spencer III, New Jersey Institute of Technology, Department of Mathematical Sciences, Newark, 07102-1982, USA, tspencer@adm.njit.edu., Srinivasan Balaji

In this talk a limit theorem for a sequence of exchangeable events/random variables will be established by using Fubini's theorem for exchange of integrals in a crucial way. Applications to waiting times for exchangeable sequences will be elucidated. Finally a renewal apprach to the analysis of waiting times will be discussed.

2 — Estimate the Renewal Time Distribution Without Renewal Counts

Laurence L. George, Problem Solving Tools, Livermore, CA, 94550-5852, USA, pstlarry@attbi.com.

Nonparametric maximum likelihood estimator (npmle) of the inter-renewal time distribution, without renewal counts. Use the installed base and renewal counts per calendar interval, without knowledge of whether renewal was first, or second, or... Npmle is similar to Kaplan-Meier npmle except that failures are renewed. Firestone tire example.

3 — Residual Life Distributions from Component Degradation Signals: A Bayesian Approach

Rong Li, School of Industrial Engineering, Purdue University, West Lafayette, IN, 47907, USA, li25@purdue .edu., Mark A. Lawley, Jennifer K. Ryan

We develop Bayesian updating methods using real-time condition monitoring information to update stochastic parameters of degradation models. We use these degradation models to develop closed form residual life distributions for the monitored device. We apply these degradation and residual life models to degradation signals obtained through accelerated testing of bearings.

4 — On The Suitability Of The WEIBULL Distribution For The Approximation Of Machine Failures

Oliver Rose, University of Wuerzburg, Assistant Professor , Wuerzburg, D, 97074, GERMANY, oli@dierosen.de., Alexander Schoemig

The reliability of semiconductor manufacturing equipment very specific. Some tools may be down 30-40% of the time, hence appropriate modeling of equipment and process failures is a must to de-rive meaningful output performance measures. In this research we investigate how the Weibull distribution is suited as an alternative to common approaches. We present an algorithm that automatically calculates Weibull parameters from machine data based on the SEMI E10 standard.

■ MC38

Center-Room N

Student Paper Contest I

Sponsor: Railroad Applications Section
Sponsored Session

Chair: Chip Kraft, chipKraft@aol.com

■ MC39

Center-Room K

Advances in Dynamic Traffic Assignment Modeling Part II

Sponsor: Transportation Science Section
Sponsored Session

Chair: Michael Florian, University of Montreal, Montreal, QC, H3C 3J7, Canada, mike@crt.umontreal.ca

1 — Traffic Flows and Queueing Networks

Tom Van Woensel, UA-UFSIA, Antwerp, B2000, Belgium, Tom .VanWoensel@ufsia.ac.be., Bart Wuyts, Nico Vandaele

This paper presents the modelling of uninterrupted traffic flows by means of queueing theory. In past work we developed queueing models that can be used to describe traffic flows at any particular point on the road. This paper models a road as a network of queues. The results obtained from this queueing network model depend mainly on the properties of the queueing model used, in particular on the distributions of the arrival and service processes. These properties are investigated in detail. We also present computational results.

2 — A Linear Program for the User Optimal Dynamic Traffic Assignment Problem

S. Travis Waller, University of Illinois, Urbana, IL, 61801, stw@uiuc.edu., Satish Ukkusuri

This presentation will address the development of an analytical approach for User Optimal Dynamic Traffic Assignment. The approach employs linear programming and guarantees an optimal solution for the case of a single destination. Proofs of correctness, properties, and numerical insights will be presented . Furthermore, as the approach uses linear programming, many significant extensions exist, and will also be discussed.

■ MC40

Center-Room G

A Cross Industry Study of the Impact of Business Practices on the Transportation and Logistics Industries

Sponsor: Logistics Section
Sponsored Session

Chair: Jeffrey Liker, University of Michigan, Ann Arbor, MI, 48109, USA, liker@umich.edu

1 — The Firm Boundary Decision in Automotive Transportation and Logistics

Kingsley A. Reeves, Jr., University of Michigan, Ann Arbor, MI, 48019, kareeves@umich.edu.

This talk focuses on the relationship between customers and suppliers of transportation and logistics services in automotive. The ultimate research objective is to determine the optimal governance structure in a customer-supplier relationship given a specific environmental context. The initial focus will be on the automotive industry where the adoption of the lean manufacturing philosophy has placed an emphasis on just-in-time deliveries and thus, elevated the importance of the transportation and logistics function. Various relationships will be analyzed (e.g. markets, partnerships, vertical integration, et cetera) in the context of the firm operating environment to examine their comparative efficiency on the basis of factors such as cost, timing, and quality.

2 — A Tale of Two Attempts of JIT Logistics in Auto

Jeffrey Liker, University of Michigan, Ann Arbor, MI, 48109, USA, liker@umich.edu.

Toyota made famous the JIT logistics system. They have managed to effectively export it to the United States even with our long transportation logistics using cross-docking and other means. Their success is contrasted to the failed attempt of another automotive company to go to JIT.

3 — Collaborative Logistics: The Food Industry Case

K. K. Sinha, University of Minnesota, Professor, Minneapolis, MN, 55455, U.S.A., ksinha@csom.umn.edu.

Logistics used to be viewed one company at a time. The field of collaborative logistics recognizes that the connections between buyers, suppliers, and logistics providers are central to effective logistics practices. Examples are provided from the food industry.

4 — Profiling Best Practices: A Cross-center and Cross-Industry Exploratory Analysis of Box-plant Trucking -logistics in the Paper Industry

Patrick S. McCarthy, Georgia Institute of Technology, J.C. Lu, Maciek A. Nowak

There is little publication about trucking logistics operations in the paper industry, which is undergoing many changes to improve their competitiveness. This presentation identifies challenges in survey studies in this area, the best practice research agenda and the potential impact of investigation outcomes to the paper and the trucking industries

■ MC41

Center-Room M

Facility Location

Contributed Session

Chair: Chi-Guhn Lee, University of Toronto, Toronto, M5S 3G8, Canada, chi@mie.utoronto.ca

1 — The Effect of Regional Taxes in the Design of Logistics Networks in Brazil

Hugo T. Yoshizaki, University of Sao Paulo, Sao Paulo, 05508-900, Brazil, hugo@usp.br., Jorge L. Biazzi, Celso M. Hino

In Brazil, differences in state taxes lead to less efficient logistics to minimize total costs, placing factories or depots far from demand. Applying a milp model in a realistic scenario, we concluded that CPG manufacturers should accept operational costs 12% higher than the case where taxes are the same.

2 — Generalized Quadratic Assignment Problem

Chi-Guhn Lee, University of Toronto, Toronto, M5S 3G8, Canada, chi@mie.utoronto.ca., Zhong Ma

Generalized Quadratic Assignment Problem (GQAP) is a generalization of the Quadratic Assignment Problem (QAP). In the GQAP, each location accommodates more than a single facility until there is not enough space to accept more facilities. We propose a brand-and-bound method to solve the GQAP optimally.

3 — A Two-stage Production and Distribution Model for Multiple Commodities

Eleni Pratsini, ETH Zurich, Zurich 8092, CH, 8092, Switzerland, pratsini@ifor.math.ethz.ch.

This study considers simultaneous strategic decisions of plant and warehouse location and tactical decisions on production recipes per plant and transportation mode selection. Lagrangean relaxation is used to solve the model, and the effects of combinations of decisions and stochastic demand are examined using data based on a real case.

4 — Optimal Contiguous Clustering -- Application to Determine Newspaper Zones

Anuj Mehrotra, University of Miami, Coral Gables, FL, 33124-8237, USA, anuj@miami.edu., Michael A. Trick, Joseph Shantz

We present an optimization based procedure to generate geographically contiguous clusters. We illustrate our procedure by developing delivery zones for a newspaper's community section. Our procedure demonstrates how optimal zoning can significantly enhance the value of consumer segmentation.

■ MC42

Fairmont-Belvedere

Customer Management Issues

Sponsor: College on Marketing Section

Sponsored Session

Chair: Jonathan Lee, Indiana University, Indianapolis, IN, 46202, USA, jonalee@iupui.edu

1 — Analyzing the Word-of-Mouth Effect in Customer Lifetime Value and Its Implications to Customer Relationship Management
Jonathan Lee, Indiana University, Indianapolis, IN, 46202 , USA, jonalee@iupui.edu., Janghyuk Lee, Lawrence Feick

Customer equity is the lifetime value of the firm's customer base . The purposes of this paper are (1) to show the importance of word-of-mouth in terms of information sources, (2) to examine the relationship between revenues and transaction patterns based on both attitudinal loyalty and actual behavior such as retention and consumption changes, (3) to show the unique impact of word-of-mouth on transaction patterns and customer revenue, and (4) to illustrate managerial implications in practicing CRM. Our study is based on the mobile phone service market in France.

2 — Acquire or Retain? This is the Question
Min Ding, Pennsylvania State University, University Park, PA, 16802, USA, mqd9@psu.edu.

Optimal product promotion requires a balance between retaining existing customers and acquiring new customers. The right balance , however, are not intuitively clear, especially when competing against another firm in a multi-period market. This paper studies this problem in the framework of a repeated game.

■ MC43

Center-Room H

Revenue Management, Routing, and Pricing

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: Darius Walczak, PROS Revenue Management, Scientist, Houston, TX, 77002, USA, dwalczak@prosrm.com

1 — Presentation by Marc Meketon
Marc Meketon, Multimodal Inc, Vice President, Princeton, NJ, 08540, USA, marc@multimodalinc.com.
Abstract not supplied

2 — Joint Design and Pricing on a Network
Luce Brotcorne, University of Valenciennes- LAMIH/ROI, Pr , Valenciennes Cedex 9, 59313, France, luce .brotcorne@univ-valenciennes.fr., Martine Labbe, Patrice Marcotte, Gilles Savard, Mustapha Bouhtou

We consider a bilevel model where a carrier strives to maximize its revenue by choosing among a subset of potential connections which connections are effectively opened and associated optimal tariffs while taking into account the cost minimizing behaviour of the customers. We propose a primal dual algorithm and present numerical results.

3 — Passenger Choice Impacts of Airline O-D Control
Peter P. Belobaba, MIT International Center for Air Transportation, Principal Research Scientist, Cambridge, MA, 02139, belobaba@MIT.EDU.

Using the Passenger Origin Destination Simulator (PODS), we simulate the shifts in passenger booking behavior that occur when competing airlines implement O-D controls for network RM. This presentation describes the impacts on traffic flows and revenues associated with increased seat availability for certain itineraries, as compared to other effects such as passenger sell-up, recapture, market share shift and spill.

4 — On the Equivalence of Pricing and Discount Allocation Problems in Revenue Management
Richard Chatwin, Delphinity, Mountain View, CA, 94040, USA, richard@delphinity.com.

Consider a continuous-time model of an airline taking bookings in multiple fare classes for a single-leg flight. Potential customers arrive according to a Poisson process. In the (pure) pricing problem, customers make the booking decision based on the airline's set price. In the discount or seat allocation problem, the airline makes the booking decision based on the customer's revealed reservation price or fare class. We demonstrate that these two types of problem are effectively equivalent.

■ MC44

Center-Room B2

Probabilistic Models of Air-to-Air Engagements and Campaigns

Sponsor: Military Applications Society
Sponsored Session

Chair: David A. Lee, Technology Assessment Group, McLean, VA, 22102, dlee@lmi.org

1 — Effects of ISR Resources and Related Errors on Combat Resource Allocation Modeling
Bill Cotsworth, AEM Services, Inc., Englewood, CO, 80111, cotsworth@aol.com., Dave Dwyer

A novel approach to modeling combat resource allocation in the presence of ISR assets was investigated. The effect of associated ISR error on the time evolution and end states of a simulated scenario will be presented. The potential to evaluate strike and ISR asset trade-offs will also be disscussed.

2 — Using Stochastic Engagement Models in Modeling Air Superiority Campaigns
David A. Lee, Technology Assessment Group, McLean, VA, 22102, dlee@lmi.org.

The paper treats the use of some familiar stochastic models of air-to-air engagements, and some new ones, in modeling campaigns for air superiority. In the campaign model discussed, one side launches forces to maximize an attacker's payoff function, and the other counters to maximize a defender's payoff function.

3 — Analyzing Large State-Space Models of Air Combat with ASSIST, SURE, & STEM
Robert V. Hemm, Logistic Management Institute, McLean, VA , 22102-7805, USA, rhemm@lmi.org.

Stochastic models of air combat may involve large state spaces, i .e., when fighters' states include their numbers of available missiles. We show how ASSIST, STEM and SURE, programs developed by NASA for Markov analyses of complex reliability issues, can be adapted to treat stochastic air combat models.

■ MC45

Center-Room B3

Military Applications Contributed Papers: Optimizing Ground Operations

Sponsor: Military Applications Society
Sponsored Session

Chair: Phillip Djang, Army Research Laboratory, WSMR, NM, pdjang@psl.nmsu.edu

1 — Countersmuggling Effectiveness
Stanley Erickson, LLNL, Livermore, CA, 94550, USA, serickson@llnl.gov.

This paper describes a methodology for evaluating the effectiveness of smuggling and countersmuggling tactics and equipment for the situation where the smuggled goods are high value and the mode of smuggling is penetration of land borders at non-customs checkpoints. The metric is loss of material is the metric used in the evaluation. Various types of border sensor, patrol choices and alarm responses are evaluated versus a single (non-useful) smuggling tactic to illustrate the methodology.

2 — Tank Training For Future Soldiers
Brad Rudy, United States Military Academy, West Point, NY , United States, x35634@usma.edu., Stephen DuPerre, William Brooks, Jade Barney

Tank Table VIII is the premier measuring tools for an M1 tank crew's effectiveness; however, conducting Table VIII impacts heavily on resources. An embedded trainer allows soldiers to practice gunnery in a simulated environment on an actual vehicle. Our research expands upon current efforts to develop an embedded training capability for the M1A2SEP and the M2A3 Bradley. We will develop a decision support framework capable of supporting analysis of a broader set of embedded training issues.

3 — Tankers in the Air Force
Jesper Stubbendorff, USAFA, Cadet, USAFA, CO, 80841, USA, c03 jesper.stubbendor@usafa.edu.,

The force structure in the Air Force is constantly under review for efficiency. One topic of interest is exactly how many air refueling aircraft, or tankers, the Air Force really needs. A model is under development to analyze potential wartime scenarios and account for the number of refueling aircraft required for deployment and theater-based support for a given scenario.

■ MC46

Center-Room C3

Nonlinear Programming Software

Cluster: State of the Art in Optimization Software
Invited Session

Chair: Hande Benson, U.S. Naval Academy, Annapolis, MD, 21402, USA, hbenson@usna.edu

1 — Two Approaches for Nonlinear Programming
Jorge Nocedal, Northwestern University, Richard Waltz, Richard Byrd, Nick Gould

The focus of this talk is on comparing the performance of a new active-set algorithm for nonlinear programming with that of an established interior point method (KNITRO). The strengths and weaknesses of each approach will be highlighted. Special consideration will be given to the effects of degeneracy (in the active set approach) and on the choice of the initial point (in the interior point approach). The talk will conclude with list of open research questions suggested by this work.

2 — Designing an Interior-point Algorithm for Large-scale Nonlinear Programming
Hande Benson, U.S. Naval Academy, Annapolis, MD, 21402, USA, hbenson@usna.edu., David Shanno, Robert Vanderbei

In this talk, we will discuss some of the features of an efficient interior-point algorithm for solving large-scale nonlinear programming problems. We will focus on slack variables and infeasibility/unboundedness detection. Extensive numerical results on two interior-point algorithms (LOQO and KNITRO) will be provided.

3 — The SOL Optimization Software
Walter Murray, Stanford University, Professor, Stanford, CA, 94305, USA, walter@stanford.edu., Philip Gill, Michael Saunders

A description of the current contents and of new developments of the SOL software library will be given. We shall also discuss the use and means of access to SOL software, which has undergone a radical transformation in recent years. This development, which includes embedding the software within a sophisticated GUI is likely to continue.

■ MC47

Center-Ballroom A8

Software Demonstration Session 07

Cluster: Software Demonstrations
Invited Session

1 — LINDO Systems, Inc. — Innovative Software Tools for Optimization Modeling
Mark Wiley, LINDO Systems, Inc., Chicago, IL, 60622, mwiley@lindo.com.

Innovative Software Tools for Optimization Modeling - See how easy it is for you to quickly build complex optimization models, effortlessly access data from Excel and databases, and seamlessly embed a solver into your own applications. LINDO Systems will demonstrate the latest enhancements to their popular linear, integer, quadratic, and general nonlinear optimization modeling tools.

2 — Maximal Software, Inc. — Optimization Modeling in Distributed Applications: How New Technologies Allow OR to Provide Web-Based Services
Bjarni Kristjansson, Maximal Software, Inc., Arlington, VA, 22201, bjarni@maximalsoftware.com.

Optimization Modeling in Distributed Applications: How New Technologies Allow OR to Provide Web-Based Services - We will demonstrate how optimization and modeling services can be packaged into component libraries based on industry standards such as ActiveX/Com and JavaBeans, allowing seamless integration of optimization into easily maintainable applications. Through new web-based standards, an environment is now created where distributed applications based on components are not only feasible, but also relatively easy to implement. We will look at different scenarios on how innovative technologies such as XML and SOAP are creating new opportunities for solving optimization problems within distributed applications.

Monday 4:30 - 6:00pm

■ MD01

Center -Ballroom A4

Tutorial: Value Function Approximation in Dynamic Programming: History and Recent Developments

Invited Session

1 — Value Function Approximation in Dynamic Programming: History and Recent Developments
Ben Van Roy, Stanford University, Professor, Stanford, CA , USA, bvr@stanford.edu.

Dynamic programming value function approximation has been a subject of discussion in the operations research literature since the 1950's. However, progress in this area has accelerated significantly over the past two decades, fueled to a large extent by activity in artificial intelligence. In this talk, we will overview algorithms for value function approximation and some of the history behind them. We will also discuss in greater depth recent developments involving a linear programming formulation for value function approximation. The talk will touch on applications in backgammon, finance, scheduling, queueing, and web server allocation.

■ MD02

Fairmont-Cupertino

Case: Technology Commercialization

Cluster: Practice Track
Invited Session

Chair: Chulho Park, SRIC-Business Intelligence

1 — Technology Commercialization with a Case study of the SRI Way of Commercialization
Chulho Park, SRIC-Business Intelligence

SRI Consulting Business Intelligence has developed a process of Integrated Technology Commercialization Management for an R&D organization, that provides a comprehensive framework and process for creating values based on intellectual property assets developed by its R&D functions. This framework encompasses and coordinates every organizational function and issue that touches on technology commercialization including company vision and motivation, business model, profit sharing model, commercialization strategy, licensing, venture start-ups and incubation. The framework will be introduced through a case of the SRI way of technology commercialization.

■ MD03

Fairmont-Fairfield

Simulation Methodology

Contributed Session

Chair: Bruce Shultes, University of Cincinnati, Assistant Professor, Cincinnati, OH, 45221-0072, USA, Bruce.Shultes@uc.edu

1 — A Comparison of Several Approaches for Simulating Non-Markovian Systems
Xudong Yang, University of Cincinnati, Cincinnati, OH, 45220, USA, yang_sheldon@yahoo.com., Bruce Shultes

Uniformization is a powerful approach for simulating non-Markovian systems. Unfortunately, not all stochastic processes are uniformizable. Efficient simulation approaches that utilize importance sampling and uniformization or exponential transformation require systems to be uniformizable. We propose a new approach for simulating non-Markovian systems that relaxes the uniformizable assumption and readily accommodates importance sampling. The power of the method is illustrated through examples .

2 — Utilizing Regenerative Ratios for Deriving Closed-Form Expressions for System Performance
Ramya Dhamodaran, University of Cincinnati, Cincinnati, OH, 45219, USA, dramya13@yahoo.com., Bruce Shultes

Many systems can be exactly or approximately modeled as a Markov chain. Direct derivation of closed-form expressions can be intractable for the expected time until a buffer fills for queueing networks, and the limiting system unavailability or expected time until system failure for repairable network systems . We show that, under certain conditions, regenerative ratios can be used to derive exact expressions for the quantities of interest. This approach is illustrated through several examples.

3 — Batch-Variance Methods for Simulation Output Analysis
Huifen Chen, Chung-Yuan University, Associate Professor, Chung-Li, TA, TAIWAN, huifen@cycu.edu.tw.

We consider batch methods for estimating the variance of the sample variance based on steady-state correlated data. Following the previous work of Ceylan and Schmeiser, we view the batch variance as a batch mean. We show analytically that methods of batch variances have asymptotic results similar to methods of batch means. Specifically, both have the same convergence rate and multipliers of the asymptotic constants; the other parts are analogous. The optimal batch size is discussed.

4 — Improved Latin Hypercube Hammersley Sequence Sampling Technique
Reynold Renyou Wang, Carnegie Mellon University, PhD student, Pittsburgh, PA, 15213, US, renyou@andrew.cmu.edu .

This paper presents a novel improved Latin Hypercube Happersley Sequence (LHHS) sampling technique- LHHS reverse radix leaped LHHS sampling technique (LHHS2). The comparison of LHHS2 with other sampling techniques such as Latin Hypercube Sampling (LHS), orthogonal LHS, optimized LHS and Monte Carlo Sampling technique shows the higher efficiency of LHHS2.

5 — On the Asymptotic Validity of Fully Sequential Selection Procedures for Steady-State Simulation
Seong-Hee Kim, Georgia Tech, Assistant Professor, Atlanta , GA, 30332, USA, skim@isye.gatech.edu., Barry L. Nelson

We present fully sequential procedures for steady-state simulation that select the best of a finite number of simulated systems when ``best'' is defined by the largest or smallest long-run average performance. We provide a framework for establishing the asymptotic validity of such procedures and prove the validity of our procedures.

■ MD04

Hilton-San Carlos II

Data Mining Applications in Customer Relationship Management

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Jianjun Shi, University of Michigan, Ann Arbor, MI, 48109, USA, shihang@umich.edu

1 — Survival Analysis and Customer Relationship Management
Lyn C. Thomas, University of Southampton, Highfield, SO17 1 BJ, UK, l.thomas@soton.ac.uk.

Initially customer relationship management has used propensity tools to find out how likely a customer is to buy another product or move to a rival supplier. However what is more important may be when such events would occur. This talk discusses some examples of using survival analysis techniques like proportional hazards modelling to answer such questions.

2 — Knowledge Discovery from Massive Data in Semiconductor Manufacturing Processes
Jionghua (Judy) Jin, University of Arizona, Tucson, AZ, 85721-0020, USA, jhjin@sie.arizona.edu.

Photovoltaic modules are produced by multistage manufacturing processes. Modules are assembled from cells consisting of several semiconductor layers produced by the roll-to-roll vacuum deposition technology. Data mining methods are discussed for discovering the process knowledge of critical process variables, critical process variation patterns, and their effects on the product quality.

■ MD05

Fairmont-Sacramento

Distinguished Speaker

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Diane Bailey, Stanford University, Stanford, CA, 94305-4026, USA, diane.bailey@stanford.edu

1 — What Happened to Work?
Stephen Barley, Stanford University, Stanford, CA, 94305-4026, USA, sbarley@stanford.edu.

This talk reviews what happened to the study of work in Industrial Engineering and makes a case for why and how Industrial Engineering can reclaim the study of work as we move into a post-industrial, information economy.

■ MD06

Fairmont-Atherton

IT Implementation

Contributed Session

Chair: Martin L. Bariff, IIT-Stuart Graduate School of Business, Chicago, IL, 60661, USA, bariff@stuart.iit.edu

1 — Strategic Management: Guaranteeing Implementation
Rodney Brim, Performance Solutions Technology, Seal Beach , 90740, USA, rbrim@performancesolutionstech.com., James R. Marshall

The Implementation Gap refers to the challenge of making strategy operational on a day-to-day basis using the resource of software. This requires a change on many levels given the priority of the urgent and implementation by everyone in the organization from top managers to front line operatives. This session will describe a rational process which solves The Implementation Gap.

2 — Demonstration That Project Management Software Can Manage the Achievement of Any Goal of Any System in Any Time Frame
James R. Marshall, California State Polytechnic University, Pomona, Pomona, 91768, USA, jmarshall.1@att .net., Rodney Brim

Given appropriately structured data, project management software will manage the achieving of any goal of any system in any time frame--like any other project. Planning data (goals, means, schedules, and required resources) generated using the process described by Marshall, Brim, and Miller will be placed into two project management softwares.

3 — Design and Implementation of a Strategic Management System in a Company
Mustafa Ozkaynak, TUSSIDE, Researcher, Kocaeli, xx, 41401 , Turkey, mozkaynak@tusside.gov.tr.

We report on a company which embarked on establishing a strategic management system in the midst of an economic crisis. Concurrently going through the TQM process, its hybrid culture due to its recent privatization presented a unique challenge. A tougher challenge was the change of the General Manager midway through the effort. We discuss how to cope with such corporate shocks and counter-productive cultural tendencies, and have the rational processes prevail in the end.

4 — Websites = Corporate Persona?
Martin L. Bariff, IIT-Stuart Graduate School of Business, Chicago, IL, 60661, USA, bariff@stuart.iit.edu.

Corporate websites typically are evaluated by degree of attaractiveness, informativeness, and usability. Moreover, this Internet presence represents a microcosim of the corporate persona, e.g., brand, culture, and personality. A model of website signaling drawn from the social sciences, e.g., attribution, communication, and impression formation theories is presented. Metrics and policy implications also are developed.

■ MD07

Fairmont-Piedmont

Model-Based Approaches for Product Family Development

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Vish Krishnan, University of Texas, Austin, TX, 78712, USA, vish.krishnan@bus.utexas.edu

1 — Designing Information Product Families
Wenge Zhu, University of Texas, Austin, TX, 78712, USA, zwenge@mail.utexas.edu., Vish Krishnan

We study the product family strategy for durable information goods monopoly in discrete market segments. A multiple dimensional quality model is proposed. Our results suggest that the best quality differentiating strategy for information product firm is to differentiate on quality dimensions instead of on quality magnitude.

2 — Standalone Benefits, Network Effects and Technology Adoption
Deishin Lee, Stanford University, GSB, Stanford, CA, 94305, USA, deishin@stanford.edu., Haim Mendelson

We model the adoption of a new technology by multiple user types, each characterized by different standalone benefits and network effects of the technology. We study the resulting network dynamics and its implications for the adoption of information technologies from both the vendors' and users' perspectives.

3 — Product Positioning, Pricing and Investments in Design Improvements for Commonality
Sebastian Heese, University of North Carolina, Chapel Hill, NC, 27599-3490, USA, heeseh@bschool.unc.edu., Jayashankar Swaminathan

Researchers have advocated that component commonality can lead to significant costs savings, but it also negatively impacts profitability due to reduced product differentiation and a reduction in overall quality of the products. In this paper, using a stylized model that captures the dependencies between design efforts, quality and manufacturing costs we show that commonality may in fact increase the overall quality of the products in addition to reducing the costs.

4 — Understanding the Interactions of Product and Process using Risk Dynamics Model
Jay Jootar, MIT, Cambridge, MA, USA, jootar@mit.edu., Steven Eppinger

This talk centers on a mathematical model of risk dynamics in the development process of a complex system. The model helps us understand how the dependency characteristics of the product affect the structure and the performance of the optimal process.

■ MD08

Center-Ballroom A2

Information and Optimization in Supply Chain Management

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Markus Ettl, IBM, Yorktown Heights, NY, 10598, USA, msettl@us.ibm.com

1 — Supply Chain Collaboration: Breakthrough Value Creation Opportunities
Rajiv Saxena, Menlo Worldwide Technologies, Redwood City, CA, 94065, USA, saxena.rajiv@menlolog.com.

Menlo Worldwide has been aggressively pursuing collaborative supply chain solutions involving partners either within a, or across multiple supply chains to create a level of value not possible to achieve in traditional non-collaborative scenarios. We will discuss key initiatives and the level of value they offer to collaboration partners.

2 — Optimization of Production Planning and Scheduling for Semiconductor Manufacturing
Brian Denton, IBM Microelectronics Division, Essex Junction, VT, 05452, USA, bdenton@us.ibm.com.

OR methods are used extensively for decision support of production planning in IBM's Microelectronics Division. We describe the practical application of linear programming and heuristics to optimization of large-scale extended enterprise supply-chains in semiconductor manufacturing. Model structure specific to this application is described, and computational experience and future directions are discussed.

3 — Managing the High-Tech Supply Chain through VMI Supplier Relationship
Alexander O. Brown, Xilinx, San Jose, CA, 95124, USA, alex.brown@xilinx.com.

This talk will describe a new supply chain program from Zilinx called "Virtual Direct" to manage ordering, forecasting, and fulfillment across EMS sites and global customers.

4 — The Right Level of Control in an Outsourced Supply Chain
Jeff Flammer, Manugistics, San Mateo, CA, 94404, USA

The trend to outsource critical (but non "core") business processes is accelerating. While the benefits are compelling, there are downsides. As many manufacturers recently learned, outsourcing often removes decision-making authority from liability. During trhis presentation, we will review a framework for the appropriate level of control over outsourced partner decisions that impact your performance.

■ MD09

Center-Ballroom A3

Aspen MIMI Demand Management, Supply Chain Planning, Scheduling and Capable-to-Promise Implementations

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Ann Bixby, Aspen Technology, Houston, TX, 77077, USA, ann.bixby@aspentech.com

1 — Before Supply Chain Planning: Demand Management
Curtis Schultz, Aspen Technology, curtis .schultz@aspentech.com.

Supply chain planning LP models are used in the process industry in a variety of ways, but many times they are used to do high-level supply/demand balancing. So while it is important that these models accurately reflect the constraints of supply, it is just as important that the demand being modeled accurately reflects the business. This presentation will introduce concepts around demand management by discussing the processes and tools some businesses are using today.

2 — Designing and Implementing a Supply Chain Planning System for Chevron Oronite, SA
Ileana Krumme, ChevronTexaco Information Company, San Ramon, CA, USA, ileana.krumme@chevrontexaco.com., Jean-Philippe Mazo

We describe the implementation of a supply chain planning system for Chevron Oronite, a chemical specialty company with over $250MM in annual sales. We discuss specific challenges, ranging from understanding user requirements, to efficient modeling, to efficient testing, to cultural issues. The system is currently in production, and is estimated to have saved $2MM in direct costs (reduced inventories, reduced transportation, etc.). In addition, it saved $1MM in intangible costs.

3 — Linear and Integer Programming Based Scheduling Models for Optimal Beef Production at ConAgra Foods
Ann Bixby, Aspen Technology, Houston, TX, 77077, USA, ann .bixby@aspentech.com., Brian Downs, Betty Peng, Balaji Viswanathan, Mike Self

We will discuss linear programming and mixed integer programming-based scheduling models for beef production. These Aspen MIMI models include scheduling of boxed beef production, offal production, and ground beef blending. The models minimize costs while satisfying as many orders and forecast demands possible, subject to product age requirements and other production constraints.

4 — An LP-Based Capable-to-Promise System for Beef Production at ConAgra Foods
Brian Downs, Aspen Technology, brian.downs@aspentech.com., Mike Self, Ann Bixby, Betty Peng, Balaji Viswanathan, Corbin Porter, Paul Homchick

We will discuss a linear programming-based capable-to-promise system in Aspen MIMI. The system handles several types of transactions, including new order commits, availability queries, changes to orders, and order deletions. The system is capable of reallocating inventory and/or altering the production schedule on the fly to fulfill orders.

■ MD10

Center-Ballroom A7

The Theory and Practice of Rescheduling

Cluster: Scheduling
Invited Session

Chair: Jeffrey Herrmann, University of Maryland, College Park, MD, 20742, USA, jwh2@glue.umd.edu

1 — Rescheduling of Unrelated Parallel Machines in Printed Wiring Board Manufacturing
Michele Pfund, Arizona State University, Tempe, AZ, 85287-5906, USA, michele.pfund@asu.edu., John W. Fowler
Abstract not supplied

2 — A Review of Scheduling Research with Executional Uncertainties
Reha Uzsoy, Purdue University, West Lafayette, IN, 47907-1287, USA, uzsoy@ecn.purdue.edu., Haldun Aytug, Mark A. Lawley, Shantha Mohan, Kenneth McKay

An increasing number of researchers from a variety of different disciplines have examined problems of scheduling with executional uncertainties. We review the basic formulations, principal results and some directions for future research.

3 — Predictive, Stochastic and Dynamic Extensions to Aversion Dynamics Scheduling
Gary Black, Tennessee Technological University, Cookeville, TN, 38505, USA, GBlack@tntech.edu., Kenneth McKay, Sherri Messimer

In real factories, the production environment following a machine disruption is not always the same as beforehand. Lingering impacts may exist. Real schedulers are observed to re-sequence jobs to mitigate these risks. This concept is called aversion dynamics. This research extends a preliminary heuristic by adding predictive, stochastic and dynamic arrival elements to increase the reality of the theoretical scheduling problem.

4 — Rescheduling Dynamic Manufacturing Systems
Jeffrey Herrmann, University of Maryland, College Park, MD, 20742, USA, jwh2@glue.umd.edu.

In a dynamic manufacturing system, rescheduling assigns jobs to resources, schedules their processing, and helps the shop recover when unexpected events disrupt operations. This talks discusses a framework for understanding rescheduling and recent research that studies how the rescheduling frequency affects manufacturing system performance.

■ MD11

Center-Room C1

Scheduling Automated Systems

Contributed Session

Chair: Yun Jiang, Department of Industrail Engineering & Engineering Management, Hong Kong University of Science & Technology, PhD Candidate, Hong, Kong, HK, China, jiangyun@ust.hk

1 — Performance of Virtual Cellular Manufacturing in Machine-Labor Constrained Systems
Nallan C. Suresh, State University of New York, Williamsville, NY, 14221, USA, ncsuresh@buffalo.edu.

The performance evaluations of virtual cellular manufacturing have so far been based on purely machine-limited systems. This paper extends the analysis to dual resource constrained (DRC) systems. Based on simulation investigations and insights from queuing models, conditions under which they compare favorably with traditional job shops are identified.

2 — A Heuristic Algorithm for Part Input into an FMS
Yumin He, Beijing University of Aeronautics and Astronautics, Beijing, 100083, P. R. China, y.he@263.net., Milton L. Smith, Richard A. Dudek

The paper presents an investigation of applying heuristics and dynamic information to the development of a state-dependent and easy to implement algorithm for dynamic part input sequencing in an FMS. Investigative results reveal applicability and effectiveness of the algorithm in improving productivity-based performance of the FMS.

3 — Multi-hoist Cyclic Scheduling with Fixed Processing and Transfer Times
Yun Jiang, Department of Industrail Engineering & Engineering Management, Hong Kong University of Science & Technology, PhD Candidate, Hong Kong, HK, China, jiangyun@ust.hk., Jiyin Liu

We study the multi-hoist cyclic scheduling problem with constant tank processing times and inter-tank transfer times. A polynomial algorithm is developed to obtain the optimal solution by identifying possible optimal cycle lengths and

checking their feasibilities. The feasibility checking is done by constructing hoist assignment constraints and solving single-source shortest path problems.

■ MD12

Fairmont-Regency 1

Cost Effectiveness Analysis in Health Care

Cluster: Health Care
Invited Session

Chair: Amy R. Wilson, Health Services Research and Policy, University of Minnesota, Minneapolis, MN, 55408, USA, arwilson@umn.edu

1 — The Cost Effectiveness of Alternatives to Methadone Maintenance Treatment
Greg Zaric, Ivey School of Business, Assistant Professor, London, ON, N6A 3K7, Canada, gzaric@ivey.uwo.ca.

Methadone maintenance treatment has been shown to be effective at reducing heroin use and in reducing the spread of HIV among injection drug users, yet it has not gained widespread acceptance . We investigate the cost effectiveness of alternatives to traditional methadone programs including rapid detox and prescription methadone.

2 — Treating Hepatitis C in Persons on Methadone Maintenance
Amy R. Wilson, Health Services Research and Policy, University of Minnesota, Minneapolis, MN, 55408, USA, arwilson@umn.edu.

Most current and former injection drug users are infected with hepatitis C. While treatment is available for this disease, this population is not treated at the same rate as is the general population. We propose a decision analytic method to assess the cost effectiveness of treating persons in methadone maintenance and compare to the cost effectiveness of treatment in the general population.

3 — The Cost Effectiveness of Breast Cancer Screening
Sylvia Plevritis, PhD, Stanford University, Assistant Professor, Stanford, CA, 94305, USA, sylvia .plevritis@stanford.edu.

A simulation model is presented that computes the cost-effectiveness of alternative breast cancer programs. The screening programs can be varied in terms of the targeted population, the screening test, the age to start screening, the age to stop screening, and the interval between screening examinations. The model will be applied toward estimating the cost-effectiveness of screening women at high genetic risk for breast cancer with magnetic resonance imaging.

4 — Cost-Utility Comparison
Harold Pollack, Univ. of MI School of Public Health, Asst . Prof. of Health Man. & Policty, Ann Arbor, MI, 48109-2029, USA, haroldp@umich.edu., Michael Wall

Objective: The objective is to compare the cost-utility of selective BPN substitution into current practice MMT, with emphasis on its role in HIV infection. We also explore the cost-utility of increasing minimum methadone dosage from current practice. Methods: We employed an epidemic (Markov) model to measure the effects of substituting BPN for sub-optimal methadone dosing (<60mg or <80mg/d) on health care costs and quality-adjusted life-years (QALYs) of intravenous heroin users. Analyses were performed with HIV prevalence of 5% within the population, considering a cost of $5, $15, and $30 per day for BPN therapy. Figures are calculated using a 100-year time horizon, calculating present discounted values for both health care costs and QALYs. Results: Substitution of BPN for sub-optimal methadone dosing <60mg, and <80mg, per day result in a cost per additional QALY of $14,011 - $50,211 and $28,744 - $99,748 respectively. Increasing the minimum daily dose of methadone to 80mg dominates all alternative treatment regimes, though increasing minimum doses to 60mg is superior to current practice as well. BPN is dominant over increasing minimum daily methadone doses to 60mg, but not 80mg, if it increases quality of life from 0.9 to 0.9333 through BPN's effects of reducing adverse effects. Conclusions: Buprenorphine offers a cost-effective alternative for patients receiving sub-optimal methadone doses, while full-dose methadone maintenance therapy dominates selective BPN substitution. Selective BPN substitution may be a cost-effective strategy for patients experiencing low quality of life with methadone therapy.

■ MD13

Center-Room D

Interior-Point Methods for Nonlinear Programming

Sponsor: Optimization Section - Nonlinear Programming
Sponsored Session

Chair: Andre Tits, University of Maryland, Professor, College Park, MD, 20742, U.S.A, andre@eng.umd.edu

Co-Chair: Hande Benson, U.S. Naval Academy, Annapolis, MD, 21402, USA, hbenson@usna.edu

1 — A Quasi-Newton Penalty Barrier Method for Convex Minimization Problems
Paul Armand, Universite de Limoges, Limoges, 87060, France, armand@unilim.fr.

We describe an infeasible interior point algorithm for convex minimization problems. The method uses quasi-Newton techniques for approximating the second derivatives and providing superlinear convergence. We propose a new feasibility control of the iterates by introducing shift variables and by penalizing them in the barrier problem. We prove global convergence under standard conditions on the problem data, without any assumption on the behavior of the algorithm.

2 — On a Primal-dual Interior-point Filter Method for Nonlinear Programming
Renata Silva, University of Coimbra, Coimbra, Portugal, renata@mat.uc.pt., Luis Vicente, Michael Ulbrich, Stefan Ulbrich

We present the primal-dual interior-point filter method for nonlinear programming developed by Ulbrich, Ulbrich, and Vicente (2000). The method is based on the application of the filter technique of Fletcher and Leyffer (1997) to the globalization of the primal-dual interior-point algorithm, avoiding the use of merit functions and the updating of penalty parameters. The algorithm decomposes the primal-dual step obtained from the perturbed first-order necessary conditions into a normal and a tangential step, whose sizes are controlled by a trust-region type parameter. Each entry in the filter is a pair of coordinates: one resulting from feasibility and centrality, and associated with the normal step; the other resulting from optimality (complementarity and duality), and related with the tangential step. The method possesses global convergence to first-order critical points. We present numerical results for large-scale problems and discuss extensions of the original algorithm and of its convergence theory.

3 — On a Feasible Interior-point Method for Nonlinear Programming
Andre Tits, University of Maryland, Professor, College Park, MD, 20742, U.S.A., andre@eng.umd.edu., Sasan Bakhtiari, William Woessner

Recent improvements to a feasible interior-point method for nonlinear programming are discussed, and numerical results on large problems are reported.

4 — Solving Nonlinear Complementarity Problems Using Interior-point Methods for Nonlinear Programming
Hande Benson, U.S. Naval Academy, Annapolis, MD, 21402, USA, hbenson@usna.edu., Robert Vanderbei, David Shanno

In this talk, we will discuss experience with formulating and solving nonlinear complementarity problems using LOQO, a general-purpose interior-point code for nonconvex nonlinear programming.

■ MD14

Center-Room E

Optimization I

Contributed Session

Chair: Taner Bilgic, Bogazici University, Istanbul, 80815, Turkey, taner@boun.edu.tr

1 — Analysis of a Class of Approximation Algorithms for Bayesian Network Inference
Taner Bilgic, Bogazici University, Istanbul, 80815, Turkey, taner@boun.edu.tr., Atalay Atasu

The inference problem on Bayesian networks, both in exact and approximate forms is NP-Hard. In this work, we analyze a class of randomized approximate inference algorithms based on the bounded variance algorithm and derive insights into the performance of such algorithms in an experimental setting.

■ MD15

Center-Room B4

Applications of Network Optimization

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Ravindra Ahuja, University of Florida, Professor, Gainesville, FL, 32611, USA, ahuja@ufl.edu

1 — Management of Railroad Impedances for Shortest Path-based Routing
Joel Sokol, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, jsokol@isye.gatech.edu., Jeff Day, George Nemhauser

As an alternative to huge tables, railroads can use a shortest path-based system with artificial costs to route traffic. Finding the costs requires solving a huge inverse multicommodity flow problem. We present specialized pivoting rules and a hot-start basis-finding algorithm for obtaining optimal solutions , and a Lagrangian heuristic that is useful when optimality is not required.

2 — Airline-Based Arrival Slot Allocation during Ground Delay Programs
Mike Ball, Robert H. Smith School of Business, College Park, MD, 20742, USA, MBall@rhsmith.umd.edu., Thomas Vossen

We employ a connection between fairly allocating arrival slots and certain balanced JIT scheduling problems to derive a network flow model for "airline centric" Ground Delay Program slot allocation. The model assigns slots soas to mini-

mize deviations from well-defined fair shares. We analyze potential benefits by a comparison with current FAA procedures.

3 — The Airline Crew Rostering Problem: A Heuristic Approach
Giorgio Gallo, University of Pisa, Pisa, Italy, gallo@di .unipi.it., Paola Cappanera

The problem of finding a work assignment for airline crew members in a given time horizon is formulated as a 0-1 Multicommodity Flow problem with additional constraints. A heuristic approach is proposed which attempts at exploiting some of its peculiarities: an initial feasible solution, obtained by solving a constrained shortest path problem for each crew member, is iteratively improved by exchanging (sequences of) activities among the employees.

4 — Network Flow Problems arising in Radiation Therapy
Ravindra Ahuja, University of Florida, Professor, Gainesville, FL, 32611, USA, ahuja@ufl.edu., Natashia Boland, Horst Hamacher

Optimization problems arising in radiation therapy is becoming an interesting area of research. In this talk, we will give an overview of these problems. We will then consider some specific problems and show that they can be transformed to network flow problems. We will also list some open problems.

■ MD16

Center-Room C4

Computational Mixed Integer Programming

Sponsor: Optimization Section-Integer Programming
Sponsored Session

Chair: Eva K. Lee, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, eva.lee@isye.gatech.edu

1 — Computational Techniques for Solving Dense Integer Programming Instances
Eva K. Lee, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, eva.lee@isye.gatech.edu.

We describe matrix reduction and perturbation techniques and strong valid inequalities useful for solving dense MIP instances. Computational results on real instances arising from cancer treatment planning will be presented.

2 — Measuring Cutting Planes
Brady Hunsaker, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, hunsaker@isye.gatech.edu., Ellis Johnson, Craig Tovey

Branch-and-cut algorithms are regularly used to solve integer programs, and often certain classes of cuts are more useful than others. We examine a number of measures of cutting planes for several common integer programming problems to see how well the measures correlate with the "usefulness" of the cuts.

3 — On the Facial Structure of the Generalized Set Covering Polytope
Todd Easton, Kansas State University, Assistant Professor , Manhattan, KS, 66506, U.S.A., teaston@ksu.edu., Eva K. Lee, Kevin Hooker

From a generalized set covering polytope {x: Ax>=b, x in {0,1}} (GSCP) where A and b are nonnegative, a conflict k uniform hypergraph is constructed. All nontrivial facets of (GSCP) are shown to be hypercliques in the some k uniform hypergraph. Furthermore, some necessary and sufficient conditions are shown for maximal hypercliques to be facet defining. Finally, some preliminary computational results are presented.

■ MD17

Center-Room B1

Facility Planning and Design III

Cluster: Manufacturing Systems
Invited Session

Chair: Sunderesh Heragu, Rensselaer Polytechnic Institute, Associate professor, Troy, NY, 12180-3590, USA, herags@rpi.edu

1 — Workforce Deployment in Manufacturing Cells Considering Worker Skills and Learning and Forgetting Effects
Bryan Norman, University of Pittsburgh, Pittsburgh, PA, 15261, USA, banorman@engrng.pitt.edu., D. A. Nembhard

We consider the problem of rotating workers in manufacturing cells in order to optimize system performance. Worker skill levels and the workers' learning and forgetting patterns affect the worker assignments and corresponding productivity. Several different objective functions are evaluated. We demonstrate our methodology on several test problems.

2 — Group-scheduling Problems in Hardware Manufacturing
Rasaratnam Logendran, Oregon State University, Associate Professor, Corvallis, OR, 97331-2407, USA, logendrr@engr .orst.edu., Chelliah Sriskandarajah, Nasser Salmasi

We investigate the multi-stage, sequence-dependent group scheduling problems, commonly found in hardware manufacturing. An example problem will be used to demonstrate the methodology and opportunities for identifying effective lower bounds will be explored.

3 — Operator Assignment in Jobshop and Cellular Systems
Michael Carbone, Rensselaer Polytechnic Institute, Troy, NY, 12180-3590, USA, carbom2@rpi.edu., Sunderesh Heragu

In this talk, we employ a closed queuing network model to estimate the interference time in jobshop and cellular layout systems. This time is then explicitly incorporated in an open network model that in turn estimates the system's operational performance measures. The model is used to determine the labor requirement when converting from a cellular to jobshop layout or vice versa.

■ MD18

Center-Room J2

Non-Traditional Applications of OR

Cluster: Non-Traditional Applications of OR
Invited Session

Chair: John Bartholdi, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, john.bartholdi@isye.gatech.edu

1 — Social Dynamics and Natural Selection in the Formation of Animal Dominance Hierarchies
Craig Tovey, Georgia Institute of Technology, Atlanta, GA , 30332-0205, USA, ctovey@isye.gatech.edu., Ivan Chase

Our experiments show that dominance hierarachies are influenced by preexisting individual attributes and by social interactions that occur dynamically as individuals interact in groups. Why would such social behaviors evolve? We propose a fitness selection explanation for the dynamics of contests, combining field data, lab data, and a probabilistic model.

2 — The Optimality of Having Two Sexes
Marina A. Epelman, University of Michigan, Assistant Professor, Ann Arbor, MI, 48109-2117, USA, mepelman@umich .edu., Stephen M. Pollock, Brian Netter

No good formal arguments exist for a central question in biology: "Why, in species which have sexual reproduction, are there usually only "males" and "females"? We present a nonlinear optimization model that supports the conclusion that having only two sexes maximizes the long run viability of the species.

3 — How Some Ants use a Bucket Brigade Assembly Line to Retrieve Seeds
John Bartholdi, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, john.bartholdi@isye.gatech.edu., Carl Anderson

Field biologists have recently reported that a certain species of ant returns seeds to the nest by "bucket brigade," a way of sharing work in which an optimal division of labor emerges spontaneously. We suggest how this protocol might arise in ants and how it benefits them.

■ MD19

Fairmont-Regency 2

Application of Optimization in the Competitive Power Industry

Sponsor: Energy/Natural Resources/Environment Section - Electricity Markets and Energy Modeling
Sponsored Session

Chair: Chung-Li Tseng, University of Maryland, Assistant Professor, College Park, MD, 20742, USA, chungli@eng.umd.edu

1 — Scheduling Electric Power under Stochastic Market Prices
Jorge Valenzuela, Auburn University, Auburn, AL, 36830, USA, jvalenz@eng.auburn.edu.

As deregulation is being introduced in the United States and elsewhere, it is becoming clear to the electric power industry that the behavior of the market prices should be explicitly factored into the formulation of the unit commitment problem (UCP). The purpose of this paper is to provide such a formulation . The UCP is now expressed as a stochastic optimization problem in which the probability distributions for hourly spot market prices are explicitly accounted for.

2 — Real Option Modeling of Power Plant Asset Value
Victor Belyaev, PG&E National Energy Group, Bethesda, MD, 20814, USA, victor.belyaev@neg.pge.com., Todd Strauss, Mariam Zarrabi

Power plant asset values are estimated with a proprietary Monte Carlo valuation tool that integrates financial methods for spread options with engineering optimization models for plant operation. Model results are compared to pure financial methods. Ways to adapt the models for routine business processes are discussed.

3 — A Framework Using Two-factor Price Lattices for Generation Asset Valuation
Chung-Li Tseng, University of Maryland, Assistant Professor, College Park, MD, 20742, USA, chungli@eng.umd .edu., Kyle Lin

We develop a framework for generating discrete-time price lattices for two general correlated Ito processes for electricity and fuel prices. A sufficient condition that guarantees existence of branching probabilities at all nodes and all stages of the lattice is presented. This condition shows that when the correlation between the two Ito processes is no greater than 0 .676, the lattice feasibility can be guaranteed.

4 — An Approach to Generate Multi-factor Price Lattices for Correlated Wiener Processes
Kyle Lin, Grado Department of Industrial and Systems Engineering, Assistant Professor, Blacksburg, VA, 24061, USA, kylin@vt.edu., Chung-Li Tseng, Wei Zhu

We propose an approach to generate discrete multi-factor price lattices that approximate the evolution of correlated Wiener processes. We apply the approach to value fuel switching units in which three price uncertainties, natural gas, diesel oil, and electricity, are involved.

■ MD20

Fairmont-Hillsborough

Auction Session 7

Cluster: Auctions
Invited Session

Chair: Jayant Kalagnanam, IBM (TJ Watson), Yorktown Hts, NY, 10598, US, jayant@us.ibm.com

1 — Electronic Sales Strategies in Time-Sensitive Markets
Jeremie Gallien, MIT Sloan School of Management, Assistant Professor of Management Science, Cambridge, MA, 02142

I consider the problem of maximizing expected time-discounted revenue when selling multiple identical items to a stream of time-sensitive, self-interested buyers. Using Dynamic Programming and Auction Theory, I derive the optimal dynamic mechanism in this framework, and conduct numerical simulations to compare it with online catalogues and auctions.

2 — Venture Captital Investments in Electronic Markets and the "Culcutta Auction"
Sridhar Seshadri, Stern School of Business, NYU, New York , NY, 10012, USA, sseshadr@stern.nyu.edu., Zur Shapira, Christopher L. Tucci

Firm valuations were grossly exceeded during the wave of investments in Internet-related businesses in the late 1990s. We model the investment behavior in such markets as a "Calcutta auction." A consistent pattern of behavior emerges from applying the model indicating the investors may have been more rational then previously thought.

3 — Forming Supplier Coalition in a Procurement Market
S. David Wu, Lehigh University, Bethlehem, PA, 18015, USA , david.wu@lehigh.edu., Svetlana Oshkai

We study the formation of supplier coalitions in a buyer-centric procurement market. The suppliers in the coalition bid for a certain product package so as to enhance their expected profit. We propose a Fare Opportunistic Profit Sharing (FOPS) scheme, and analyze the coalition members' bidding strategy under different conditions.

■ MD21

Fairmont-Glen Ellen

Financial Engineering, Session 02

Cluster: Financial Engineering
Invited Session

Chair: Stanislav Uryasev, Uryasev@ise.ufl.edu

1 — Minimal Cost Rebalancing to the Efficient Frontier
Hiroshi Konno, konno@indsys.chuo-u.ac.jp., Rei Yamamoto

We will propose a new scheme for rebalancing a given portfolio to a portfolio on the mean-absolute deviation efficient frontier such that the total "concave" transaction cost is minimal. We will show that a branch and bound algorithm can solve this problem in a practical amount of time.

2 — Comparative Analysis of Linear Portfolio Rebalancing Strategies: An Application to Hedge Funds
Pavlo Krokhmal, krokhmal@ufl.edu., Stanislav Uryasev, Grigory Zrazhevsky

This paper applies formal risk management methodologies to optimization of a portfolio of hedge funds (fund of funds). We compare recently developed risk management methodologies: Conditional Value-at-Risk and Conditional Drawdown-at-Risk with more established Mean-Absolute Deviation, Maximum Loss, and Market Neutrality approaches.

3 — Classification Using Optimization: Application to Credit Ratings of Bonds
Vlad Bugera, bugera@ufl.edu., Stanislav Uryasev, Grigory Zrazhevsky

We consider an approach for classification of objects. It is based on optimization of a set of utility functions characterizing quality of classification. The approach is demonstrated with the calculation of credit ratings of bonds.

■ MD22

Fairmont-Paseo

Optimization Problems in the Power Industry

Contributed Session

Chair: Andy B. Philpott, University of Auckland, Auckland, New Zealand, a.philpott@auckland.ac.nz

1 — Stochastic Unit Commitment: A Solution Considering the Correlation Structure of the Hourly Demands
U. Aytun Ozturk, University of Pittsburgh, Pittsburgh, PA , 15261, USA, uaost2@pitt.edu., Mainak Mazumdar, Bryan Norman

Reliable scheduling of power production is critical for the operation of utilities. The purpose of this work is to introduce a solution method to schedule generators for producing electricity taking into consideration the stochasticity of demand and its hourly correlation structure. Uncertainties both on the demand and supply sides are considered in the model.

2 — Hydro-Electric Reservoir Optimization in Electricity Pool Markets
Andy B. Philpott, University of Auckland, Auckland, New Zealand, a.philpott@auckland.ac.nz., Geoffrey Pritchard, Philip Neame

We consider a reservoir optimization model for a hydro-electric generator operating in an electricity pool market in which each generators offers a supply function in each half-hour trading period. A dynamic programming model estimates the expected future value of stored water over a long planning horizon by constructing optimal supply functions for each trading period.

3 — A MINLP Model for a Problem of Minimizing Fuel Consumption on Natural Gas Pipeline Networks
Diana Cobos, Universidad Autonoma de Nuevo Leon, San Nicolas, NL, 66450, Mexico, diana@yalma.fime.uanl.mx., Roger Z. Rios

The problem of minimizing fuel consumption on natural gas pipeline networks is addressed. A MINLP model for a special case of this problem will be presented and discussed. In addition, our computational experience on evaluating an outer approximation with equality relaxation and augmented penality method (based on GAMS) will be shown.

4 — Decision and Risk Analysis System for the Energy Industry
Lev D. Virine, Schlumberger Information Solutions, Calgary, AB, T2R 0C5, Canada, lvirine@calgary.geoquest .slb.com.

Decision and risk analysis software developed by Schlumberger Information Solutions features advanced tools for the visualization of economic analysis results. Its open design permits the use of various calculation engines. The application is comprised of three integrated modules: sensitivity analysis engine, decision tree, and Monte Carlo simulation tool.

5 — Automatic Regulation and Control of Power Load in Manufacturing Process
Jiali Liu, Tsinghua University, Beijing, 100029, P.R .China, liujiali@95777.com., Jin Song, Jiachen Liu

Power load is a critical issue in factory production and manufacturing process. Many industrial enterprises are facing the problem of violent fluctuation of power load offering. On the basis of generalizing and simplifying the actual problem, this paper presents a control and regulation methodology for power load --- unit discretization method, which could decrease the fluctuation and protect equipments while not changing the production plan. The software package and simulations based on the method are given in this paper.

■ MD23

Center-Room L

Panel: Current Issues in Aviation

Cluster: Aviation
Invited Session

Chair: Arnold Barnett, MIT, Cambridge, MA 02139-4307, USA. abarnett@mit.edu.

■ MD24

Hilton-Pacific

INFORM-ED CASE COMPETITION 2002: Finalists 3 & 4

Sponsor: Education
Sponsored Session

Chair: Christopher Zappe, Bucknell University, zappe@bucknell.edu

1 — INFORMS 2002 Annual Case Competition

During this special open session, the final two of four finalists in the INFORMS 2002 Annual Case Competition will deliver 30-minute presentations of their entries before a panel of judges . The judges will select the winning entry from the cases presented during this session and the preceding session.

■ MD25

Center-Room F2

Computations in Data Envelopment Analysis

Cluster: Data Envelopment Analysis
Invited Session

Chair: Jose Dula, University of Mississippi, Associate Professor, University, MS, 38677, USA, jdula@olemiss.edu

1 — Early Detection of the Impact of Including and Omitting an Attribute in DEA
Francisco Lopez, University of Texas at El Paso, Assistant Professor, El Paso, TX, 79968, fjlopez@utep.edu, Jose Dula

Procedures for early detection of the impact of including or omitting an input or output in a DEA model provide information on robustness of models for the standard DEA models: constant, variable, increasing, and decreasing returns assumptions and help decide whether to include or omit attributes in subsequent models . Computations reveal that, with a fraction of the work required to re-solve the LPs we can get a good idea of the impact of the modification in the list of attributes.

2 — DEA Computations with VBA and CPLEX.
Marie-Laure Bougnol, University of Mississippi, Assistant Professor, University, MS, 38677, USA, mbougnol@bus .olemiss.edu., Jose Dula

The typical platform and software for DEA computations is a PC and Microsoft Excel. The analyst may add sophistication by programming the DEA procedures in VBA using the available LP solver. These procedures are inadequate for larger problems. Other difficulties arise from the LP solver's resistance to adapt to the demands of DEA. The CPLEX libraries for LP can be harnessed within VBA in a PC to solve large DEA problems. We discuss this implementation and report on the results.

3 — Solving Massive DEA Problems
Jose Dula, University of Mississippi, Associate Professor , University, MS, 38677, USA, jdula@olemiss.edu.

Solving DEA problems with 100K or more DMUs is now possible using standard platforms. We report on an implementation on a standard Windows machine using Cplex to solve huge DEA problems. We explore the impact of Reduced Basis Entry (RBE), Hot starts, and other features in Cplex on these massive problems. We also discuss the creation of a standard test suite for massive problems.

■ MD26

Hilton-San Carlos I

Telecommunications Session 1

Sponsor: Telecommunications
Sponsored Session

Chair: Ali Amiri, Oklahoma State University, Stillwater, OK, 74078, USA, amiri@okstate.edu

1 — An Economic Analysis of Organizational Firewall Architecture
Wei Yue, University of Texas, Dallas, Assistant Professor , Richardson, TX, USA, wei.yue@utdallas.edu., Srinivasan Raghunathan

There is a need to examine managerial decisions of organizational perimeter defense infrastructure. Large organizations may require a very different perimeter defense structures compared to small organizations. In this paper we present an economic analysis of organizational firewall architecture based on firewall quality levels, traffic levels and asset values.

2 — Path Selection With Protection For Existing Telecom Networks With Pre-Specified Alternative Paths
Ray Patterson, University of Alberta, Associate Professor , Edmonton, AB, Canada, Ray.Patterson@ualberta.ca., Samit Soni, Erik Rolland

This paper models a network selection problem where alternative paths between traffic demand points are known in advance. The Mixed Integer Programming model presented in this paper selects two disjoint string paths for each traffic demand between pairs of demand nodes. One string path is the primary route, and the other string path is the secondary route.

3 — Multi-period Homing in Cellular Telecommunications Networks
Syam Menon, University of Texas at Dallas, Assistant Professor, Richardson, TX, 75080, USA, syam@utdallas.edu., Ali Amiri

Cellular telecommunications systems tend to be more flexible than traditional ones. As a result, traditional approaches to telecommunications network design are often inappropriate for the design of cellular networks. We present a multi-period problem that arises in the design of cellular telecommunications networks. A procedure based on column generation is described to solve this problem. Extensive computational results are presented.

4 — Determining Trunk Reservation Parameters for a Non-Symmetric Telecommunications Network
Thaddeus Sim, University of Alberta School of Business, Edmonton, AB, Canada, thaddeus.sim@ualberta.ca.

We describe a proof-of-concept study of implementing a control mechanism called trunk reservation in TELUS' Edmonton network. Trunk reservation limits the number of inefficient multi-link calls connected in the network when it approaches operational capacity, allowing more calls to connect via their direct paths. We used fixed-point approximations of a birth-death process to formulate an integer non-linear programming model, which we solved using simulated annealing.

■ MD27

Center-Room C2

Competition in Supply Chains II

Contributed Session

Chair: Annapurna Valluri, Wharton School, University of Pennsylvania, Philadelphia, PA, 19104, USA, avalluri@wharton.upenn.edu

1 — A Multi-period Competitive Newsboy Model with Service Depended Demands
Weixin Shang, Department of Industrial Engineering & Engineerng Management, Ph.D. Student, Hong Kong, HK, China, shangwx@ust.hk., Liming Liu, N.G. Siu Wa

We consider a dynamic two-firm multi-period competitive newsboy model where a firm's future demands are affected by its past and current realized service levels. We show that for a class of demand distributions, a unique feedback Nash equilibrium solution exists. We then obtain the optimal replenishment quantities for each firm.

2 — Agent Learning in Supplier Selection Models
Annapurna Valluri, Wharton School, University of Pennsylvania, Philadelphia, PA, 19104, USA, avalluri@wharton.upenn.edu., David Croson

We study, via agent-based modeling, a supplier-selection model requiring complicated rewards and punishments. One buyer offers a tournament-based reward structure to a heterogeneous group of sellers; the convergence to equilibrium results in high-quality sellers both self-selecting into the relationship and providing high quality, even when quality is unobservable and unmeasurable.

3 — The Impact of Sharing Cross Sales Information In Two-Level Supply Chain
John Wu, Kansas State University, Associate Professor, Manhattan, KS, 66505, U.S.A, chw@ksu.edu., Lian Li

In competitive global marketing environment, demand is greatly influenced by cross-sales from competitor's actions and reactions . This paper studies the impact of sharing cross-sales information and the consequent benefit. We develop a two-level supply chain model with AR(1) demand process plus its linear cross-sales and we formulate manufacturer's inventory expression and cost expression. The impact of cross-sales factors are analyzed in terms of inventory reduction and cost saving.

■ MD28

Center-Ballroom A1

Innovative Capacity Management for the New Millenium

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Terry Taylor, Columbia University, Graduate School of Business, Assistant, Professor, New York, NY, 10027-6902, USA, tat2002@columbia.edu

Co-Chair: Erica Plambeck, Stanford University, Assistant Professor, Stanford, CA, USA, plambeck_erica@gsb.stanford.edu

1 — Capacity Management for a Contract Manufacturer
Costis Maglaras, Columbia University, New York, NY, 10027 , USA, c.maglaras@columbia.edu.

A contract manufacturer recieves potential requests over time that demand a certain amount of processing capacity for a desired duration, at a specified point in time. We adopt a revenue maximization approach to characterize the optimal

accept/reject policy for the manufacturer and obtain useful insights about optimal pricing behavior.

2 — Constructing an Optimal Portfolio of Capacity Options
Achal Bassamboo, Stanford Unversity, Stanford, CA, USA, achalb@stanford.edu., Stefanos Zenios

Consider a firm that is launching a new product, the product can be in one of the various stages of product development/product life cycle. In each period, depending on the stage a random product demand is observed. Capacity options with different maturities are available. We use dynamic programming to determine the optimal portfolio of these capacity options.

3 — Optimal Mechanism Design Under Capacity Constraints
Philipp Afeche, Northwestern University, p-afeche@kellogg .northwestern.edu.

We study the optimal allocation of capacity to time-sensitive customers. In particular, we investigate discrepancies between allocation mechanisms that maximize total system benefits vs. those that maximize the provider's profits.

4 — Renegotiation of Quantity Flexibility Contracts
Terry Taylor, Columbia University, Graduate School of Business, Assistant Professor, New York, NY, 10027-6902, USA, tat2002@columbia.edu., Erica Plambeck

In practice, it is common for firms to renegotiate the terms of previously agreed to supply contracts. We examine how the possibility of renegotiation affects how quantity flexibility contracts should be designed, how firms invest in innovation and capacity, and profitability.

■ MD29

Center-Ballroom A5

Inventory Planning in Large-Scale Supply Chain Systems

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Kathryn Caggiano, UW-Madison School of Business, Assistant Professor - Operations, and Information Management, Madison, WI, 53706, kcaggiano@bus.wisc.edu

1 — Determining Base-stock Levels in Large-scale Capacitated Assembly Systems
James Rappold, UW-Madison School of Business, Assistant Professor - Operations and Information Management, Madison, WI, 53706, jrappold@bus.wisc.edu., Adam Resnick, Leyuan Shi

We present a periodic-review production and inventory planning model that determines component and finished product inventory levels when demand is highly uncertain and assembly capacity is finite. We compare the performance of our solution approach to management practices currently used in the firm that motivated our research.

2 — Periodic Review Inventory Control with Lost Sales and Lead Times
Ganesh Janakiraman, School of Operations Research and Industrial Engineering, Visiting Assistant Professor, Ithaca, NY, 14853, ganesh@orie.cornell.edu.

Very few papers analyze optimal inventory policies for supply chain systems with lead times and lost sales. We examine aspects of multi-echelon lost sales problems that make them more difficult to analyze than their backorder counterparts and present our recent efforts and results for both single and multi-echelon systems.

3 — Improved Base-Stock Policies Under Order Crossover
James Bradley, Johnson Graduate School of Management, Assistant Professor of Production and Operations Management, Ithaca, NY, 14853-6201, jrb28@cornell.edu., Lawrence Robinson

Whenever replenishment orders can cross over one another, order-up-to policies based on the variance of lead time often cause excessive inventory. In this paper, we develop tractable bounds on the variance of the number of orders outstanding, which make the Normal approximation of the shortfall distribution easy to use ñ no more information or computation are required than for the traditional lead-time demand approximation. The result is reduced inventory cost, with no more effort.

4 — Simple Algorithms for Pooling Inventory to Satisfy Customer Service Requirements at Minimum Cost
Kathryn Caggiano, UW-Madison School of Business, Assistant Professor - Operations and Information Management, Madison, WI, 53706, kcaggiano@bus.wisc.edu., Peter Jackson, John Muckstadt, James Rappold

We consider a problem of assigning customers to service locations to fulfill demands for service parts. Safety stock holding costs and/or transportation costs are significant. If holding costs alone are significant, the problem reduces to a Concave Assignment Problem (CAP). We derive properties of the optimal solution to the CAP and give an exact algorithm to find it. We also discuss practical heuristic approaches.

■ MD30

Center-Ballroom A6

Flexibility and Pricing in Supply Arrangements

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Candace Yano, University of California, Berkeley, CA, 94720-1777, USA, yano@ieor.berkeley.edu

1 — Volume-Flexible Contract with a Flexibility Bound
Houmin Yan, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, yan@se.cuhk.edu.hk., Hanqin Zhang

We analyze a supply contract with a flexibility bound in which the buyer has two time-instants to order a seasonal product, one at contract formation, and another (under an option provided by the contract or from a spot purchase) after the forecast is updated. The buyer purchases q units initially and reserves the option to later purchase up to a certain percentage of the initial order at a pre-negotiated price. We derive the optimal initial order quantity (based on early forecasts of demand and the spot price) and the optimal reaction plan for exercising the option with the revised forecast.

2 — Dynamic Pricing of Inventory/Capacity when Price Changes are Costly
Serguei Netessine, University of Pennsylvania, Philadelphia, PA, netessin@wharton.upenn.edu.

In practice there is often a limit on the number of times the firm can adjust the price throughout the sales season due to the high costs associated with frequent price changes. If that is the case, instead of a continuous pricing rule the company might want to establish a piece-wise constant pricing policy in order to limit the number of price adjustments. Such a pricing policy, which involves optimal choice of prices and timing of price changes, is the focus of this paper.

3 — Customer Forecast Decisions in Forecast-Commitment Contracts
Elizabeth Junqueira, Washington University in St. Louis, junqueira@olin.wustl.edu., Candace Yano

We discuss forecast decisions under a ``Forecast-Commitment'' contract in which the customer provides a supplier a forecast for a future order, along with a guarantee to purchase a portion of the forecast. In return, the supplier commits to a delivery quantity and pays penalties for shortfalls of the commitment from the forecast, and for shortfalls of the delivery quantity from the lesser of the commitment or the observed demand. We characterize the customer's optimal forecast under these contract terms.

4 — Strategic Investments, Trading and Pricing under Uncertainty
Jiri Chod, chodji@simon.rochester.edu., Nils Rudi

This article studies stochastic investments by multiple firms, in capacity which may be ex-post traded. The trade is negotiated in a bargaining game, embedded in a non-cooperative investment game. We study the effect of trading, demand uncertainty and correlation, currency risk and trading frictions on investments, prices, profits and consumers.

■ MD31

Center-Room J3

George B. Dantzig Dissertation Finalist Presentations

Prize Session

Chair: Anton Kleywegt, School of Industrial and Systems Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0205, anton@isye.gatech.edu

1 — Dynamic Pricing Models to Improve Supply Chain Performance: Research and a Case Study Motivated by the Automotive Industry
Julie L. Swann, School of Industrial and Systems Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0205, Julie.swann@isye.gatech.edu

2 — The Linear Programming Approach to Approximate Dynamic Programming—Theory and Applications
Daniela Pucci de Farias, MIT, Cambridge, MA 02139, pucci@mit.edu
Other finalist presentations to be announced.

■ MD32

Center-Room J4

ICS I Attacking and Defending Networks

Sponsor: INFORMS Computing Society

Sponsored Session

Chair: Gerald Brown, Naval Postgraduate School, Monterey, CA, 93943, USA, gbrown@nps.navy.mil

1 — Interdicting Stochastic Networks With Binary Interdiction Effort
David Woodruff, University of California, Professor, Davis, CA, 95616, USA, dlwoodruff@ucdavis.edu., Rudiger Schultz, Raymond Hemmecke

We provide formulations, test instances and benchmark results for a new class of network interdiction problems. The formulations are appropriate for computer, terrorist or drug transportation networks where the characteristics of the network cannot be known completely in advance but rather interdiction must be planned based on conjectured configurations.

2 — Trilevel System Defense Models
Kevin Wood, Naval Postgraduate School, Monterey, CA, 93940, USA, kwood@nps.navy.mil.

If we interdict the interdictor in a bilevel network or system interdiction model, we have a trilevel system defense or hardening model. We use generalized Benders decomposition to solve these problems, and present "Defending the Shortest Path" as a computational example.

3 — A Network Disruption Modeling Tool
Richard Deckro, Air Force Inst. of Tech., Wright-Patterson AFB, OH, 45433-7765, USA, richard .deckro@afit.edu., James A. Leinart

A cut-set algorithm from the literature is used to generate all cut-sets. Decision analysis techniques are used to rank the sets according to the overall objectives for achieving a network disruption. The methodology is incorporated in a Visual Basic/Excel Spreadsheet environment and allows for user-friendly, yet powerful analysis.

4 — Protecting Packet-switched Communications Networks
Kelly Cormican, Naval Postgraduate School, Monterey, CA, USA, kjcormic@nps.navy.mil.

We apply mathematical programming-based network interdiction techniques to packet-switched networks that do not possess a centralized routing design. We provide (non-simulation) mathematical models of behavior, with initial focus on the Navy - Marine Corps Intranet (NMCI). We also show methods for the attack and defense of such networks.

■ MD33

Hilton-University

Applications of Multistage Stochastic Programming

Sponsor: Optimization Section-Stochastic Programming
Sponsored Session

Chair: Suvrajeet Sen, University of Arizona, Tucson, AZ, 85721-0020, USA, sen@sie.arizona.edu

1 — A Stochastic Programming System for Financial Trading using Scenario Approximations
Chanaka Edirisinghe, University of Tennessee, Knoxville, TN, 37996, USA, chanaka@utk.edu.

Multiperiod stochastic programming is used as a modeling tool for direct risk specification and control for hedge-fund management. Evolution of market parameters is an integrated input and used within a scenario generator. A second-order approximation of the scenarios controls model size and impact on risk metrics. Applications justify the approach.

2 — Calibration and Pricing of Contingent Claims using Stochastic Programming
Alan King, IBM Research, Research Staff Member, Yorktown Hts., NY, 10590, USA, kingaj@us.ibm.com., Teemu Pennanen

Theorems that link the valuation of contingent claims to the existence of a martingale measure can be derived using linear programming duality. We will discuss their extension to a practical method for calibrating the price of an option. Tests of the method using actual market data will be presented.

3 — GAMS/SCENRED — Scenario Reduction within GAMS Programs
Nicole Groewe-Kuska, Humboldt University, Berlin, Germany , nicole@mathematik.hu-berlin.de., Holger Heitsch, Werner Roemisch, Steven Dirkse, Franz Nelissen

SCENRED is a tool for the reduction of scenarios modeling the random data processes of stochastic programs. The scenario reduction algorithms determine a scenario subset (of prescribed cardinality or accuracy) and assign optimal probabilities to the preserved scenarios. We demonstrate how to solve stochastic programs using GAMS/SCENRED.

4 — The DASH Model for Power Portfolio Optimization
Suvrajeet Sen, University of Arizona, Tucson, AZ, 85721-0020, USA, sen@sie.arizona.edu., Lihua Yu, Talat Genc

We will describe a large-scale stochastic programming model for power portfolio optimization. The model maximizes expected profits, while penalizing decisions that may result in high losses for some rare events. The model includes forward contracts, spot market activity, as well as production-costing decisions.

■ MD34

Hilton-Plaza

Decision Analysis Society Awards

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Elisabeth M., Pate'-Cornell, Stanford University, Stanford, CA, 94305-4024, USA, mep@leland.stanford.edu

1 — Decision Analysis Society Awards

The Decision Analysis Society of INFORMS will announce the recipients of the 2002 Ramsey Medal for lifetime contributions to decision analysis, the 2002 publications award for best publication in the year 2000 and the 2002 student paper award. Each winner will be inbited to speak briefly. The winner of the Decision Analysis Practice Award will also be announced. The practice award competitors will make their presentations in an earlier session.

■ MD35

Hilton-Almaden II

Statistical Methods in Engineering Design

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Kurt Palmer, University of Southern California, Los Angeles, CA, 90089-0193, USA, kpalmer@usc.edu

1 — Failure Amplification Method (FAM): An Experimental Approach to Categorical Response Optimization
V. Roshan Joseph, University of Michigan, Ann Arbor, MI, 48109-1285, USA, C.F.J. Wu

Categorical data arises quite often in industrial experiments because of an expensive or inadequate measurement system for obtaining continuous data. When the failure probability/defect rate is small, experiments with categorical data provide little information regarding the effect of factors of interests and are generally not useful for product/process optimization. We propose an engineering-statistical framework for categorical response optimization that overcomes the inherent problems associated with categorical data. The basic idea is to select a factor that has a known effect on the response and use it to amplify the failure probability so as to maximize the information in the experiment. We develop new modeling and optimization methods that are appropriate for these experiments. The FAM methodology generalizes and supersedes the "operating window method" (originally proposed by Don Clausing) as it provides more information than the OW method. It is illustrated with two real experiments.

2 — A Comparison of Cluster Analysis Techniques for Input Variability Definition
Kurt Palmer, University of Southern California, Los Angeles, CA, 90089-0193, USA, kpalmer@usc.edu.

Robust engineering design requires an understanding of sources of variation in the manufacturing process. Cluster analysis can be used to identify families of raw material sources based upon the material properties. We present several simple cluster analysis techniques. Their performance is compared using both idealized and real data sets.

3 — Global Optimal Design in Feature Space using Bayesian Classification Trees
Takeru Igusa, Johns Hopkins University, Baltimore, MD, 21218, USA, tigusa@jhu.edu.

Mappings from a high-dimensional design parameter space to low-dimensional feature spaces are explored using Bayesian classification trees. The final classification tree, which encapsulates the knowledge gained from the design of one system, can be efficiently used as a starting point for optimal designs of related systems.

4 — Probabilistic Modeling of Optimization Error
Hongman Kim, Phoenix Integration, Inc., Blacksburg, VA, 24060, USA, hkim@phoenix-int.com.

A probabilistic model is fitted to the errors of poorly converged optimization runs. The Weibull distribution was identified as a reasonable error model. We show that two sets of optimization results, obtained from two different initial design points, can serve to estimate the average errors without performing expensive accurate optimization runs.

■ MD36

Center-Room F1

Tutorial: Scheduling Multiclass Queueing Networks via Fluid Models

Sponsor: Applied Probability Society

Sponsored Session

Chair: John Hasenbein, University of Texas, Austin, TX, 78712-1063, USA, jhas@mail.utexas.edu

1 — Tutorial: Scheduling Multiclass Queueing Networks via Fluid Models
John Hasenbein, University of Texas, Austin, TX, 78712-1063, USA, jhas@mail.utexas.edu., Ron Billings

In this tutorial we present the problem of scheduling jobs in a multiclass queueing network to minimize performance measures such as cycle time or holding costs. Even with deterministic arrival and service processes, scheduling such models in an optimal or near optimal manner is quite challenging. The fluid model approach uses a deterministic (mean value) approximation to the original network to drive a scheduling algorithm. The talk will focus on two areas in which much progress has been made recently: (1) efficiently solving the "fluid model holding cost problem," (2) using the fluid model schedule to develop near optimal policies. We will provide a survey of alternate approaches to the problem, along with a review of current trends in the area.

■ MD37

Center-Room J1

Queueing in Manufacturing

Contributed Session

Chair: Cigdem Z. Gurgur, University of Toledo, Toledo, OH, 43606, USA, cgurgur@eng.toledo.edu

1 — The Optimal Control of Stochastic Production-Inventory Systems with Job Shop Routings
Pieter L.M. Van Nyen, Eindhoven University of Technology, Eindhoven, NL 5600 MB, The Netherlands, p.v.nyen@tm.tue .nl., Nico J. Vandaele, Henny P.G. van Ooijen

This paper investigates a stochastic multi-product multi-machine production-inventory system characterized by job-shop routings. The stockpoints and the production facility are controlled simultaneously. By applying queueing network analysers and local search techniques, we obtain an overall optimal control policy while satisfying prespecified customer service levels for all products.

2 — Optimal Configuration of Production and Procurement Control Policies in Multi-Stage, Multi-Product, Pull-Type, Decentralized Manufacturing Systems
Cigdem Z. Gurgur, University of Toledo, Toledo, OH, 43606 , USA, cgurgur@eng.toledo.edu., Tayfur Altiok

We describe a methodology for the optimal configuration of production and procurement control policies in two-card kanban controlled manufacturing systems involving periodic material handling between stages. We approximate the system using stochastic decomposition and use Response Surface Methodology to minimize total inventory subject to a customer service level constraint.

3 — Performance Analysis of Complex Production Systems
Jingshan Li, GM R&D Center, Sr. Research Engineer, Warren , MI, 48090-9055, USA, jingshan.li@gm.com.

Performance analysis is important for design, operation and management of production systems. A complex production system may consist of some or all different operations, such as rework, split, merge, etc. This paper presents a system approach called "overlapping decomposition" to approximate the system throughput. The approach has been used in many automotive paint shops to estimate system performance and guide continuous improvement efforts and obtained fairly good results.

■ MD38

Center-Room N

Public Transportation Systems

Contributed Session

Chair: Terry L. Friesz, George Mason University, Fairfax, VA, 22030, USA, tlfriesz@gmu.edu

1 — The Impact of Telecommuter Rail Cars on Commuter Modal Choice
James C. Hayton, San Jose State University, San Jose, CA, 95192-0070, USA, jhayton@sjsu.edu., Saloua Sehili

This paper examines the implications of telecommuter railcars. Prior research suggests modal shift towards public transportation will occur. Employers benefit from an expanded labor pool; society benefits from reductions in congestion and emissions; employees benefit from reduced stress and increased leisure time. The paper concludes with suggestions for future research.

2 — Shunting Passenger Train Units in the Netherlands
Ramon M. Lentink, PhD student, Rotterdam, 3000 DR, The Netherlands, rlentink@fbk.eur.nl., Leo G. Kroon

Outside the rush hours, almost all passenger train units need to be parked at shunt yards. Important subproblems are the matching of arriving and departing trains, the routing of train units, the order of parking the units and cleaning. In this talk, we discuss mathematical formulations of several subproblems with computational results.

3 — Continuous Dynamic Disequilibrium Network Design in the Presence of Elastic Travel Demands
Nicolaos A. Kydes, George Mason University, Washington, DC, 20009, USA, nkydes@gmu.edu., Terry L. Friesz, Srinivas Peeta

We investigate a continuous dynamic disequilibrium network design model to determine an optimal capacity enhancement plan over time in the presence of elastic travel demand and subject to a budget constraint. A constrained multigrid optimization algorithm taken from Kydes (2002) is used to solve numerical examples and explore the meaning of the Braess Paradox in a dynamic setting.

4 — Blacksburg Transit — Facing the Challenges of the Future
Ujval Gandhi, Virginia Polytechinc Institute and State University, Graduate Student, Blacksburg, VA, 24060, USA, ugandhi@vt.edu.

Blacksburg Transit began running bus services for Virginia Tech in 1983. Since then, it has grown to 31 routes and serves 1.9 million passenger trips per year serving Virginia Tech. The challenges of future budget cuts and uncertain market conditions facing Blacksburg Transit can be studied using a system dynamics perspective.

■ MD39

Center-Room K

Dynamic Traffic Assignment Applications

Sponsor: Transportation Science Section
Sponsored Session

Chair: Hani S. Mahmassani, University of Maryland, Director, Maryland Transportation, Initiative, College Park, MD, 20742, USA, masmah@mail.utexas.edu

1 — Development and Application of a Simulation-based Dynamic Traffic Assignment Model
Michael Florian, University of Montreal, Montreal, QC, H3C 3J7, Canada, mike@crt.umontreal.ca., Michael Mahut, Nicolas Tremblay

Both the on-line and off-line evaluation of intelligent transportation systems (ITS) measures, such as en-route guidance and adaptive control strategies, rely on the use of faster than real time traffic models. Off-line, traffic models coupled with iterative dynamic traffic assignment (DTA) algorithms can be used to approximate dynamic equilibrium conditions, which can serve as a benchmark for evaluating ITS measures. This paper describes a simulation-based dynamic equilibrium traffic assignment model. The method of successive averages (MSA) is used to solve the outer problem of finding the time-dependent path flow rates, while the inner problem of finding the time-dependent path travel times (through traffic simulation) is solved using the space-time queuing model of Mahut. The model was applied to the Stockholm road network, which consists of 4342 links, 1980 nodes and 250 zones, representing some 11,000 turns. Results are presented.

2 — Assessing Impacts of ITS Strategies on Mobile Source Emissions in a Dynamic Network Traffic Assignment Framework
Tejas Mehta, University of Texas at Austin, Austin, TX, 78712, tejasm@mail.utexas.edu., Hani S. Mahmassani, Yi-Chang Chiu
Abstract not supplied

3 — Examining Trade-offs Between Network Efficiency and Air Quality using a Dynamic Traffic Assignment Methodology
Amulya Kottapalli, University of Texas at Austin, Austin, TX, 78712, amul25@rediffmail.com., Hani S. Mahmassani, Yi-Chang Chiu, Tejas Mehta

We consider a time-dependent network traffic assignment problem which seeks to jointly minimize total travel time and total pollutant emissions. We present a simulation-based solution algorithm for the resulting multi-objective system-optimal dynamic traffic assignment (MOSO-DTA) problem, which generates a representative set of non-dominated solutions.

■ MD40

Center-Room G

Strategic Network Design in Transportation and Logistics

Sponsor: Logistics Section
Sponsored Session

Chair: Hans-Jurgen Sebastian, Aachen University of Technology, Aachen, D-52062, Germany, sebasti@or.rwth-aachen.de

1 — Strategic/Tactical Planning of Multimodal Transportation Networks for Postal and Express Shipment Providers
Hans-Jurgen Sebastian, Aachen University of Technology, Aachen, D-52062, Germany, sebasti@or.rwth-aachen.de.

This presentation focuses on the design of multimodal service networks of postal and express shipment companies.We will consider models and methods to support finding optimal decisions about locations and their layout configuration, transportation modes and links, the fleet of vehicles and about vehicle scheduling. Applications from DeutschePost WorldNet will be presented.

2 — An Innovative Approach for Recycling — Network Optimization
Ralf Schleiffer, Aachen University of Technolgy, Aachen, D-52062, Germany, ralf@or.rwth-aachen.de., Jens Keilen, Hans-Jurgen Sebastian, Florian Golm, Natalia Kapoustina, Maira Magnani

This contribution will report on our approach to generate and to optimize a recycling network for ELVs based on the idea of reverse SCM. This is achieved by modeling the network as a number of layered interconnected nodes and by applying fuzzy clustering techniques and highly parallel randomized evolutionary optimization.

3 — Flat Glass — Redesigning a Distribution Network
Ralf Wassenhoven, Aachen University of Technology, Aachen , D-52062, Germany, wassenhoven@or.rwth-aachen.de., Dirk Uberall, Hans-Jurgen Sebastian

Nowadays there is a big variety of possibilities to use flat glass. However,the handling of single sheets and the transportation to the processing firms is difficult and dangerous . We discuss several approaches to design efficient distribution networks taking into account both the manufacturers and the transforming firms interests.

■ MD41

Center-Room M

Competitive Facility Location

Contributed Session

Chair: Gilbert Laporte, HEC-Montreal, Montreal, QC, H3T 2A7, Canada, gilbert@crt.umontreal.ca

1 — The Multi-Store Location and Pricing Decisions of a Spatial Monopoly
Abdullah Dasci, HEC-Montreal, Montreal, QC, H3T 2A7, Canada, dasci@crt.umontreal.ca., Gilbert Laporte

We analyze the location and pricing decisions of a firm that sets up a number of stores in a compact geographical space and determine the prices. The number of stores is made endogenous through the introduction of fixed costs. The firm is allowed to set the mill prices different as a price discrimination instrument.

2 — A Continuous Model for Multi-Store Competitive Location
Abdullah Dasci, HEC-Montreal, Montreal, QC, H3T 2A7, Canada, dasci@crt.umontreal.ca., Gilbert Laporte

We analyze the location strategies of retail firms that own and operate a number of stores in a competitive geographical market. The number of stores to be opened is made endogenous by the introduction of fixed costs. A novel methodology, in which firms' strategies are represented as continuous functions over the market, is developed.

3 — Competitive Facility Location and Design Problem
Robert Aboolian, California Sate University San Marcos, Assistant Professor, San Marcos, CA, 92096, USA, raboolia@csusm.edu., Dmitry Krass, Oded Berman

Consider the problem of locating and determining the design characteristics of new competitive facilities. The complexity of the problem is discussed and efficient exact and approximate solutions for special cases of this problem are developed. We also develop a tight worse-case error bound for one of the special cases of this problem.

■ MD42

Fairmont-Belvedere

Marketing Research

Sponsor: College on Marketing Section
Sponsored Session

Chair: J. Miguel Villas-Boas, University of California, Berkeley, CA, 94720-1900, USA, villas@haas.berkeley.edu

1 — Multiproduct Oligopoly and Bertrand Supertraps
J. Miguel Villas-Boas, University of California, Berkeley , CA, 94720-1900, USA, villas@haas.berkeley.edu., Luis Cabral

We study oligopoly price competition between multiproduct firms, firms whose products interact in the profit function. Specifically, we focus on the impact of intra-firm product interactions on the level of equilibrium prices and profits. We present a number of applications of the general results, including learning curves, network effects, systems competition, bundling, switching costs, and Internet cross-referencing.

2 — Strategies for Increasing Market Share Among Different Territories: Implications for Practitioners
Chaim Ehrman, Loyola University, Chicago, IL, 60611, USA, cehrman@luc.edu.

Performance of Franchisees are typically evaluated by the percent of sales they generate compared to other franchisee operations. Using a Harvard Case, "Trans American Cable" (TRAC) we demonstrate an optimal methodology for Marketing Practitioners in terms of targeting those Management Areas that will have the highest likelihood of increasing Market share for the Franchisee.

3 — Preliminary Results for an Exact Algorithm for the Share of Choices Problem
James Cochran, Louisiana Tech University, Ruston, LA, 71272, USA, jcochran@cab.latech.edu., Jeffrey Camm, David Curry, Sriram Kannan

We test an algorithm that combines Lagrangian relaxation with various logic rules to determine if it can efficiently determine the optimal solution to difficult maximal coverage problems with special ordered sets, focusing specifically on share of choices problems (selection of product attributes that result in the optimal projected market share).

■ MD43

Center-Room H

Online Auctions

Sponsor: Revenue Management and Pricing Section
Sponsored Session

Chair: Georgia Perakis, MIT, Associate Professor of Operations Research, Cambridge, MA, 02139, USA, georgiap@mit.edu

1 — Time is Money: The effect of clock speed on seller's revenue in Dutch auctions
Elena Katok, Penn State University, University Park, PA, 16802, USA, ekatok@psu.edu., Anthony Kwasnica

This study examines the role of timing in auctions under the premise that time is a valuable resource. We study Dutch and first-price sealed bid auctions in the laboratory, with a specific emphasis on the speed of the clock in the Dutch auction. At fast clock speeds revenue in the Dutch auction is significantly lower than the sealed bid auction, but when the clock is sufficiently slow revenue in the Dutch auction is greater than the revenue in the sealed bid auction.

2 — Optimal Dynamic Auctions for Revenue Management
Garrett van Ryzin, Columbia University, New York, NY, 10027, USA, gvanryzi@research.gsb.columbia.edu., Costis Maglaras, Gustavo Vulcano

We consider a variation of the single-leg, revenue management problem in which consumers act strategically and bid for units of capacity over time. For this setting, we prove that dynamic variants of the first-price and second-price auction maximize the seller's expected revenue. These optimal auctions are easy to compute and implement. Comparisons with traditional revenue management illustrate when auctions may provide improvements in revenues.

3 — Market Research and Market Design
Sandeep Baliga, Northwestern University, Evanston, IL, 60208-2009, USA, baliga@nwu.edu., Rakesh Vohra

We study trading models when the distribution of signals such as costs or values is not known to traders or the mechanism designer when the profit-maximizing trading procedure is designed. We present adaptive mechanisms that simultaneously elicit this information (market research) while maintaining incentive compatibility and maximizing profits when the set of traders is large (market design).

4 — Bidding and Selling Mechanisms in Online Auctions
Jeff Hawkins, MIT, Cambridge, MA, 02139, USA, jhawkins@mit.edu., Dimitris J. Bertsimas, Georgia Perakis

In recent years, online auctions have become a convenient, efficient, and effective method of doing business for both consumer and business-to-business trade. In this talk we investigate problems arising in online auctions from both a bidder's as well as a seller's perspective. In particular, in this talk we build a dynamic optimization model for bidding in multiple sequential auctions (this includes the potential of also bidding in future auctions that have not started yet). Moreover, we consider the problem from the aspect of a seller and discuss optimal price setting mechanisms for a seller selling items in one or potentially many online multi-bidder auctions.

■ MD44

Center-Room B2

Joint Warfare System (JWARS) - Algorithms, Uses, and Analysis

Sponsor: Military Applications Society
Sponsored Session

Chair: Paul Bross, CACI, Project Manager, Arlington, VA, 22209, USA,

paul.bross@osd.mil

1 — New Terrain Roughness and Probability of Line-of-Sight Modeling for JWARS
H. Ric Blacksten, CACI/JWARS, Principal Functional Analyst, Arlington, VA, 22209, USA, rblacksten@caci.com., Chuck Burdick, Mihaly G. Grell

Measures of terrain roughness and Pr(LOS) are generated by: calculating empirical roughness as a function of range, sans "soap film" substrate; fitting empirical roughness as two-parameter curve; fitting empirical PLOS curves for several observer heights to a two-parameter curve. Result is four-parameter composite model providing excellent fits to empirical data.

2 — Ground Force Sustainment Planning in JWARS
Paul Bross, CACI, Project Manager, Arlington, VA, 22209, USA, paul.bross@osd.mil., Chuck Burdick, James Huynh, Harry Argo

The JWARS office has applied the concept of forward-looking moving averages to sustainment planning for ground forces in a theater context. This planning discipline, when combined with actual force consumption, yields battlefield behavior that is doctrinally correct yet logistics constrained. This paper discusses the approach and sample outcomes.

3 — JWARS Analytical Tools and Capabilities
Harry Argo, Joint Warfare System Office, LTC US Army, Arlington, VA, 22209, USA, harry.argo@osd.mil., Greg McIntyre, Chuck Burdick, Paul Bross

The JWARS office has developed a robust suite of analytical support tools that enhance study development and implementation, along with the capability to select different measures of output from the model. The authors present a representative set of these tools in the context of a case study.

■ MD45

Center-Room B3

Military Applications Contributed Papers: Resource Allocation in Military

Sponsor: Military Applications Society
Sponsored Session

Chair: Phillip Djang, Army Research Laboratory, WSMR, NM, pdjang@psl.nmsu.edu

1 — Exact Methods and Heuristics to Solve Weapon-Target Assignment (WTA) Problem
Krishna Jha, University of Florida, Graduate Student, Gainesville, FL, 32611, USA, kcjha@ufl.edu., Ravindra Ahuja, Arvind Kumar, Robert Murphey

The WTA problem is one of the most important problems in defense related OR applications. The problem is NP-hard and consists of assigning weapons to targets to minimize expected survival value of targets. We report branch and bound based exact algorithms and very large-scale neighborhood search based heuristic algorithms for solving this problem.

2 — Cost, Price and Risks of Fixed Price Incentive Firm Contracts
James Gordon, US Air Force, Major, Silver Spring, MD, 20910, USA, james.gordon@noaa.gov., Chien-Ching Cho

When acquiring a system with significant cost uncertainties, the Government often uses a fixed price incentive firm contract to motivate tight conractor cost control. This talk presents the general behavior and unique characteristics of such contracts. Methods for evaluating Government and contractor risks with assessed system cost distribution are shown also.

3 — Information Queuing Problem
Erick Brough, United States Air Force/ United States Air Force Academy, USAF Academy, Co, 80841, United States, c03erick.brough@usafa.edu., John Anderson

The Air Force uses an undermanned information gathering center that processes images from several sources. The problem is that the volumes of images form queues so long that important information becomes obsolete while waiting in the queues. A graphical simulation was created to determine the optimal number of image processors to correct the system.

■ MD46

Center-Room C3

Global Optimization Software

Cluster: State of the Art in Optimization Software
Invited Session

Chair: Nick Sahinidis, University of Illinois, Urbana, IL, 61801, USA, nikos@uiuc.edu

1 — MathOptimizer — Modeling and Optimization in Mathematica®
Janos Pinter, Pinter Consulting Services, Halifax, NS, B3M 1J2, Canada, jdpinter@hfx.eastlink.ca.

Mathematica offers an integrated environment for scientific and technical computing. MathOptimizer is a native Mathematica product that enables the global and local (numerical) solution of a general class of optimization problems. We will review the main features of MathOptimizer, including some challenging tests and applications.

2 — A Benchmark for Global Optimization and Continuous Constraints
Arnold Neumaier, University of Vienna, Vienna, Austria, Arnold.Neumaier@univie.ac.at., Oleg Shcherbina

We discuss the available test problem collections for constrained global optimization and continuous constraint satisfaction problems, and about test results obtained on these problems for several global optimization codes available at present.

3 — Global Optimization with BARON
Nick Sahinidis, University of Illinois, Urbana, IL, 61801 , USA, nikos@uiuc.edu., Mohit Tawarmalani

Since the early 1990s, the branch and bound system BARON has implemented constraint programming and novel global optimization techniques for the solution of nonconvex NLPs and MINLPs. We demonstrate that this tool is now capable of solving nonconvex optimization problems from a variety of disciplines in a completely automated manner.

■ MD47

Center-Ballroom A8

Software Demonstration Session 08

Cluster: Software Demonstrations
Invited Session

1 — Decisioneering, Inc. — Simulation and Modeling using Crystal Ball Professional
David Fredericks, Decisioneering, Inc., Denver, CO, 80202 , USA, dfredericks@decisioneering.com.

Simulation and Modeling using Crystal Ball Professional - Crystal Ball software is one of the most recognized software tools for introducing the concepts of simulation and risk analysis to students. This discussion will introduce the fundamentals of uncertainty analysis, Monte Carlo simulation and optimization modeling techniques using Crystal Ball. Practical applications will include financial and portfolio analysis and optimization.

2 — ILOG, Inc. — ILOG CPLEX 8.0 Technical Overview: New Features and Performance Breakthroughs Introduced with Version 8.0
Irv Lustig, ILOG, Inc., Mountain View, CA, 94043, USA, Ilustig@ilog.com.

ILOG CPLEX 8.0 Technical Overview: New Features and Performance Breakthroughs Introduced with Version 8.0. Learn about new features, algorithms and capabilities for achieving added performance in LP, QP, MILP and now MIQP models, including: MIP performance enhancements, IP search strategy feature, sifting algorithm, concurrent optimization capabilities, new QP simplex algorithms and new MIQP algorithm.

Tuesday 8:00 - 9:30am

■ TA01

Center -Ballroom A4

Tutorial: Control of the Supply Chain: Some Lessons from Traffic Flow Theory

Invited Session

1 — Control of the Supply Chain: Some Lessons from Traffic Flow Theory.
Carlos Daganzo, University of California at Berkeley, Berkeley, CA, 94720, daganzo@ce.berkeley.edu.

What do gas molecules, automobiles, and factory products have in common? It turns out that their macroscopic motion in one-dimensional space (e.g., over a multi-echelon inventory system) is described by very similar equations. Therefore, fluid/traffic dynamics models and techniques are relevant for supply chain management. This tutorial will show how these techniques can be used for controlling supply chains in new ways.

■ TA02

Fairmont-Cupertino

Case: Entrepreneurship Education for Engineers: The Stanford Experience

Cluster: Practice Track

Invited Session

Chair: Tom Byers, Stanford University, Stanford, CA, 94305, USA, tbyers@stanford.edu

1 — Entrepreneurship Education for Engineers: The Stanford Experience
Tom Byers, Stanford University, Stanford, CA, 94305, USA, tbyers@stanford.edu., Tina Seelig

This case study session explores the future of high-technology entrepreneurship education with particular emphasis on the needs of engineering and science majors. Many people consider high-technology entrepreneurship the driving force of the global economy. In addition, entrepreneurship education is now a well established part of the MBA curricula at most major schools. From the perspective of their work at the Stanford Technology Ventures Program (http://stvp.stanford.edu), the presenters will share their observations on how engineering and science majors are being addressed by some of the leaders in the field.

■ TA03

Fairmont-Fairfield

Tutorial: Modeling Capacity in Production and Supply Chain, Planning Models

Cluster: Practice Track
Invited Session

Chair: Reha Uzsoy, Purdue University, West Lafayette, IN, 47907-1287, USA, uzsoy@ecn.purdue.edu

1 — Modeling Capacity Production and Supply Chain Planning Models
Jakob Asmundsson, Purdue University, Reha Uzsoy

The vast majority of production, distribution and service systems operate in a finite capacity environment, where the output capacity of the system over any given time interval is limited by the availability of one or more resources such as production equipment, skilled labor, etc. Hence a major characteristic of these systems is congestion, in which a number of different tasks compete for the scarce resources with the potential to cause significant degradation in system performance. The basic difficulty is that a planning model, whether for an individual facility or an entire supply chain, requires estimates of the lead times at the various nodes in order to match production to a demand pattern that is realized over time. However, the lead times at nodes of a supply chain or the work centers of a manufacturing facility are determined to a large extent by the utilization of the node, which is an output of the planning process. In this tutorial we examine the different ways of modeling manufacturing capacity used in the literature to date, relate these to industrial practice, and discuss a number of novel approaches.

■ TA04

Hilton-San Carlos II

Data Mining Applications in Telecom and Computing Industries

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Wei Jiang, M&JG Enterprise, Statistical Consultant, Morristown, NJ, 07060, USA, wjg@insight.att.com

1 — Multiplicative Adjustment of Class Probability: Educating Naive Bayes
Jonathan Hosking, IBM, Yorktown Hts., NY, 10598, USA, hosking@watson.ibm.com., Se June Hong, Ramesh Natarajan

We show that in the NaÔve Bayes classification model, each feature variable contributes a multiplicative adjustment factor to the estimated class probability. We define the Adjusted Probability Model (APM), which controls the importance of the feature variables by raising each adjustment factor to a different power. Experiments demonstrate that APM is surprisingly effective. Assigning different degrees of importance to the feature variables seems to remove much of the naÔvetÈ from NaÔve Bayes.

2 — Activity Monitoring in Telecommunication Industry
Wei Jiang, M&JG Enterprise, Statistical Consultant, Morristown, NJ, 07060, USA, wjg@insight.att.com., Kwok Tsui

Activity monitoring, emerging as a new research area in data mining and business intelligence, has a broad applications in telecommunication industry. This paper discusses several important applications including fraud detection, data quality tracking, and business structure monitoring. It is demonstrated that powerful statistical quality control methods such as SPC can be successfully implemented in telecommunication service to extract business process information.

■ TA05

Fairmont-Sacramento

Worker Flexibility

Contributed Session

Chair: Eylem Tekin, University of North Carolina-Chapel Hill, Chapel Hill, NC, 27599-3180, USA, eylem_tekin@unc.edu

1 — Opportunities for Worker Cross-Training in Service Operations
Eylem Tekin, University of North Carolina-Chapel Hill, Chapel Hill, NC, 27599-3180, USA, eylem_tekin@unc.edu., Wallace J. Hopp, Mark P. Van Oyen

We develop models for flexible workforce management in service environments with multiple classes of customers. In particular, we investigate cross-training strategies such as pooling and floating, and demonstrate the performance improvement opportunities by using queueing models.

2 — Worker Cross-Training Decisions in Field Service Systems
Sal Agnihothri, Binghamton University, State University of New York, Associate Professor, Binghamton, NY, 13902, U.S.A., agni@binghamton.edu., Ajay Mishra

When the job types are heterogeneous, there by requiring multiple skills, cross-training workers increases worker flexibility as well as service costs. In this talk we review the results of our recent research aimed at evaluating the impact of different cross-training configurations on system performance measures. We also develop an index to measure the extent of cross-training.

3 — Stochastic Workforce Planning
Charles P. Schmidt, University of Alabama, Steven Nahmias

We consider service facilities with random job arrivals and seek to determine the optimal size and composition of the workforce. Various models are proposed to estimate the expected net revenue associated with a given workforce. The net revenue function is then used in a dynamic programming model to determine the optimal workforce when there are hiring/firing costs, wage costs, and stochastic attrition of the workforce. The form of the optimal policy is derived in simple cases, heuristics are suggested in more complex cases, and applications and insights gained are presented.

■ TA06

Fairmont-Atherton

Socio-technical Systems

Contributed Session

Chair: Tony LaTurner, Utah Valley State College, Assistant Professor, Orem, Ut, 84058, USA, tlt@vii.com

1 — Analysis of Business Units of a Japanese Telecommunication Company
Takashi Namatame, Senshu University, Tokyo, Japan, takashi@isc.senshu-u.ac.jp., Tomoaki Tabata, Norihiko Watanabe, Takahiro Ono

Recent years, the invironment around the telecommunication in Japan is strict. So, it is important to consider various factors on the business strategies. In this study, we pick up a Japanese telecommunication company and analyze efficiency and effectiveness aspect of the business units. Then, some management implications are pointed.

2 — Cost Accounting & Activity Base Costing is For Accountants and Not to be Used by Operations Managers
Tony LaTurner, Utah Valley State College, Assistant Professor, Orem, Ut, 84058, USA, tlt@vii.com.

Many of the measurements we use to determine "value added," in our day-to-day operations management are counter-productive to our basic goals, to make money. Any of the cost and absorbtion costing accounting models force managers to produce waste, inefficiencies and can ultimately threaten the firms ability to implement a meaningful 'constant improvement program.' Just in Time, Lean Production and Agile Manufacturing are all hampered by these accounting measurements.

3 — Quality of Life — A Subject of Attitude, a Gesture of Balance
Ana Lucia T. Seroa da Motta, UFF - Fluminense Federal University, Pos Doc. Ph.D. Prof., Rio de Janeiro, RJ, 22611190, Brazil, anaseroa@ism.com.br., SÈrgio Ballerini

Presenting method aiming at total quality, by following internal resolution 32/2002 from INMETRO. INMETRO is a Brazilian Federal Agency, which acts in areas of Scientific Metrology, Legal Metrology, Normalization, Quality and Certification. Very high indexes of pathologies registered since 1992 by routine health¥exams, lead administration of life quality's program to develop this method, which seeks to standardize and normatise administration procedures in order to reduce the actual indices.

■ TA07

Fairmont-Piedmont

Determinants of Product Development Rate and Impact

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Glen Schmidt, McDonough School of Business, Asst. Professor, Washington, DC, DC, 20057, USA, schmidtg@msb.edu

1 — Conjoint Adaptive Ranking Database System (CARDS)
Ely Dahan, UCLA Anderson School, Asst. Professor of Marketing, Los Angeles, CA, 90095-1481, USA, edahan@ucla .edu.

We propose a twist on conjoint. Rather than first getting responses and then estimating the utility function, we first enumerate all possible utility functions (using prior knowledge), and then give the conjoint survey in a way consistent with 1 utility function. Advantages: (1) dramatically reduced questioning, (2) estimation of utility at any point, (3) weighting of highly ranked product profiles, (4) rapid improvements in database performance. We offer initial experimental results.

2 — R&D competency and industrial organization
Korhan Gurkan, Carnegie Mellon, Asst. Professor, korhang@stanford.edu.

We advance a game-theoretic model of R&D competition and study the impact of different types of R&D competencies on the way industries are structured.

3 — Clockspeed in Disparate Industries
Glen Schmidt, McDonough School of Business, Asst. Professor, Washington, DC, DC, 20057, USA, schmidtg@msb .edu.

We examine the meaning and measure of clockspeed in disparate industries such as computers printers and pharmaceuticals. For example, in printers, products are introduced more frequently but it seems improvements may be more incremental.

■ TA08

Center-Ballroom A2

Performance Analysis and Optimization in e-Business

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: Yingdong Lu, IBM, Yorktown Height, NY, 10549, USA, yingdong@us.ibm.com

1 — On Measuring Supplier Performance under Vendor-managed-inventory Programs
Ki-Seok Choi, Georgia Institute of Technology, kchoi@isye .gatech.edu., Jim Dai, Jeannette Song

As a widely accepted performance measure, service level is often used in supplier contracts in VMI programs. While this measure of supplier performance is sufficient in a supplier-retailer setting , we show that it is not necessarily so in a supplier-manufacturer setting. We propose alternative measures.

2 — Traffic Modeling and Profiling for e-Commerce Web Sites
Zhen Liu, IBM, Yorktown Heights, NY, 10598, USA, Mark Squillante, Cathy H. Xia, Shun-Zheng Yu, Li Zhang

The problems of workload characterization, performance modeling, workload/performance forecasting and capacity planning are fundamental to the growth of e-Business services and applications . Previous studies have primarily focused on the complexity of Web traffic at the level of hits/page-views. In contrast, our study focuses on higher-level characteristics, and introduces techniques for profiling, clustering and classification of Web site traffic. In particular, we devise novel techniques for efficient and automated extraction of Web traffic patterns from access logs.

3 — Optimization Analysis for Online Selling Modes
Frank Y. Chen, Chinese University of Hong Kong, Shatin, N .T., Hong Kong, Youyi Feng

Consider a firm selling a product on the Internet over a fixed time period. The distribution of potential customer's reservation price may change over time. The firm may sell multiple units of the product through either posted pricing or online auction, or combination of both. In this study we consider two models. In Model 1 the firm starts with a posted price and then switches to an online auction. In Model 2 the firm announces a buyout price and a reserved price for end-season auction. The optimization analysis provides with the best operational parameters for obtaining maximum revenue for the selling firm in each model.

4 — Rebate, Returns, and Price Protection Polices in Supply Chain Coordination
Xiangwen Lu, University of California, Irvine, CA, 92697, USA, xlu@translab.its.uci.edu., Jeannette Song, Amelia Regan

We study channel coordination policies for products subject to price drops during their short product life cycles. For systems with one purchase opportunity, we identify win-win policies. For systems with two purchase opportunities, we show that a win-win policy may not exist if holding and loss-of-goodwill costs are considered.

■ TA09

Center-Ballroom A3

Impact of New IS Capabilities on the Structure of B2B Relationships

Cluster: e-Business: Integrating Academic and Industrial Perspectives
Invited Session

Chair: C. Schlueter Langdon, University of Southern California

Co-Chair: R. Sikora, University of Illinois at Urbana-Champaign

1 — Web Services: The Next Big Thing? An Exploratory Analysis of Web Services Capabilities
C. Wu, C. Schlueter Langdon

Web services (WS) vendors promise that WS-based IS can more easily facilitate interaction across systems than current technology. However, many issues remain unsolved and are investigated in a qualitative study: What exactly is a WS or how to define it as a unit of analysis? How does a WS as an IT innovation affect IS capabilities?

2 — Inter-organizational IS and Relational Value
N. Saraf, C. Schlueter Langdon

Inter-organizational IS influence how value is derived from relationship networks. We measure network relational value as benefits from exploiting interdependencies across relationships. Using knowledge sharing as a mediating variable we investigate how three types of IS capabilities affect the creation of relational value. The research model is being tested in the communications and high-tech industry.

3 — Recognizing Interaction Effects in IS Research: Complementing IS Research Methodology
C. Schlueter Langdon, University of Southern California, Michael J. Shaw, R. Sikora

Many IS research problems, such as IT standardization and the alignment of IS and business strategy, exhibit interaction effects. Increased market volatility and accelerated rate of IT innovation require an understanding of the dynamics of interaction effects. In order to investigate these effects we propose to complement formal modeling methods with new analytic modeling techniques.

■ TA10

Center-Ballroom A7

Scheduling and Transportation Logistics

Cluster: Scheduling
Invited Session

Chair: George Vairaktarakis, Case Western Reserve University, Cleveland, OH, 44106-7235, USA, gxv5@po.cwru.edu

1 — Transporting/Managing Inventories of Liquid Chemical Products Using Oceangoing Vessels
Mohsen Elhafsi, University of California, Riverside, CA, USA, Abdelghani A. Elimam, B. Dodin

2 — A Surrogate Approach to Multi-resource Generalized Assignment Problem
Bahram Alidaee, University of Mississippi, Oxford, MS, USA

3 — Managing WIP Costs in General Production Systems
Joe Szmerekovsky, Case Western Reserve University, Cleveland, OH, USA, George Vairaktarakis

4 — Loading/Unloading Operations in Container Terminals
George Vairaktarakis, Case Western Reserve University, Cleveland, OH, 44106-7235, USA, gxv5@po.cwru.edu., Chung-Lun Li
Abstracts not supplied

■ TA11

Center-Room C1

Scheduling Disruption Management

Contributed Session

Chair: Jonathan F. Bard, Department of Mechanical Engineering, Austin, TX, 78712, USA, jbard@mail.utexas.edu

1 — Nervousness Revisited: The Effects of Real-time Order Promising
Anne G. Robinson, Stanford University, Stanford, CA, 94305-

4026, USA, agrobins@stanford.edu., Robert C. Carlson

Real-time Available-to-Promise capabilities require dynamic allocation of system resources to reflect each additional customer order. In this research, we describe a model for system stability using real-time order promising and present circumstances under which change costs are beneficial.

2 — Balancing Delivery Speed and Delivery Reliability for Due Date Management

Rahul Patil, University of Colorado, Boulder, CO, 80309-0419, USA, Rahul.Patil@colorado.edu., Stephen R Lawrence

Balancing delivery speed and delivery reliability is an important aspect of due date management in dynamic job shops. We propose a two-phase approach to set the due dates for the arriving orders by considering order priorities, shop load, overtime options, and various costs explicitly.

3 — Disruption Management for Machine Scheduling

Xiangtong Qi, Department of MSIS, Austin, TX, 78712, USA, qix@mail.utexas.edu., Jonathan F. Bard, Gang Yu

We study the problem of updating a machine schedule when disruptions occur. It differs from pure rescheduling in that the cost associated with the deviation from the original schedule is considered. A classification scheme is proposed. Theoretical results are provided when an SPT schedule is optimal for the original problem.

4 — The Development of Synchronized Scheduling Model at Steel Works

Sang Hyuck Park, RIST, Pohang, KB, Korea, parksh@rist.re .kr.

A current production scheduling in steel works, has had several problems: low synchronization between upstream and downstream processes, too much rescheduling tasks. In this research, we aimed to develop prototype system to guarantee punctuality of production planning and enhance synchronization between processes to both maximize energy savings and minimize delayed time.

■ TA12

Fairmont-Regency 1

Improving Productivity in Health Care

Sponsor: Health Applications Section
Sponsored Session

Chair: Liam O'Neill, Cornell University, Assistant Professor, Ithaca, NY, 14853, USA, lo22@cornell.edu

1 — Using the Optimal Partition in Assignment Problems

Allen Holder, Trinity University, San Antonio, TX, 78212, USA, aholder@trinity.edu.

Abstracts not supplied

2 — Beyond the World Health Report 2000

Peter Hilsenrath, University of North Texas Health Center , Ft. Worth, TX, 76107, USA, philsenr@hsc.unt.edu., Joseph Coyne

The WHO's ranking of health systems of the world has generated much controversy. The methodology employed which includes production frontiers, is flawed many critics argue, but the exercise and the debate it generates is probably worthwhile. Hilsenrath and Coyne discuss the WHO report and its limitations.

3 — Integrating Managerial Accounting and Patient Flow Databases to Improve Operating Room Staffing and Scheduling

Franklin Dexter, University of Iowa, Iowa City, IA, 52242 , USA, franklin-dexter@uiowa.edu.

Abstracts not supplied

4 — How Patients Choose Hospitals: The Effect of Medical Technology and Quality

Liam O'Neill, Cornell University, Assistant Professor, Ithaca, NY, 14853, USA, lo22@cornell.edu., Franklin Dexter

Multinomial logistic regression is used to determine how patients choose hospitals. Recent data was obtained on inpatient encounters at 150 Pennsylvania hospitals. Geographic Information Systems (GIS) is used to determine patient travel time. Some preliminary results are presented.

■ TA13

Center-Room D

Fractional Programming and Generalized Convexity I

Sponsor: Optimization Section - Nonlinear Programming
Sponsored Session

Chair: Mohit Tawarmalani, Purdue University, Assistant Professor, West Lafayette, IN, 47907-1310, USA, mtawarma@mgmt.purdue.edu

1 — Elementary Closures for Integer Programs

Yanjun Li, GSIA, Carnegie Mellon University, Dr., Pittsburgh, PA, 15232, USA, yanjun@andrew.cmu.edu., Gerard Cornuejols

In integer programming, the elementary closure associated with a family of cuts is the convex set defined by the intersection of all the cuts in the family. We compare eighteen families of cuts in the literature by comparing their elementary closures. All inclusion relationships are established between them.

2 — Global Optimization of Nonlinear Disjunctive Programs with Bilinear Equations

Ignacio Grossmann, Carnegie Mellon University, Professor, Pittsburgh, PA, 15213, USA, grossmann@cmu.edu., Sangbum Lee

We address the global optimization of disjunctive optimization problems that involve bilinear equations. Tight relaxations are obtained by exploiting the convex hull of the disjunctions, and reformulation and linearization techniques that are used in a two level branch and bound algorithm. Applications include pooling/blending problems and wastewater treatment networks.

3 — Convex Extensions and Polyhedral Basis

Mohit Tawarmalani, Purdue University, Assistant Professor , West Lafayette, IN, 47907-1310, USA, mtawarma@mgmt .purdue.edu.

We recently introduced the notion of convex extensions of nonlinear functions. In this talk, we describe various applications of convex extensions in producing tight relaxations for MINLPs. We develop the notion of a polyhedral basis, and provide many insights into convexification techniques and finite probability spaces through its study.

4 — Symmetry Groups, Semidefinite Programs, and Sums of Squares

Pablo A. Parrilo, Swiss Federal Institute of Technology, Zurich, ZH, CH-8092, Switzerland, parrilo@aut.ee.ethz.ch., Karin Gatermann

We explore the geometric, algebraic, and computational implications of continuous and discrete symmetries in SDP. It is shown that symmetry exploitation allows a significant reduction in both matrix size and number of decision variables. For these problems, we show how the feasible set can be restricted to a specific subspace, reducing the problem to a SDP of smaller dimensions. Of particular interest are the SDPs arising from sum of squares decompositions of symmetric polynomials.

■ TA14

Center-Room E

Minimax Problems

Contributed Session

Chair: Dimitri P. Bertsekas, MIT, Cambridge, MA, 02139, USA, dimitrib@mit.edu

1 — A Unifying Framework for Duality and Minimax

Dimitri P. Bertsekas, MIT, Cambridge, MA, 02139, USA, dimitrib@mit.edu., Angelia Nedic, Asuman Ozdaglar

We provide unification of duality, via two geometrical problems that are dual to each other. Within the simple geometry of these problems, the fundamental constraint qualifications for strong duality admit straightforward proofs. As special cases, we obtain the major results of Lagrangian duality and minimax (saddle point) theory.

2 — An Interior Point Method for Large-scale Nonlinear Minimax Problems

Enitan A. Obasanjo, Imperial College of Science and Technology, London, SW7 2BZ, United Kingdom, eao99@ic.ac .uk., Berc Rustem

We present the design and implementation of a primal dual interior point method for large-scale constrained nonlinear, and not necessarily convex, minimax problems. Convergence properties of the algorithm are described and its effectiveness is demonstrated through some numerical examples.

■ TA15

Center-Room B4

Very Large Scale Neighborhood Search

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: James Orlin, MIT E40-147, Professor, Cambridge, MA, 02139, USA, jorlin@mit.edu

1 — Very Large Scale Neighborhoods Induced from Dynamic Programs

Ozlem Ergun, Georgia Tech, Atlanta, GA, 30332, USA, oergun@isye.gatech.edu., James Orlin

We consider exponential sized neighborhoods (for neighborhood search algorithms) in which the neighborhood of a solution is defined using recursion. In some cases, we can search these exponential sized neighborhoods in polynomial time by relying on dynamic programming recursions. We provide a number of illustrations for neighborhoods of the TSP.

2 — Neighborhood Search Algorithms and the Extended Neighborhood
Dushyant Sharma, MIT, Cambridge, MA, 02139, USA, dushyant@mit.edu., James Orlin

In neighborhood search, it is some times the case that two different neighborhood structures share the same set of local optima. We refer to these two neighborhoods as LO-equivalent. The largest neighborhood that is LO-equivalent to a neighborhood N is called the extended neighbor of N. For the TSP, we show that the extended neighborhood of the 2-opt neighborhood has at least (n/2)! neighbors, and we give a polyhedral characterization of the extended neighborhood.

3 — A Multi-exchange Heuristic for the Single Source Capacitated Facility Location Problem
Maria Paola Scaparra, University of California, Santa Barbara, Post Doc Student, Santa Barbara, CA, USA, scaparra@di.unipi.it., Stefano Pallottino, Ravindra Ahuja, James Orlin, Maria Grazia Scutella'

This paper presents a very large scale neighborhood (VLSN) search algorithm for the single source capacitated facility location problem. The neighborhood structures are induced by customer multi-exchanges and by facility moves. We consider both single-customer multi-exchanges, detected on a suitably defined customer improvement graph, and multi-customer multi-exchanges, detected on a facility improvement graph. Computational results for some benchmark instances are reported.

■ TA16

Center-Room C4

Applications of Integer Programming

Sponsor: Optimization Section-Integer Programming
Sponsored Session

Chair: Eva K. Lee, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, eva.lee@isye.gatech.edu

1 — Strong Inequalities for the Bounded Inventory Problem
Simge Kucukyavuz, UC Berkeley, simge@ieor.berkeley.edu., Alper Atamturk

We consider a production lot-sizing problem with bounded inventory. We propose strong cutting planes for this problem and present computational results on incorporating these cuts in a branch-and-cut algorithm.

2 — Freight Routing in a Less-than-truckload Network
Dave Devang, Georgia Institute of Technology, Atlanta, GA , 30332-0205, USA, devang@isye.gatech.edu., Eva K. Lee, John Bartholdi

We propose an MIP model to route freight in a hub-and-spoke based less-than-truckload distribution network. The model captures both the sorting costs at hubs and stepwise cost in twin trailer truck transportation. We implemented a primal heuristic within a branch-and-bound algorithm. Computational performance of a tight and a relaxed MIP formulations will be described. We will also discuss briefly a parallel B&B implementation used for solving a large LTL carrier problem with 361 terminals and 24 hubs.

3 — A Three Phase Approach to Bid-line Optimization
Ellis Johnson, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, ellis.johnson@isye.gatech.edu., Jeffrey Weir

The first phase of our three stage approach to airline crew bid-line optimization is assigning the number of "patterns" of pairings. About half of the rules, including new circadian rhythm sleep rules, are captured in this phase. The second stage goes to dated pairings within these patterns. Finally, the restrictions are relaxed in order to cover remaining pairings.

■ TA17

Center-Room B1

Scheduling Wafer Fabrication II: New Approaches to Operational Modeling and Simulation for Semiconductor Manufacturing

Cluster: Manufacturing Systems
Invited Session

Chair: Michele Pfund, Arizona State University, Tempe, AZ, 85287-5906, USA, michele.pfund@asu.edu

1 — Statistical Operations Control For Wafer Fab Scheduling
George Runger, Arizona State University, Tempe, AZ, 85287-5906, USA, runger@asu.edu., Esma Gel, Cem Vardar, Andy Burhanuddin

We discuss the role of statistical operations control for rescheduling decisions. We discuss a strategy for adaptive schedule control and provide a framework for implementation within a scheduling system.

2 — Decision Rules for Adaptive Rescheduling for Wafer Fabs
Cem Vardar, Arizona State University, Tempe, AZ, 85287-5906, USA, cem.vardar@asu.edu., Michele Pfund, George Runger, Esma Gel, Andy Burhanuddin

We study different decision rules to trigger rescheduling or local repair of existing schedules. Several statistical measures were studied in this research. We outline a multiple step look-ahead strategy to evaluate the impact of statistically significant deviations from the target schedule on the fab performance.

3 — Framework for the Performance Assessment of the Shifting Bottleneck Heuristic for Complex Job Shops
Lars Moench, Technical University of Ilmenau, Assistant Professor, Ilmenau, 98684, Germany, Lars .Moench@wirtschaft.tu-ilmenau.de., Roland Sturm, Oliver Rose

In this paper, we show the architectural concept that was used to integrate the FORCe scheduler into a commercial factory simulation software package. Instead of using the simulator's data structures directly, we implemented a factory data image that is updated by the simulator. This data image is then used by the schedule to perform its computations. Due to this approach, the scheduler can easily be separated from the simulator if a stand-alone software module is required.

4 — Performance Comparison of the FORCe Scheduler and Dispatch Rules
Oliver Rose, University of Wuerzburg, Assistant Professor , Wuerzburg, D, 97074, GERMANY, rose@informatik .uni-wuerzburg.de., Roland Sturm, Lars Moench

In this paper, we assess the performance of the FORCe scheduler with respect to factory performance indicators like product cycletimes and deviations from given due dates. We compare the scheduler's results against classical dispatch rules like FIFO, Earliest Due Date, or Critical Ratio. In addition, we provide information about the computation times of the schedules.

■ TA18

Center-Room J2

Demand and Supply Chain Management — Putting Theory into Practice

Sponsor: Optimization Section-Practice and Applications
Sponsored Session

Chair: Rajiv Saxena, Menlo Worldwide Technologies, Redwood City, CA, 94065, USA, saxena.rajiv@menlolog.com

1 — Supply Chain Design: Bridging the Gap to Where the Rubber Meets the Road
Steve Hill, Menlo Worldwide Technologies, hill .steve@menlolog.com.

An optimal supply chain design does not guarantee optimal results . Theoretical designs need validation by operating managers. Astute implementation and operation of an optimal design are fundamental to achieving savings predicted by theory.

2 — Demand Based Management — True Optimization at the End of the Demand Chain
Michael Neal, DemandTec, Chairman, San Francisco, CA, 94070, mike.neal@demandtec.com.

The supply chain starts at the consumer point-of-purchase, where a new era of Demand Based Management (DBM) solutions are helping retailers and manufacturers control business performance. Whether it is improved revenues, improved profits, or enhanced price image they are after, companies are explicitly responding to their customer's preferences, and fundamentally improving business performance. This presentation will highlight specific DBM case studies to illustrate how they work, and to quantify the financial opportunity.

■ TA19

Fairmont-Regency 2

Optimization and Equilibrium Models in Energy Applications

Sponsor: Energy/Natural Resources/Environment Section - Electricity Marktets and Energy Modeling
Sponsored Session

Chair: Steven Gabriel, University of Maryland, Assistant Professor, College Park, MD, 20742-3021, USA, sgabriel@eng.umd.edu

1 — Marginal Cost Pricing in a Generation Scheduling Model with Constraints on Dual Variables
Alexis L. Motto, Department of Electrical and Computer Engineering, Montreal, QC, H3A 2A7, Canada, alexis .motto@mail.mcgill.ca., Francisco D. Galiana

This presentation is concerned with equilibrium and optimality for generation scheduling in electricity markets. We formulate the profit-constrained generation scheduling problem using a minimum complementarity format, and derive an equivalent model that can be solved using available optimization software. The proposed model has been successfully applied to several test systems.

2 — Day-ahead Price Forecasting Methods in Electricity Markets
Antonio Conejo, Univ. Castilla-La Mancha, Professor, Ciudad Real, 13071, Spain, Antonio.Conejo@uclm.es., Francisco Nogales, Javier Contreras

In the framework of competitive electricity markets, power producers and consumers need accurate price forecasting tools. We provide several models to predict next-day electricity prices. Moreover, we present real world case studies from mainland Spain and California electricity markets to illustrate and compare the predictive behavior of these models.

3 — Predicting Structural Market Power in the Mexican Electricity System: An Optimization-based Approach
Marcelino Madrigal, Energy Regulatory Commission, Director of Research, Mexico, DF, 11510, Mexico, mmadrigal@cre.gob.mx., Guillermo Gutierrez, Jose Carlos Femat, Francisco de Rosenzweig

This work presents two models for competition modelling that are intended to predict and detect structural congestion problems that may limit competition in the future electricity market in Mexico. The first model is an optimization-based procedure using "human-driven" simulation. The second model uses a mathematical program with equilibrium constraints. The effect of demand elasticity and the level of bilateral contracting on market power is analyzed.

4 — An Equilibrium Model of the North American Natural Gas Market
Steven Gabriel, University of Maryland, Assistant Professor, College Park, MD, 20742-3021, USA, sgabriel@eng.umd.edu., Supat Kietnithiamorn, Jifang Zhuang

In this presentation, we examine the North American natural gas market from the nonlinear complementarity problem/variational inequality problem perspective (NCP/VIP). The NCP/VIP formulation takes into account the non-cooperative, game theoretic interactions between the various players (e.g., pipeline companies, producers, marketers, etc). We discuss qualitative properties of the NCP/VIP-based equilibrium and present relevant examples.

■ TA20

Fairmont-Hillsborough

Empirical Issues in Auction Design

Cluster: Auctions
Invited Session

Chair: Hsiu-Khuern Tang, Hewlett-Packard Laboratories, Researcher, Palo Alto, CA, 94304, USA, hsiu-khuern_tang@hp.com

1 — Semiparametric Estimation of Affiliated Private Value Model of Auctions Using Copulae
Kemal Guler, Hewlett-Packard Laboratories, MS 1140, CA, 94304, USA, kemal_guler@hp.com., Hsiu-Khuern Tang, Bin Zhang

We investigate applications of copula-based representation of joint distribution of bidders' private information in semiparametric structural econometrics of auctions. We present a model of sealed-bid first-price auction with affiliated private values (APV) where dependence of valuations is represented by a parametric copula. We show that the structure of affiliation in bidder valuations can be estimated parametrically from observed bids under minimal behavioral assumptions - namely, monotonicity of bids in valuations. We also characterize the Bayesian-Nash equilibrium inverse bid functions. This characterization allows nonparametric estimation of the marginal distribution of valuations.

2 — Estimation of Bidders' Risk Attitudes
Hsiu-Khuern Tang, Hewlett-Packard Laboratories, Researcher, Palo Alto, CA, 94304, USA, hsiu-khuern_tang@hp.com., Kemal Guler

We consider the problem of estimating the risk attitudes of symmetric bidders with independent private values (IPV). Bidders are risk averse if their common utility function U is concave. The function U affects the amount of bid shading in first price auctions, i.e., the difference between a bidder's value v and his equilibrium bid b. Since the values v are not observed in first price auctions, an indirect method has to be used to estimate v-b. We present a "quantile-matching" method that accomplishes this by using the variation in bidding behavior across different auction formats, specifically first and second price auctions. From this, the utility function may be estimated, either parametrically or nonparametrically. We show examples where modeling the risk aversion in estimating the optimal reserve price increases the expected seller's payoff. Lastly, we discuss how our method extends to affiliated private value (APV) models.

3 — A Model of an Online Bidding Process
Alex Zhang, Hewlett Packard Laboratories, Palo Alto, CA, 94304, USA, alex_zhang@hp.com.

We consider the process of bidding in a first-price, online auction with ascending bids. The auction has a definite duration and bidders "arrive at" the auction in a random sequence, and may decide to bid immediately or to return and bid later. Our goal is to infer, statistically, the underlying distribution of bids, from the recorded ascending sequence of bids. We then compare several variations of the bidding process model.

4 — Uniform Treatment of Symmetric and Asymmetric APV Models of First Price Sealed Bid Auctions
Bin Zhang, HP, Sr. Scientist, Fremont, CA, 94539, US, bin_zhang2@hp.com., Kemal Guler

Present a new approach of APV models that eliminates the need for separate treatment of symmetric and asymmetric bidders, and removes the ëcurse of dimensionality' suffered by the current kernel estimation methods for 1st price auctions with asymmetric bidders. The new approach leads to a significant reduction in sample size for estimating the distribution of bidder valuations. For example, required sample sizes are reduced by 3.5 times if 2 bidder segments, and by 40,000 if 10 segments.

■ TA21

Fairmont-Glen Ellen

Financial Engineering, Session 03

Cluster: Financial Engineering
Invited Session

Chair: Stanislav Uryasev, Uryasev@ise.ufl.edu

1 — Integrated Risk Management and Trading Strategies: an Application in Stock Portfolio Management
Chanaka Edirisinghe, University of Tennessee, Knoxville, TN, 37996, USA, chanaka@utk.edu.

Primary focus of this talk is to highlight the need to integrate risk management and stochastic parameter estimation directly within a model for stock portfolio optimization. It develops that adjusting the stock return estimates by certain measures of volatility evolution can lead to substantial improvement of a given trading strategy. Direct risk control with frequent trading , rather than simple diversification concepts, provides superior performance. We will also provide results on performance of stock portfolios managed actively with such a technique.

2 — Portfolio Optimization with Drawdown Constraints
Alexei Chekhlov, a_chekhlov@thorcapital.com., Stanislav Uryasev, Michael Zabarankin

Portfolio drawdown is a drop in the portfolio value compared to the previous maximum. This paper extends our earlier work on investigation of a new risk measure, Conditional Drawdown-at-Risk (CDaR). CDaR is defined as the mean of the worst x% drawdowns, averaged over time and number of scenarios. Using CDaR, we solved a real life portfolio allocation problem (portfolio of derivatives).

3 — Optimal Security Liquidation Algorithms
Sergei Butenko, University of Florida, Ph.D. Candidate, Gainesville, FL, 32611, USA, butenko@ufl.edu., Alexander Golodnikov, Stanislav Uryasev

We consider the problem of a portfolio liquidation with the aim of maximization of the expected return. The risk is constrained using CVaR risk functions. We compare two approaches: stochastic programming optimization and dynamic programming techniques. The approaches were tested with the optimization of a trading strategy.

■ TA22

Fairmont-Paseo

Auctions

Contributed Session

Chair: Hideo Owan, Washington University, St. Louis, MO, 63130-4899, owan@olin.wustl.edu

1 — Choosing a Bidding Language for Combinatorial Auctions 1243
Vinod P. Narayanan, University of Massachusetts-Amherst, Amherst, 01002, U.S.A., deepushari@yahoo.com., Abhijit Deshmukh

In this paper, we formalize grammars of the various languages used in combinatorial auctions and compare their strengths from the perspective of economic efficiency, expressiveness and simplicity. This analysis allows us to select an appropriate bidding language based on the type of valuation used in a combinatorial auction.

2 — Decomposition and Combinatorial Auctions
Jawad Abrache, CRT and Université de Montréal, Mr., Montréal, Qc, H3T 1J4, Canada, jawad@crt.umontreal.ca., Teodor Gabriel Crainic, Michel Gendreau

Multi-round iterative auctions are motivated by the fact that the auctioneer often lacks complete and truthful information about bidders' private valuations of items. We review previous efforts to design iterative combinatorial auction mechanisms, and we explore the relationships between mathematical programming decomposition methodologies and iterative combinatorial auctions.

3 — A Theory of B2B Exchange Formation and Ownership
Hideo Owan, Washington University, St. Louis, MO, 63130-4899, owan@olin.wustl.edu., Jack A. Nickerson

The recent explosion of attempts to form B2B exchanges and the large failure rate of these attempts raise questions about when and why B2B exchange formation succeeds. We maintain that a central element in answering these questions is understanding both buyer and supplier incentives to participate, a topic mostly ignored in the literature. Our model provides a theory of B2B exchange formation and of ownership structure needed to support formation by investigating various conditions under which B2B exchanges attract enough buyers and suppliers to form.

4 — Multiple Unit Auction with the Economy/Diseconomy of Scale
Mingzhou Jin, Mississippi State University, Assistant Professor, Mississippi State, MS, 39762, USA, mjin@ie.msstate.edu., S. David Wu

The paper studies multi-unit auctions for industrial procurement with the supplier cost following economy/diseconomy of scale. For the NP-complete winner determination problem, one binary tree algorithm with bound (BTB) is developed based on the properties of optimal solution. The algorithm complexity is linear in the order size, which can increase the performance of auction. The supplier behavior and price dynamics are also studied for the sequential auction with myopic behavior assumption.

■ TA23

Center-Room L

What Will Tomorrow Bring?

Cluster: Aviation
Invited Session

Chair: Arnold Barnett, MIT, Cambridge, MA, 02139-4307, USA, abarnett@mit.edu

1 — Predicting the Effectiveness of Airport Congestion Tolls
Terence P. C. Fan, MIT, tpfan@mit.edu., Amedeo R. Odoni

The use of congestion pricing has long been advocated as a means of dealing with airport delays. We describe a new model that provides insights on the conditions under which such pricing can be effective and identifies the incidence of benefits and costs on the various types of airport users.

2 — A Quick and Dirty Methodology for Retrospective Assessment of Airport Capacity Enhancements
Mark Hansen, University of California at Berkeley, Berkelely, CA, 94720, mhansen@ce.Berkeley.edu.

We describe and demonstrate a method for assessing the capacity and delay impacts of projects intended to increase airport capacity. We use a Tobit statistical model to analyze data about capacity, and then incorporate the Tobit results into a deterministic queuing model. We present a case study based on the new runway at Detroit-Wayne County Airport.

3 — Aviation Security: A Lost Cause?
Arnold Barnett, MIT, Cambridge, MA, 02139-4307, USA, abarnett@mit.edu.

The aviation-security situation changes so rapidly and unpredictably that it is hard to say what will seem most important at the time of the conference. But we will discuss developments from an INFORMS perspective (i.e., in a relentlessly logical way).

■ TA24

Hilton-Pacific

Integrating Research and Teaching

Sponsor: Education
Sponsored Session

Chair: Julie Swann, Georgia Tech, Assistant Professor, Atlanta, GA, 30332-0205, USA, julie.swann@isye.gatech.edu

1 — Advising Graduate Students
Barry L. Nelson, Northwestern University, Evanston, IL, 60208, bnelson@northwestern.edu.

Advising graduate students is one of the most important and satisfying, but (potentially) frustrating, activities that research faculty undertake. I will discuss what students should expect from you, what you should expect from students, and some ideas for getting research started and keeping it moving.

2 — Role of Consulting in Teaching and Research
Yavuz Bozer, University of Michigan, Professor, Ann Arbor , MI, 48109-2117, USA, yabozer@umich.edu.

The real or perceived tension between research and teaching has been the subject of much debate. Consulting and close interactions with industry has added a third dimension to that debate. In this presentation we will address some of the pitfalls and synergies that exist between research, teaching, and consulting.

3 — Capacity Sharing Issues — Research, and Teaching Implications
Ananth Iyer, Purdue University, Professor, W Lafayette, IN, 47907, USA, aiyer@mgmt.purdue.edu.

For the past few years I have tried to have some convergence between my research interests and teaching material. I will describe what I have done for the specific problem context when independent inventory managers share production capacity. We will see what theoretical results have been obtained, a teaching game used in class and potential research questions. I hope we can discuss the potential tradeoffs of such efforts.

■ TA25

Center-Room F2

DEA Session 5

Cluster: Data Envelopment Analysis
Invited Session

Chair: Joseph C. Paradi, University of Toronto, Toronto, Ontario, M5S 3E5, Canada, paradi@mie.utoronto.ca

1 — A New Malmquist-type Productivity Change Index
Mette Asmild, University of Toronto, Toronto, Ontario, M5S 3E5, Canada, mea@mie.utoronto.ca., Fai Tam

Two different formulations of how to calculate the Malmquist Index from DEA scores are already common in the literature and their properties and results are quite different. In this paper we suggest a new formulation of a Malmquist-type productivity change index. This formulation has the advantage of being transitive without depending on a fixed base period. The index is illustrated using DEA scores from an empirical data set of North American pulp and paper mills and the results compared to those of the other indices.

2 — Knowledge Worker Performance Analysis Using DEA: An Application to Engineering Design Teams at Bell Canada
Joseph C. Paradi, University of Toronto, Toronto, Ontario , M5S 3E5, Canada, paradi@mie.utoronto.ca., Sandra Smith, Claire Schaffnit-Chatterjee

Knowledge worker productivity measurement is a very difficult undertaking, but implementing improvement suggestions are even more challenging for management. Data Envelopment Analysis (DEA) was used to examine the productivity, efficiency and effectiveness of one such knowledge worker group; the Engineering Design Teams (EDT) employed by Bell Canada, the largest telecommunications carrier in Canada. Two functional models of the EDTs were developed and analysed using input oriented Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) DEA models. First left free, the multipliers were then constrained using DEA Assurance Region models based on economic prices and managerial preferences. This study offers an excellent example where inefficient Decision Making Units (DMU) - i.e. EDTs - could be made more efficient by improving their scale efficiency simply by reassigning work amongst the units.

3 — A Three Stage Model for Bank Branch Efficiency Evaluation
Joseph C. Paradi, University of Toronto, Toronto, Ontario , M5S 3E5, Canada, paradi@mie.utoronto.ca., Steve Rouatt

Efficiency and productivity evaluation of a set of 839 bank branches of a major Canadian Commercial Bank is carried out using Data Envelopment Analysis (DEA) to assess the main determinants of performance within the bank's complex branch operations. Three models were designed to assess the production efficiency, the lending efficiency, and the profitability efficiency. Input orientation was used for all three models and the technical efficiency scores for the three models were 0.75, 0.81 and 0.86, respectively. Branches were analyzed from a regional and market size perspective with the strongest differences being found at the regional level. Overall, the branches were found to be CRS in nature with a notable segment operating at DRS, contravening the wisdom of economies of scale. The bank's current methods of evaluation and the DEA results are compared to determine the accuracy of the models.

■ TA26

Hilton-San Carlos I

Resource Allocation in Network Planning

Sponsor: Telecommunications
Sponsored Session

Chair: Eli Olinick, EMIS Department, Assistant Professor, Dallas, TX, 75275-0123, USA, olinick@engr.smu.edu

1 — Using a Vickrey Share Auction for Allocating Spectrum
Gnana Anandalingam, University of Maryland, College Park, MD, 20742, USA, ganand@rhsmith.umd.edu.

The Vickrey model has lead to bad consequences in many spectrum auctions. We posit some axioms that have to be satisfied for a successful outcome when allocating spectrum, or any resource. We present a new mechanism, the Vickrey "share auction", and prove that it will satisfy many of these axioms.

2 — Articulating Knowledge for Robustness in the Network Planning Domain
Steven Cosares, Hofstra University, Associate Professor, Hempstead, NY, 11549, USA, acsstc@hofstra.edu., Meral Binbasioglu

For a decision support system to develop a plan that is robust to demand uncertainty and survivable requires the planner to be precise in describing the plan objectives and the potential demands. We describe an approach to model the knowledge possessed by a planner, with the goal of minimizing appropriate risk measures in the plan. The model accommodates limited knowledge, e .g., about new services, by using aggregate data like the total demands, which are more reliable than pt-pt estimates.

3 — Provisioning for Video Distribution Using a Combination of Simulation and Optimization
Neil Keon, Southern Methodist University, Dallas, TX, 75275-0333, USA, nkeon@mail.cox.smu.edu.

The traditional provisioning approaches for services such as Video-on-Demand have focused on stochastic models of data traffic and approximations for probabilities of packet loss. We use empirical measurement of bandwidth requirements to simulate video traffic for many users, coupled with ordinal optimization insights that resolve some difficulties with the approximations mentioned above.

■ TA27

Center-Room C2

Negotiation & Collaboration in Supply Chains

Contributed Session

Chair: Cihan Oruc, Koc University, Dept. of Industrial Eng., Istanbul, 80910, Turkey, coruc@ku.edu.tr

1 — Negotiations in Supply Chain Networks
Petr Fiala, University of Economics, Prague 3, 130 67, Czech Republic, pfiala@vse.cz.

Supply chain is defined as system of participants where material, financial, information and decision flows connect participants in both directions. The global production systems move from rigid supply chain structures into globally distributed dynamic networks of agile business units. The partnership relations are based on supply contracts negotiated by multiple criteria. Negotiation processes to reach a consensus among participants can be modeled by different network structures.

2 — Online Supply Chain Collaboration Research Institute
Peter Carr, Athabasca University, St. Albert, T8N 1B4, Canada, peterca@athabascau.ca., Kewal Dhariwal

This paper provides an outline of a Research Institute for the Study of Supply Chain Management with online collaboration. Included is background on the Alberta oil sector and the political and economic importance of the project. Outline designs are provided for the institute and the commercial development of the model created.

3 — Multi-company Collaborative Supply Chain Management with Economical and Environmantal Considerations
Cihan Oruc, Koc University, Dept. of Industrial Eng., Istanbul, 80910, Turkey, coruc@ku.edu.tr., Metin Turkay

Production systems that may belong to different companies have close interaction among each other due to supplier-producer relationships. A generic mixed-integer programming model and an optimization algorithm are developed to integrate production systems that are operated by different companies considering operational, economical, and environmental aspects of supply chain for sustainable operations.

4 — The Impact of Depreciation in the Economical Value of Items on Channel Coordination Decisions
Aysegul Toptal, Texas A&M University, Ph.D. Candidate, College Station, TX, 77843-3131, US, aysegul@neo.tamu.edu, Sila Cetinkaya

We analyze the coordination issues for a buyer-vendor system where the items have short product life cycles and the demand is random. We consider the decline in the economical value of the items over time via modeling the dependency between demand and retail price. We propose a useful negotiation mechanism between the two parties.

■ TA28

Center-Ballroom A1

Contracts, Coordination in Supply Chains

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Yehuda Bassok, University of Southern California, Los Angeles, CA, USA, ybassok@marshall.usc.edu

1 — Impact of Price Postponement when Goods are Substitutable: Monopolistic and Competitive Views
Ling Wang, University of Michigan, Ann Arbor, MI, 48109, USA, lingw@umich.edu., Roman Kapuscinski

The effect of price postponement for two partially substitutable products facing stochastic demands is considered. We describe the properties of optimal policies for two cases of price timing, in both monopolistic and competitive settings. In addition, we numerically characterize the impact of system parameters on the savings from price postponement.

2 — Strategic Inventories in Dynamic Procurement Contracts
Anand Krishnan, University of Pennsylvania, Yehuda Bassok, Ravi Anupindi

This paper bridges two streams of research- Contract theory, which focuses on the role of Incentives and Information in contracts, and Inventory theory. Under arbitrary demand functions , unrestricted contractual structure and arbitrary horizon lengths-- we demonstrate that the ability to carry Inventories strategically, and its interplay with Incentives and Information, is an important factor in optimal contract design.

3 — On the Price-Sensitive Newsvendor Model
Shuya Yin, University of British Columbia, Vancouver, BC, V6T1Z2, Canada, shuya.yin@commerce.ubc.ca., Daniel Granot

We strengthen and extend results derived by Emmons and Gilbert (Management Science, 1998) for the price-sensitive (PS) newsvendor model. We further introduce sequencing in this model, which allows the parties to commit to the contract parameters sequentially and alternately, and investigate the effect of sequencing on the channel efficiency and channel members' profits .

4 — Bargaining and the Structure of the Supply Chain
Mahesh Nagarajan, University of Southern California, Los Angeles, CA, 90089, USA, Yehuda Bassok

We consider a supply chain with N suppliers and a single assembler. We propose a sequential-bargaining framework to allocate channel profits. We show that the order of negotiations affects the profits of the suppliers. We also study the effect of coalition formation on the players' profit, and on the structure of the supply chain.

■ TA29

Center-Ballroom A5

Retail Supply Chain Management II

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Narendra Agrawal, S.C.U, Associate Professor, Santa Clara, CA, 95053, USA, nagrawal@scu.edu

Co-Chair: Stephen Smith, Santa Clara University, Professor, Santa Clara, CA, 95053-0382, USA, ssmith@scu.edu

1 — Flow Management to Optimize Retail Profits at Theme Parks
Kumar Rajaram, The Anderson School, UCLA, kumar .rajaram@anderson.ucla.edu., Reza Ahmadi

Motivated by a study at a major theme park, we develop a flow management model to link park operations with store-level merchandising. This model sets the capacities and schedules of the major attractions to increase visitor flows to high profit retail areas subject to visitor satisfaction, capacity, scheduling and flow balance constraints.

2 — Product Design for Mass Customization with Dual Distribution Channels
Kai Jiang, Stanford University, Stanford, CA, 94305-4026, USA, kaijiang@stanford.edu., Hau Lee

Consider a retailer that operates on both the Internet and conventional channels. Products for the physical channel are build to stock based on pre-determined features; while products can be customized to meet specific customer requirements of the Internet channel. We study the product design problem for the physical channel, and the product pricing problem for both channels. We then compare the performance of this hybrid retailer with a pure Internet retailer and a pure conventional retailer.

3 — Managing Retail Channel Overstock: Markdown Money and Returns Policies
Andy Tsay, Santa Clara University, Santa Clara, CA, 95053 , U.S.A., atsay@stanfordalumni.org.

Manufacturers sometimes pay "markdown money" to their retail partners expressly to avoid accepting returns of unwanted product . We formulate a model that distinguishes between these practices, and determine conditions under which each will be more desirable with respect to channel coordination and individual firm performance.

4 — The Impact of Consumer Learning on Inventory Decisions
Young-Hoon Park, Johnson Graduate School of Management, Cornell University, Ithaca, NY, USA, yp34@cornell.edu, Vishal Gaur.

Retail assortment determines not only current sales but also future sales because a consumer with a successful store visit today is more likely to re-visit in future. We analyze a multi-period model of assortment planning with consumer learning to determine how store loyalty and the rate of consumer learning impact inventory decisions and long-term profits.

■ TA30

Center-Ballroom A6

Risk Management in Supply Chains

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Vishal Gaur, Stern School of Business, NYU, New York, NY, 10012, USA, vgaur@stern.nyu.edu

Co-Chair: Sridhar Seshadri, Stern School of Business, NYU, New York, NY, 10012, USA, sseshadr@stern.nyu.edu

1 — Hedging Financial Risks in Supply Chain Management
Martin Haugh, Columbia University, Assistant Professor, Industrial Engineering and Operations Research, New York, NY, 10027, USA, mhaugh@ieor.columbia.edu., Rene Caldentey

We consider the problem of dynamically hedging the profits of an operation when these profits are correlated with returns in the financial markets. We discuss how different informational assumptions give rise to different types of hedging and solution techniques. We also consider the more general problem of simultaneously optimizing over both the operating policy and the hedging strategy. Finally, we solve some problems commonly encountered in supply chain management.

2 — A Real Option Approach for Valuating Long-term Planning in the Mining Industry
Rene Caldentey, Stern School of Business, New York, NY, 10012, US, rcaldent@stern.nyu.edu., Rafael Epstein, Denis Saure

We develop a real option model for valuating investement and operational decisions in the mining industry under the assumptions that ouput prices are stochastic and that there exists a complete market for future prices. Our main contribution is the development of a realistic-practical production function and the incorporation of technology investment decisions.

3 — Hedging Inventory Risk Through Market Instruments
Vishal Gaur, Stern School of Business, NYU, New York, NY, 10012, USA, vgaur@stern.nyu.edu., Sridhar Seshadri

We analyze how to hedge non-linear cashflows from the newsvendor model when demand is correlated with the price of a financial asset, and show that hedging reduces the variance of profits, improves expected utility, and increases return on investment. We demonstrate our methodology using data from two retailing firms.

■ TA31

Center-Room J3

Advances in Metaheuristics and Combinatorial Optimization

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Stefan Voss, Univ of Tech Braunschweig, Professor, Braunschweig, D38106, Germany, stefan.voss@tu-bs.de

1 — Object-oriented Metaheuristic Optimization with OptQuest
Manuel Laguna, University of Colorado, Boulder, CO, 80309-0419, USA, laguna@colorado.edu.

OptQuest is an optimization software package based on metaheuristic methodology. We discuss the technology behind OptQuest and demonstrate the latest version, which includes additional functionality to tackle sequencing and design problems within an object-oriented environment.

2 — Inventory-routing Model for a Multi-period Problem with Stochastic and Deterministic Demand
Rita Ribeiro, Universitat Pompeu Fabra, PhD student, Barcelona, 08005, Spain, rita.ribeiro@econ.upf.es., Helena R. LourenÁo

In this work, we consider an inventory-routing problem with two sets of customers, one with known demand and another one with unknown demand that follows a random distribution. The objective is to determine the routes for a week period and the quantities delivered at the random demand points, minimizing total costs. The cost include transportation and inventory cost. We present a mathematical model to the problem and propose and Iterated Local Search Heuristic.

3 — General Purpose Metrics in Solution Spaces
David Woodruff, University of California, Professor, Davis, CA, 95616, USA, dlwoodruff@ucdavis.edu.

A decision maker would often be more interested in seeing a diverse collection of good solutions rather than the one solution that is in some mathematical sense the optimal solution to an approximate problem with imprecise data. Also, many metaheuristic methods assert the ability to construct a diverse set of solutions. This talk describes and justifies on-going research toward general purpose methods for characterizing solution diversity.

4 — Shortest Paths for All-pairs with Arc Elimination
Cees Duin, University of Amsterdam, Amsterdam, xx, 1018 WB, Netherlands, ceesd@fee.uva.nl.

We formulate two algorithms to obtain for all pairs of nodes the shortest path in a graph with n nodes and m arcs. The algorithms combine the Bellman equations with arc elimination. As usual nodes are listed, but listed nodes are scanned with other arcs than incident arcs. This way, arcs and associated label checks are detected as redundant.

■ TA32

Center-Room J4

Tutorial: Global/Nonlinear Optimization in Modeling Environments

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Janos Pinter, Pinter Consulting Services, Halifax, NS, B3M 1J2, Canada, jdpinter@hfx.eastlink.ca

1 — Tutorial: Global/Nonlinear Optimization in Modeling Environments
Janos Pinter, Pinter Consulting Services, Halifax, NS, B3M 1J2, Canada, jdpinter@hfx.eastlink.ca.

We discuss and demonstrate the use of global and (convex) nonlinear optimization software using several modeling platforms, to meet a range of needs from the business-focused user to the research scientist. The presentation is based on recent algorithm and professional software development work, and it will include live demo examples, as well as a review of some recent applications.

■ TA33

Hilton-University

Stochastic Programming

Contributed Session

Chair: Huseyin Topaloglu, Cornell University, Professor, Ithaca, NY, USA, topalglu@princeton.edu

1 — Improving the Stochastic Decomposition Algorithm by Using an Efficient Sampling Technique
Vicente Rico-Ramirez, Instituto Tecnologico de Celaya, Department of Chemical Engineering, Celaya, 38010, Mexico , vicente@iqcelaya.itc.mx., Urmila Diwekar

This work proposes an improvement to the stochastic decomposition algorithm for stochastic linear programming problems by using the HSS technique. It is shown that the variance and the number of samples required for convergence are reduced when using such a technique instead of Monte Carlo or importance sampling techniques.

2 — Separable, Piecewise-Linear Approximations for Two-Stage Stochastic Programs
Huseyin Topaloglu, Cornell University, Professor, Ithaca, NY, USA, topalglu@princeton.edu., Warren Powell, Andrezej Ruszczynski

We propose an adaptive approximation methodology to approximate recourse functions in two-stage stochastic programs using separable functions. We establish the conditions under which our approximation scheme yields the optimal results, the convergence of our approach scheme for a special problem class and present numerical experiments.

3 — Optimal Design and Planning of Engineering Systems Under Uncertainty
Luke E. Achenie, University of Connecticut, Storrs, CT, 06269, USA, achenie@engr.uconn.edu., Guennadi Ostrovsky, Ivan Datskov

The optimal design and planning of engineering systems under uncertainty is considered. Some of the solution methods assume that at the operation stage, one can determine accurate values of all uncertain parameters. We consider the more general case when the assumption is only true for a subset of uncertain parameters.

4 — Monte Carlo Methods for Testing the Solution Quality for Multistage Stochastic Programs
Anukal Chiralaksanakul, The University of Texas at Austin , Graduate Student, Austin, TX, 78712-1063, USA, anukal@mail.utexas.edu., David Morton

Topic Areas: Optimization Techniques, Stochastic programming. We present a methodology to test the quality of a feasible solution to a multistage stochastic programming and report our computational experiments of the proposed methodology on multistage stochastic programming problems from the literature.

5 — Dynamic Capacity Acquisition and Assignment under Uncertainty
Renan Garcia, Georgia Institute of Technology, Graduate Research Assistant, Atlanta, GA, 30332, USA, rgarcia@isye .gatech.edu.,

Shabbir Ahmed

We address the problem of determining a capacity expansion schedule for a set of resources, and the assignment of resource capacity to tasks over a multi-period planning horizon. This decision must be made in an uncertain environment, and using a scenario based approach, we develop a stochastic integer programming model for this problem. A decomposition based branch-and-bound strategy is used to solve the problem to global optimality, resulting in encouraging preliminary computational results.

■ TA34

Hilton-Plaza

Intrapersonal (behavioral) Environment I: Subjective Probabilities in Decision Analysis

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Robert Clemen, Duke University, Durham, NC, 27708-0120, USA, clemen@mail.duke.edu

1 — Interior Additivity and Subjective Probabilities

Canan Ulu, Duke University, Durham, NC, 27708-0120, USA, cu2@mail.duke.edu., Robert Clemen

Interior additivity (IA) is the property that P(B)=P(A or B)ñP(A) for all disjoint A and B with probabilities strictly between zero and one. We describe a support-theory-based subjective probability model that is consistent with IA, provide experimental evidence for the model, and discuss implications for decision analysis.

2 — Overconfidence in Subjective Confidence Intervals

Jack Soll, INSEAD, Cedex, France, jack.soll@insead.edu., Joshua Klayman

Recent studies report minimal overconfidence in two-alternative questions, but substantial bias in subjective interval tasks. Our analyses show that overconfidence in intervals persists after controlling for unsystematic judgmental error. Additionally, interval width and placement varies with elicitation procedure. Overconfidence is real, but its magnitude depends on how questions are asked.

3 — Debiasing Expert Overconfidence: A Bayesian Hierarchical Calibration Model

Kenneth Lichtendahl, Duke University, Durham, NC, 27708-0120, USA, kjl11@mail.duke.edu., Robert Clemen

We propose a Bayesian hierarchical calibration model for debiasing a set of experts' assessed probabilities. The distributions of the model parameters are updated using Markov Chain Monte Carlo methods. The updated parameter distributions can be used to calibrate new assessments and new experts.

4 — Entropy Methods for Probability Encoding in Decision Analysis

Ali Abbas, Stanford University, Stanford, CA, 94305, USA, aliabbas@stanford.edu.

We show methods to simplify the elicitation of univariate probability distributions in decision analysis by exploiting additional knowledge the decision maker may have about the uncertainty of interest. We also show approximations for joint probability distributions using lower-order pairwise elicitations that are easier to elicit in practice.

■ TA35

Hilton-Almaden II

Automatic Process Control Methods for Quality Improvement

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Daniel Apley, Texas A&M University, College Station, TX, 77843-3131, USA, apley@tamu.edu

1 — Recent Advances in Statistical and Engineering Process Control

Fugee Tsung, Hong Kong University of Science & Technology , Kowloon, Hong Kong, season@ust.hk.

Statistical process control (SPC) and engineering process control (EPC) are useful tools to variation reduction and process improvement. With advances in information, sensing, and data capture technology, large volumes of data are being routinely collected and shared over multiple-stage processes, which have growing impacts on the existing SPC and EPC methods. This talk will discuss several technical challenges in this area and present some recent extensions.

2 — A Framework for Integrating Experimental Design and Statistical Control for Quality Improvement in Manufacturing

Harriet Black Nembhard, University of Wisconsin, Madison, WI, 53706-1572, USA, hbnem@engr.wisc.edu., Rene Valverde-Ventura

We design a methodology for combining DOE and Cuscore charts for manufacturing operations. DOE screens out an important variable which is used in a feedback controller. The Cuscore statistic monitors the controller output error for an expected cause. We show how this method helped to eliminate a recurring quality problem.

3 — PID Charts for Process Monitoring

Huaiqing Wu, Iowa State University, Ames, IA, 50011-1210, isuhwu@iastate.edu., Wei Jiang, Fugee Tsung, Vijayan Nair, Kwok-Leung Tsui

We introduce a new class of monitoring procedures that is based on the relationship between a proportional-integral-derivative (PID) feedback control scheme and the corresponding prediction scheme. The charts are obtained by applying the PID predictor to the autocorrelated data to get residuals and then monitoring the residuals. This class of procedures includes as special cases seve ral charts that have been recently proposed in the literature and thus provides a unifying framework. The PID charts have three parameters which can be suitably tuned to achieve good average run length (ARL) performance for large or small mean shifts. Methods for determinin g chart parameters to obtain good ARL performance are discussed. Simulation studies for ARMA(1,1) models show that PID charts are competitive with the SCC charts of Alwan and Roberts~(1988) for detecting large shifts and perform better in detecting small to moderate shifts. The effects of model-parameter misspecification and bias in estimating the variance of the residuals are investigated in a robustness study.

4 — Process Adjustment Methods for Discrete-Part Manufacturing: an Unifying View

Rong Pan, Pennsylvania State University, University Park, PA, 16802, Enrique del Castillo

We consider the problem of adjusting a process operating in statistical control but initially off-target at setup. The initial offset is assumed unknown. A general formulation for the setup adjustment problem is presented. This formulation unifies well-known methods, such as Grubbs' rules, stochastic approximation, and LQG control.

5 — Optimizing Batch Settings by Accounting for Uncontrollable Variables

Di Xu, American Express, Phoenix, AZ, 85015, USA, dixu@eden.rutgers.edu., Susan Albin

We consider a batch process with multiple process settings and uncontrollable variables such as environmental factors and material properties. We combine multivariate statistical modeling and optimization to identify suitable settings based on the information about uncontrollable variables in the batch. We demonstrate the proposed approach using a simulated extrusion process.

■ TA36

Center-Room F1

Dynamic Stochastic Spatial Models in Medicine

Sponsor: Applied Probability Society
Sponsored Session

Chair: Lawrence M. Wein, Stanford University, Prof. of Operations, Information &, Technology, Stanford, CA, 94305-5015, USA, lwein@stanford.edu

1 — Modeling and Analysis of Directed Evolution for Protein Design

Yuval Nov, Stanford University, Stanford, CA, 94305, USA, yuvaln@stanford.edu., Lawrence M. Wein

We develop and validate a new stochastic spatial model for a protein landscape. This Gaussian model assumes mutational additivity and captures the clustering of favorable mutants. We estimate model parameters from industrial data, and analyze various multi-round directed-evolution procedures.

2 — Optimizing the Choice of Influenza Vaccines

Joseph Wu, MIT, Cambridge, MA, 02142, USA, tkwu@mit.edu., Lawrence M. Wein, Alan Perelson

To help the CDC decide which strains of influenza to incorporate into their annual vaccine, we formulate and analyze a dynamic, stochastic, spatial control problem that includes a Markov epidemic process, a shape-space model for the immune system, and cross-reactions of a vaccine to prior epidemics and vaccines.

3 — Design and Analysis of a Novel Approach to Drug Delivery

Lawrence M. Wein, Stanford University, Prof. of Operations, Information & Technology, Stanford, CA, 94305-5015, USA, lwein@stanford.edu., Noah Lotan

We consider a novel approach to drug delivery: A drug cluster, consisting of a set of drug beads connected by bonds, is injected upstream of the target organ, and clogs the artery and releases drug as its bonds degrade. Percolation theory and order statistics are used to analyze this problem.

■ TA37

Center-Room J1

Inventory Risk Pooling

Contributed Session

Chair: Sven Axsater, Lund University, Lund, 22100, Sweden, sven.axsater@iml.lth.se

1 — Does the Risk-Pooling Effect Always Increase with the CV of Demand?
Shitao Yang, Seton Hall University, Madison, NJ, 07940, U .S.A., yangst@shu.edu.

We simulated a one-warehouse multi-retailer distribution system with stochastic demand. Key findings include (1) the risk-pooling benefit from holding inventory at the warehouse decreases once the CV of demand exceeds one; and (2) information sharing reduces the penalty for not holding inventory at the warehouse.

2 — Fill Rates of General Review Inventory Systems
Jiang Zhang, Department of Operations, Cleveland, OH, 44106, U.S.A., jxz35@po.cwru.edu., Matthew J. Sobel

We present exact formulas and new approximations for the fill rates of single-stage and multi-stage discrete-time inventory systems which are reviewed every R periods and which are managed with base stock policies.

3 — Capturing the Risk Pooling Effect through Demand Reshape
Amit Eynan, Washington University, St Louis, MO, 63130, USA, eynan@olin.wustl.edu., Thierry Fouque

We propose a new approach, entitled demand reshape, to take advantage of the risk pooling effect. Firms can improve their profit by encouraging some customers, who intended to purchase one product to switch to another. The effectiveness of this approach is evaluated in various scenarios and found to be promising.

4 — A New Decision Rule for Lateral Transshipments in Inventory Systems
Sven Axsater, Lund University, Lund, 22100, Sweden, sven .axsater@iml.lth.se.

A number of warehouses facing compound Poisson demand are considered. Normally the warehouses replenish from an outside supplier. However, lateral transshipments are also possible. Our decision rule minimizes the expected costs under the assumption that no further transshipments will take place. This rule is then used repeatedly as a heuristic.

5 — A Periodic-Review Model with Serially-Correlated , Inventory-Level-Dependent Demand
Timothy Urban, University of Tulsa, Collins Professor of Business, Tulsa, OK, 74104, USA, timothy-urban@utulsa.edu .

It has been established that many consumer goods have demand that is (1) serially-correlated, and (2) dependent on the shelf-space allocation (or the level of inventory). We present a periodic-review model with partial backlogging that reflects these demand characteristics.

■ TA38

Center-Room N

Railroad Scheduling and Blocking

Sponsor: Railroad Applications Section
Sponsored Session

Chair: Pooja Dewan, Burlington Northern Santa Fe Railway, Fort Worth, TX, 76131, USA, pooja.dewan@bnsf.com

1 — New Approaches for Solving the Railroad Blocking Problem
Ravindra Ahuja, University of Florida, Professor, Gainesville, FL, 32611, USA, ahuja@ufl.edu., Dharma Acharya, Jian Liu, Pooja Dewan

Blocking problem is one of the most important problems in railroad scheduling and is a very large-scale multi-commodity flow network design problem containing millions of fixed charge variables. We propose new approaches for solving this problem based on neighborhood search techniques that are able to solve the problem very efficiently in practice. We expect major savings by the use of these approaches.

2 — Sequencing Classifications in FirstClass(tm)
Erika Yazid, MultiModal Applied Systems, Inc., Princeton, NJ, 08540, USA, erika@multimodalinc.com., David Friedman

The FirstClass(tm) project between CSX and MultiModal (called Algorithmic Class Tracking at CSX) involves two major algorithmic technologies: (1) the ability to rapidly sequence blocks, and (2) the ability to generate detailed classification tables. This talk focuses on the block sequencing, and explains the blocking network with its various artificial arcs, the shortest-path technology used, and our experiences with parallelization of the algorithm.

■ TA39

Center-Room K

Recent Advances in Congestion Pricing Methods

Sponsor: Transportation Science Section
Sponsored Session

Co-Chair: Donald W. Hearn, University of Florida, Gainesville, FL, 32611

Co-Chair: Siriphong, Lawphongpanich, University of Florida, Gainesville, FL, 32611-6595, Lawphong@ise.ufl.edu

1 — Computing First Best Tolls
Lihui Bai, University of Florida, Gainesville, FL, 32611-6595, Donald W. Hearn, Siriphong Lawphongpanich

In a toll pricing framework, we define a toll set based on a solution to the system optimized traffic equilibrium problem. In practice, only approximate solutions to the problem are available and they often render the toll set empty. We will present techniques for dealing with this and related difficulties.

2 — Techniques for Solving Large-scale First Best Toll Pricing Problems.
Lihui Bai, University of Florida, Gainesville, FL, 32611-6595, Donald W. Hearn, Siriphong Lawphongpanich

Toll sets associated with real-world transportation networks contain large numbers of variables and constraints. In this talk , we will propose several large-scale techniques for computing tolls and discuss their relationships. We will also present numerical results from real-world networks.

3 — Second Best Toll Pricing Problem with Elastic Demand.
Siriphong Lawphongpanich, University of Florida, Gainesville, FL, 32611-6595, Lawphong@ise.ufl.edu., Donald W. Hearn, Mehmet Bayram Yildirim

In this talk, we will present three equivalent formulations for the second best toll pricing problem, establish existence conditions for and properties associated with optimal second best toll vectors, and propose an algorithm along with a framework for determining a second best toll vector.

■ TA40

Center-Room G

Integrated Logistics Systems

Contributed Session

Chair: Sila Cetinkaya, Texas A&M University, College Station, TX, USA, sila@tamu.edu

1 — Implementation and Benefits of Rolling Inventory
Rocio Ruiz-Benitez, University of Massachusetts, Research Assistant, Amherst, MA, 01003, USA, rocioruizbenitez@hotmail.com., Ana Muriel

We study a warehouse management problem where the schedule of incoming supplies and customer orders for a wide variety of products are known over a number of periods. In addition to storage at the warehouse, product can be held in the trailers (rolling inventory) at the warehouse yard, avoiding loading costs . We model the problem of determining which trailers to leave at the yard, so as to maximize savings, as a large-scale integer program. A solution approach and computational results follow.

2 — FTL and LTL Shipments Considerations in a Two-Echelon Inventory Lot-Sizing Model
Wikrom Jaruphongsa, National University of Singapore, Assistant Professor, Singapore, 119260, Republic of Singapore, isejw@nus.edu.sg., Sila Cetinkaya, Chung-Yee Lee

This paper presents a two-echelon inventory lot-sizing model with less-than-truckload (LTL) and full-truckload (FTL) outbound shipments considerations. The problem is challenging due to the consideration of cargo capacity constraints, i.e., the multiple set-ups cost structure associated with an FTL shipment. The paper presents several structural optimality properties of the problem and develops efficient algorithms based on the dynamic programming approach to find the optimal solution.

3 — Dynamic Lot Sizing with Batch Ordering and Truckload Discounts
Chung-Lun Li, Hong Kong University of Science and Technology, Associate Professor, Kowloon, Hong Kong, lichung@ust.hk., Wen-Qiang Xiao, Vernon N. Hsu

We study two dynamic lot size models. In the 1st model production is restricted to a multiple of a constant batch size, where backlogging is allowed and all cost parameters are time-varying. An efficient DP is developed to solve the problem. Using this result, an algorithm is developed to solve the 2nd model, which has a general form of product acquisition cost structure, including a fixed charge for each acquisition, a variable unit production cost, and a freight cost with a truckload discount.

4 — Neighborhoods : A New Service Parts Stock Plan
Yi-Hui (Christi MA, IBM, development engineer, Mechanicsburg, PA, 17050, USA, yima@us.ibm.com.

A new parts logistics stock plan solution called Neighborhood approach has been developed and implemented within IBM to support a robust set of customer requirements. Through the neighboring concept, a time-based service delivery strategy that balances all the relevant financial costs is established.

■ TA41

Center-Room M

Urban Transportation Planning Models I

Sponsor: Transportation Science Section
Sponsored Session

Chair: James Moore, University of Southern California, Professor of Civil Engineering, and Public Policy and Management, Los Angeles, CA, 90089-2531, USA, jmoore@almaak.usc.edu

1 — Calibration of Dynamic Traffic Assignment Models for Operational Planning: Methodology and Results using DYNASMART-P
Hayssam Sbayti, University of Texas, Austin, TX, USA, hayssam@mail.utexas.edu., Hani S. Mahmassani, Yi-Chang Chiu

Dynamic Traffic Assignment (DTA) models are intended to overcome the limitations of static planning tools. The deployment of such models, however, critically depends on the ability to calibrate these models, which differs considerably from conventional models . This paper discusses the methodology and results of DYNASMART-P calibration and application.

2 — Transportation Network Dynamics: Is It Possible to Evolve Transportation Networks Using Localized Investment Rules?
David M. Levinson, Dept. of Civil Engineering at the University of Minnesota, Minneapolis, MN, 55455, USA, levin031@tc.umn.edu., Bhanu Yerra

This research models transportation network dynamics as a complex system. In such models properties of the simplest interacting agents in the system, in our case road segments, are modeled with certain rules, which are both spatial and temporal, and are capable of mimicking the global properties This research models transportation network dynamics as a complex system.

3 — Rapid Estimation of Network Flows via Associate Memories
Guen Young, Kim Kangnam University, Gyeonggi-Do, 449702, Korea, James Moore

California Department of Transportation seismic risk analysis procedures for bridges use average daily traffic volumes. However, traffic flows in the network would change significantly following a major earthquake. Our research focuses on providing rapid, reliable estimates of flows in damaged networks, and incorporating these estimates into bridge retrofit decisions.

4 — Application of a Random-Utility-Based Multizonal Input-Output Models: Production, Trade, Travel & Location Choice in the State of Texas
Ling Jin, The University of Texas at Austin, Austin, TX, 78712, USA, jinling_ut@yahoo.com., Yong Zhao, Kara M. Kockelman

This study describes and applies a spatially disaggregate input-output model of location choice and trade flows using Texas data sets. The model derives from a standard input-output framework but recognizes interzonal interactions and producer utility maximization through choice of input origins and travel modes via nested logit models. The empirical application pursued in this work investigates the sensitivities of trade flows and other model outputs to various inputs and parameters.

■ TA42

Fairmont-Belvedere

Product and Concept Development

Contributed Session

Chair: Donald Gerwin, Carleton University, Ottawa, K1S 5B6, Canada, dgerwin@carleton.ca

1 — Does the Hierarchical Position of Informants Influence their Assessment of New Product Development Success Factors?
Holger M. Ernst, WHU - Otto Beisheim Graduate School of Management, Vallendar, 56179, Germany, hernst@whu.edu.

The continuous development and introduction of new products is one of the most significant contributors to sustained company growth and profitability in many industries. For at least three decades, many researchers have undertaken empirical studies aiming at the identification of new product success factors (in the following referred to as NPD research). A look at past empirical NPD research reveals that the overwhelming majority of studies is based on single informants only. A systematic evaluation of potential respondent effects is missing in NPD research to date.

2 — Improving Feedback to Conceptual Design
Deepu Mathew, Systems Modeling and Realization Technologies Lab, Graduate Research Assistant, Amherst, MA, 01002, USA, dmathew@ecs.umass.edu., Janis Terpenny

The purpose of this research is to reduce the failure rate of new products by improving the quality of information available to designers during New Product Design. This is done by extracting the relevant knowledge from Design change documents and including them as constraints in the functional knowledge base so that it is readily available to designers during conceptual design.

3 — An Evaluation of Research on Integrated Product Development
Donald Gerwin, Carleton University, Ottawa, K1S 5B6, Canada, dgerwin@carleton.ca., Nicholas J. Barrowman

Integrated Product Development (IPD) has become an important new standard for managing new product development. This paper first critiques the IPD literature by identifying problems with empirical research and recommending solutions. Second, we conduct a meta-analysis to evaluate relationships between specific IPD characteristics and project performance. Third, we offer suggestions for extending IPD research.

4 — Automated Design and Synthesis of Innovative Mechatronic Products
Jiachuan Wang, University of Massachusetts, Amherst, Research Assistant, Amherst, MA, 01003, USA, jiacwang@ecs .umass.edu., Janis Terpenny

This paper addresses product design representation and synthesis issues for an automated procedure to assist the rapid investigation of multiple configurations of mechatronic products. This approach synergistically combines mechanical design, electrical control and system thinking in the product design process. An impedance-based bond graph representation for multi-domain dynamic systems using active and passive elements is specified, which is evolved and built by means of genetic programming.

5 — Intentioned Innovation: A View Through the Lens of Product Design
John Feland, Center for Design Research, Doctoral Candidate, Stanford, CA, 94305, United States, gohogs@cdr .stanford.edu.

Business needs a new view of Innovation. Research has focused on Innovation from the perspective of the business domain. Those exploring NPD have focused on the nature of the organizations and success at bringing new and innovative products to market. This presentation provides the view of the product designer. Through this lens a new framework for achieving Innovation is developed. The Innovation Impact Map is designed to facilitate Innovation across Business, Technology, and Human Issues.

■ TA43

Center-Room H

Revenue Management I

Contributed Session

Chair: Mustafa Karakul, University of Toronto, Toronto, ON, M5S 3E6, Canada, karakul@rotman.utoronto.ca

1 — Pricing for Profit vs. Pricing for Revenue
Stefano Alberti, 4R Systems, Wayne, PA, 19087, USA, salberti@4rsystems.com., Madhu Vudali, Vikas Sabnani, Ozgur Ozluk

Demand models used for purposes of profit maximization differ substantially from those used for revenue maximization. This talk explores the differences between the two, and provides a rationale for modeling the same market with different demand functions, according to the firm's objective.

2 — Resource-Constrained Bidding Models
Christina R. Scherrer, Georgia Tech, Atlanta, GA, 30332, USA, crs@isye.gatech.edu., Paul M. Griffin, Steven T. Hackman

We discuss the problem of dynamically pricing jobs based on remaining capacity and current and future profit potential. We discuss how this resource-constrained bidding differs from traditional revenue management and present solution techniques and results. Industry applications, including architecture and construction bidding, are discussed.

3 — Optimal Pricing and Ordering Decisions for Two One-Way Substitutable Products
Mustafa Karakul, University of Toronto, Toronto, ON, M5S 3E6, Canada, karakul@rotman.utoronto.ca., Lap Mui A. Chan

This paper considers the combined pricing and ordering problem of an innovative company, which is introducing a new product to a market where there is already a well-established product. The new product is superior to the existing one and can be used as a substitute. The existing products price is at its known equilibrium value. Moreover, the customer pool of the existing product is fairly well established and thus its demand can take only one of a few different values.

4 — Duality for Revenue Management
Thomas R. Jefferson, Sultan Qaboos University, Al-Khod, 123, Oman, trjefferson@hotmail.com., Carlton H. Scott

Revenue maximization is found to be a convex problem under reasonable assumptions. A dual is found using a version of conjugate duality based on Young's transform. Price and quantity are shown to be dual to each other. A simple example is solved.

5 — The Integral-Constrained Pricing Optimization Planning in a Hub-and-Spoke Network
Cheng-Chang Lin, Dept of Transp and Comm Mgmt Sci, National

Cheng Kung University, Tainan, 701, Taiwan, cclin@mail.ncku.edu.tw., Melanie M. Young

The pricing optimization planning is a tactic resources management problem for the transportation carriers. It simultaneously determines the prices and an operational plan so that the profit is maximized while meeting the service level and integral operational constraints. Two algorithmic schemes, Lagrangian relaxation and primal ascent were developed and evaluated.

■ TA44

Center-Room B2

Military Operations Research at West Point

Sponsor: Military Applications Society
Sponsored Session

Chair: Greg Parnell, U.S. Military Academy, West Point, NY, 10996-1779, USA, gregory.parnell@usma.edu

1 — Command Post Re-engineering
Mike McGinnis, United State Military Academy, West Point, NY, USA, Garrett Brougham, Johnny Fernandez, Nick Mudd, Ryan Pagels, Howie Titzel

In the past decade our military forces have shifted from MTW to many types of operations other than war. Current headquarters have only made marginal organizational changes to adapt to the new missions and new technologies. This presentation will address reengineering military command posts around the flow of information.

2 — Logistics Decision Support System
Holly West, U.S. Millitary Academy, West Point, NY, 10996-1779, USA, holly.west@usma.edu., Elizabeth Schott, Jim Jackson

The Logistics Decision Support System will facilitate better and more efficient logistics forecasting by maneuver units. The decision makers who will use the system are the maneuver battalion support platoon leaders and the battalion S-4s.

3 — Military Decision Making in the Information Age
Margaret H. Belknap, U.S. Millitary Academy, West Point, NY, 10996-1779, USA, margaret.belknap@usma.edu.

Information Age commanders must adapt to the changing nature of warfare to successfully direct their commands in battle. As our military forces transition to an information-based force, three critical aspects of military decision making will be most affected by enhancements in Information Technology - certainty, tempo, and command and control.

4 — Enhancing Joint Compatibility
Krista Magras, U.S. Military Academy, West Point, NY, 10996-1779, USA

This research builds upon previous work on improving the Army's efforts at enhancing multinational force compatibility. It applies the concepts developed to multinational and joint operations to aid in identifying shortfalls and assessing compatibility between the Army and possible international partners and further developing the process to evaluate compatibility between the Army and Air Force. Research seeks to provide army desion makers an objective approach to support good policy choices.

■ TA45

Center-Room B3

Military Applications - Contributed Papers S09

Sponsor: Military Applications Society
Sponsored Session

Chair: Dean S. Hartley, III, Hartley Consulting, Oak Ridge, TN, 37830, DSHartley3@comcast.net

1 — Optimization of Reconnaissance Flights in Naval Operations
Adalet Oner, Turkish Naval Academy, Operations Reserch Dept., ISTANBUL, 81704, TURKEY, aoner@dho.edu.tr., Baybora Aksoy

There are multiple surface units (targets) detected earlier by radars on a particular sea area. An observer (an air vahicle) will try to identify those moving targets by passing them within the specified identification range of its sensors to maximize the flow rate of information coming from identification. A branch and bound type algorithm and simulation model is proposed to optimize the flight pattern of the observer.

2 — Optimal Handling of Incidents During Surveillance Missions
Seethal Mishra, Univ at Buffalo, Graduate Student, Buffalo, 14051, USA, skmishra@acsu.buffalo.edu., Dr. Rajan Batta, Dr. Robert J Szczerba

We consider the problem of optimally dispatching aircraft to incidents that occur over a region. The case of determining the best aircraft to send to an incident given only one more possible incident is analytically solved. This solution is then embedded in a rolling-horizon framework to solve the general problem for a mission. Incidents are assumed to belong to different priority classes with possible movement between classes if not serviced. Computational results will be reported.

3 — NATO Code of Best Practices for Command and Control Assessment
Dean S. Hartley, III, Hartley Consulting, Oak Ridge, TN, 37830, DSHartley3@comcast.net., David Alberts

A NATO panel has enhanced the COBP for command and control to cover operations other than war. This code describes how to maximize the likelihood of producing a good study in the C2 domain. The presentation will describe the process.

■ TA46

Center-Room C3

Software for Semidefinite and Conic Optimization

Cluster: State of the Art in Optimization Software
Invited Session

Chair: Reha Tutuncu, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, reha@andrew.cmu.edu

1 — Semidefinite Programming in the Space of Partial Positive Semidefinite Matrices
Samuel Burer, University of Iowa, Iowa City, IA, 52242-1000, USA, samuel-burer@uiowa.edu.

We present a primal-dual path-following algorithm that is based on a new search direction, which is defined completely within the space of partial symmetric matrices. We show polynomial convergence of the algorithm and also present computational results demonstrating certain advantages over other existing algorithms.

2 — Recent Enhancements to CSDP
Brian Borchers, New Mexico Tech, Socorro, NM, 87801, USA, borchers@nmt.edu.

CSDP is a C library and stand alone solver for semidefinte programming problems that was originally released in 1997. Over the years, the code has been through a number of significant revisions. In this presentation we will discuss recent enhancements to CSDP including improvements in performance and robustness.

3 — Free Variables and Fixed Variables in Conic Optimization
Reha Tutuncu, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, reha@andrew.cmu.edu., Michael Todd, Kim Toh

Existence of free or fixed variables in conic optimization problems present both challenges and opportunities for the robust and efficient solution of associated problems. We discuss the effects of special handling of such variables on the performance of SDPT3, a MATLAB based software for semidefinite-quadratic-linear optimization.

■ TA47

Center-Ballroom A8

Software Demonstration Session 09

Cluster: Software Demonstrations
Invited Session

1 — Real Options Software: Active Project Management using a Real Options Framework
Larry G. Chorn, Real Options, Inc., Richardson, TX, 75080 , lchorn@realoptions-software.com.

Active Project Management using a Real Options Framework - This presentation illustrates the benefits of active management on project value. By categorizing key economic variables into active and passive, management can focus on variables that can improve the investment risk profile. This is illustrated through an example in FlexAbleô, the only commercial software that provides the patented, complete Real Options solution.

Tuesday,10:00 - 11:30

■ TB01

Center -Ballroom A4

Tutorial: Facility Location: Models, Algorithms, and Applications

1 — Facility Location: Models, Algorithms, and Applications
Timothy Lowe, University of Iowa, Iowa City, IA, 52242-1000, USA, timothy-lowe@uiowa.edu.

Researchers from various disciplines (operations research, geography, economics, mathematics, etc.) have contributed to the rather extensive body of knowledge

on facility location problems. Various models for determining the location of facilities to provide service to geographically dispersed demands for this service have been developed. Often, these new models are developed in response to a newly discovered need. Model differences include such things as objective function, constraints, distance measure, and problem setting, e.g., on a transport network, in the Euclidean plane, over a discrete set of points, etc. In this tutorial we survey many of these models, and discuss applications as well as solution approaches. Particular emphasis will be given to approaches to large- scale location problems via aggregation.

■ TB02

Fairmont-Cupertino

Tutorial: Developing Industrial-Strength Spreadsheet Optimization Models

Cluster: Practice Track
Invited Session

Chair: Tom Knowles, IIT

1 — Developing Industrial-Strength Spreadsheet Optimization Models Using VBA A Case Study: Optimizing the Worldwide Supply Chain
Tom Knowles, IIT

Spreadsheet add-ins, such as Solver (bundled with Excel) and What'sBest (from Lindo Systems, Inc.), have put the power of optimization on managers' desks. This tutorial will illustrate how Visual Basic for Applications (VBA) can be used to free the manager from modifying the worksheet model for scenario changes and instead focus on analyzing the results. We discuss some useful elements of VBA and design issues. We present a case study of the supply chain of a multinational company.

■ TB03

Fairmont-Fairfield

Practice: Contributed 2

Cluster: Practice Track
Invited Session

Chair: Robert Wood, San Jose State University

1 — Broadcast Scheduling for Mobile Marketing
Bert De Reyck, London Business School, London, NW1 4SA, United Kingdom, bdereyck@london.edu., Zeger Degraeve

We describe a broadcast scheduling system for mobile marketing, sending advertisements to customers via text messages. The problem is deciding which ads to send out at what time to which customer segments, to maximize customer responses and revenues from retailers. We use integer programming with an interface in Microsoft Excel.

2 — Liberating Your Internal Market
Robert Wood, San Jose State University, Gary Hamel

A team of young activists inside the World Bank worked for three years to produce a remarkable new kind of marketplace for innovations. The results include stunning good new ways of attacking poverty an a real basis for effective ongoing change. Their work shows how almost any bid organization can get started creating and implementing power but low-risk new strategies.

■ TB04

Hilton-San Carlos II

Data Mining Applications in Manufacturing and Credit Industries

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Shane Pederson, Bank One Card Services, Elgin, IL, 60123, USA, shane_Pederson@bankone.com

1 — Identifying Important Variables and Interactions in Black Box Functions
Art B. Owen, Stanford University, Professor, Stanford, CA , 94305, USA, art@stat.stanford.edu., Tao Jiang

Quasi-Monte Carlo methods have been successfully used to integrate some very high dimensional functions. Inspection always seems to reveal that those functions are especially simple, having functional anova decompositions dominated by main effects and low dimensional interactions. This talk will present a method for inspecting black box functions to determine which variables and interactions are most important. The method is constructive, in that provides a computable approximation to the function under study. The approach uses a multivariate orthogonal series expansion of square integrable functions on the unit cube. The coefficients are estimated by quasi-regression: a combination of Monte Carlo sample and shrinkage. It can be informative and interesting to apply the method to black box functions from machine learning such a support vector machines and neural networks. Such functions can be much simpler than their functional forms suggest. The challenge, still not solved, is to reconcile variable importance determined with respect to a product measure and data decidedly not from a product measure. This talk is based on joint work with Tao Jiang.

2 — Data Mining in Credit Card Portfolios
Shane Pederson, Bank One Card Services, Elgin, IL, 60123, USA, shane_Pederson@bankone.com.

Credit card accounts are managed primarily through credit line and annual percentage rate (APR) assignments and fee assessments. While consumer actions tend to trigger fees, credit lines and APRs are chosen to optimize metrics of importance to the creditor , such as maximized net cash flow or minimized write-off losses. We discuss exploratory data analyses used in the development of an optimization tool used to assign line and APR on an ongoing basis. Examples from a test are given.

■ TB05

Fairmont-Sacramento

Strategy I

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Kelley Porter, Stanford University, Stanford, CA, 94305-4026, USA, kaporter@stanford.edu

1 — Strategic Evolution
Yosem Companys, Stanford University, Stanford, CA, 94305-4026, USA, companys@stanford.edu.

Recent research underlies three persisting tensions in the strategic evolution literature. These are the tensions between the inertial and adaptive tendencies of firms, deliberate versus fortuitous change, discontinuous versus continuous change, and static versus dynamic markets. These tensions suggest new areas for future research.

2 — The Process of Boundary Choice in Organizations
Filipe Santos, Stanford University, Stanford, CA, 94305-4026, USA, fsantos@stanford.edu., Kathy Eisenhardt

In this paper we present an inductive multiple case study of boundary decisions in organizations operating in high-velocity environments. The research goal is to understand the rationale and conditions that drive over time the value chain choices and product/market decisions in organizations.

3 — A Review of Research on Real Options
Jeff Rosenberger, Stanford University, Stanford, CA, 94305-4026, USA, jrosenbe@stanford.edu.

This article reviews recent real options research in the strategy literature by concentrating on real option creation, exercise, and benefits. Specifically, the empirical research tests hypotheses around how uncertainty, asset value, irreversibility, exercise costs, and competition, affect option creation and exercise. The article concludes by outlining several future research directions.

■ TB06

Fairmont-Atherton

Licensing and Standards

Contributed Session

Chair: Jennifer Jie Zhang, Simon School of Business, University of Rochester, Rochester, NY, 14627, United States, zhangji@simon.rochester.edu

1 — Valuing Flexibility in Technology Licensing Agreements
Mazen A. Skaf, Strategic Decisions Group, Menlo Park, CA, 94025, U.S.A., mskaf@sdg.com.

The research presents a framework for evaluating flexibility in the course of the negotiation and in the life of a technology licensing agreement between strategic partners. Using a real options and decision analytic approach, I discuss the buyer's reservation line for negotiating contractual real options and the option value of negotiation.

2 — Optimal Software Licensing Policy under Quality Uncertainty
Jennifer Jie Zhang, Simon School of Business, University of Rochester, Rochester, NY, 14627, United States, zhangji@simon.rochester.edu., Abraham Seidmann

We study the optimal licensing policy of an independent software vendor with quality uncertainty. We show that the software vendor can price discriminate the consumers based on their quality sensitivity and discuss the impact of different licensing policies on market share structure and surplus distribution.

3 — Reconceptualizing Models of De Facto Standards Competition: Are They Always "Winner Take All"?
Joel West, San Jose State University, Associate Professor , San Jose, CA, 95192, USA, joelwest@ieee.org., Scott Gallagher

Economists have identified positive network effects and switching costs as key dynamics of de facto standards contests. Based on early examples, they conclud-

ed that positive feedback irrevocably "tips" a standards battle towards the standard with the most users and complementary assets. However, some standards contests don't tip as predicted. We use these to develop a more robust and broadly applicable model, which explicitly incorporates the implicit assumptions of positive feedback models.

■ TB07

Fairmont-Piedmont

Set Based Product Development: Application and Strategies

Cluster: Product Design and Development for Competitive Advantage
Invited Session

Chair: Durward Sobek, Montana State University, Bozeman, MT, 59717-3800, USA, dsobek@ie.montana.edu

1 — Spackling: Smoothing Make-to-order Production of Custom Products with Make-to-stock Production of Standard Items
Ely Dahan, UCLA Anderson School, Asst. Professor of Marketing, Los Angeles, CA, 90095-1481, USA, edahan@ucla .edu., Glen Schmidt, Kyle Cattani

We propose a novel approach to manufacturing custom goods and stock goods on the same, flexible line. Key contributions of the research include: (1) optimality of equal absolute dollar markups for stock and custom products, (2) quantifying the cost cutoff that makes this hybrid policy optimal, and (3) modeling the endogeneity of prices and costs.

2 — Exchanging Preliminary Information in Concurrent Engineering: Alternative Coordination Strategies, Christoph Loch, Arnoud De Meyer

Abstract not supplied

3 — Towards a Normative, Contingent View of New Product Development Management
Steven Spear, Harvard Business School, Assistant Professor, Boston, MA, 02163, USA, sspear@hbs.edu.

Organizations are complex systems that present many of the same design difficulties as complex technical systems: requirements for partitioning design responsibility in such a way that the parts can be integrated into a harmonious whole which the "right" answers discovered through iterative problem solving. Just as modularization is a tool used in the technical domain to facilitate collaborative, distributed design, modularization of organizations is a tool to facilitate collaborative self-reflective organizational system design, operation, and improvement.

4 — Modeling Set Convergence from an Options Perspective
Durward Sobek, Montana State University, Bozeman, MT, 59717-3800, USA, dsobek@ie.montana.edu., David Ford

Many organizations favor quick convergence from a set of design alternatives to one, but research on Toyota Motor Corporation has found that delayed convergence can be a better strategy. This paper presents a model of a generic NPD process structured as a series of abandonment options. System development with uncertainty, option costs, and value added are simulated to estimate the value of early versus delayed convergence strategies .

■ TB08

Center-Ballroom A2

Managing Demand in Supply Chains

Cluster: e-Business: Integrating Academic and Industrial, Perspectives
Invited Session

Chair: Joseph P. Geunes, University of Florida, Gainesville, FL, USA, geunes@ise.ufl.edu

1 — Production Planning with Order Selection Flexibility
Joseph P. Geunes, University of Florida, Gainesville, FL, USA, geunes@ise.ufl.edu., Kevin Taaffe, H. Edwin Romeijn

We consider a producer that accepts or denies orders for its output, based on the economic benefits of order acceptance and production capacity limits. The producer collects revenue for each unit sold, and revenue can vary among orders. Our models maximize net profit from order selection and production planning decisions.

2 — Markdown Mechanisms
Altan Gulcu, Georgia Institute of Technology, altan@isye.gatech.edu., Wedad Elmaghraby, Pinar Keskinocak

The Internet provides tremendous opportunities for implementing dynamic pricing mechanisms. In this paper, we analyze the design and performance of a markdown pricing mechanism, which is a form of dynamic pricing. Our focus is the structure of the optimal markdown mechanisms in the presence of rational or “strategic” buyers.

3 — Production and Outsourcing Decisions for Competing OEMs with Cost Reduction Opportunities
Stephen M. Gilbert, University of Texas, Austin, TX, USA, steve.gilbert@bus.utexas.edu.

We examine the production and outsourcing decisions for two OEMs that produce partially substitutable products and have opportunities to invest in cost reduction. Specifically, we investigate the way in which outsourcing can dampen the intensity of competition between the OEMs and the conditions under which they can benefit from outsourcing at least a portion of their manufacturing activities to a common supplier.

4 — A Customer Allocation Problem with Subcontracting and Capacity Acquisition
H. Edwin Romeijn, University of Florida, Gainesville, FL, USA, romeijn@ise.ufl.edu., Joseph P. Geunes, Wei Huang

Consider a set of capacitated production and storage facilities and a set of customers facing deterministic demand for a single product. We propose heuristics for the problem of assigning customers to facilities to minimize total production, inventory, and transportation costs. We also study extensions allowing for subcontracting and capacity acquisition.

■ TB09

Center-Ballroom A3

Analysis of System or Mechanism in Electronic Markets

Cluster: e-Business: Integrating Academic and Industrial, Perspectives
Invited Session

Chair: Han Zhang, Georgia Institute of Technology, Atlanta, GA, 30332

1 — Evaluating The Impact of Plant-level e-Commerce Systems on Manufacturing Plant Performance and Productivity: An Empirical Analysis
Rajiv D. Banker, University of Texas, Dallas, TX, USA, Hsihui Chang, Indranil Bardhan

We evaluate the impact of IT investments on the efficiency of manufacturing plants. A longitudinal analysis of 1500 manufacturing plants is conducted to evaluate the impact of plant-level e-business investments on performance. We study the impact of different manufacturing practices on the choice of plant-level IT investments and evaluate efficiency improvements for different types of manufacturing strategies.

2 — Analysis of a Hybrid Catalog/Auction Mechanism in Online Auction
Vernon N. Hsu, George Mason University, Ke Fu

We study a new online auction mechanism that combines features of catalog and auction. We use both modeling and empirical study approaches to analyze this new form of online market. Issues such as seller and buyer behavior, and pricing mechanism will be discussed.

3 — The Effect of Feedback System on Electronic Market
Xiaorui Hu, St. Louis University, Han Zhang, Jian Yang

A model for the mechanism of a feedback system on e-market is formulated. Comparison between both buyer and seller’s long-term expected gains is presented. The results demonstrate that the existence of a feedback system on a website benefits both buyers and honest sellers.

■ TB10

Center-Ballroom A7

Optimization-based Distributed Scheduling

Cluster: Scheduling
Invited Session

Chair: Erhan Kutanoglu, University of Texas, Assistant Professor, Austin, TX, 78712, USA, erhank@mail.utexas.edu

1 — Single-machine Distributed-scheduling Using Cooperative-interaction and Coupling-agents
In-Jae Jeong, Texas A&M University, College Station, TX, 77843-3367, USA, V. Jorge Leon

This paper considers a single-machine scheduling problem where the decision authorities and information are distributed in multiple sub-production systems. Sub-production systems share the single-machine and must cooperate with each other to achieve a global goal of minimizing the sum of weighted completion times of all jobs. It is assumed that neither the sub-production systems nor the shared-machine have complete information about the entire system.

2 — Some New Developments for Solving Online Scheduling Problems with Unknown Release Dates
Gang Chen, University of Florida, Gainesville, FL, cgang@ufl.edu., Zuo-Jun (Max) Shen, Sherman Bai

We present two heuristics for solving online scheduling problems with unknown release dates. The first heuristic combines dynamic dispatching rules and static optimization and can be described as an on-going dispatch-then-schedule process. In the second heuristic a combinatorial auction mechanism is used to allocate time slots on the machines to jobs that come in over time. We also propose a new measure for analyzing online algorithms which we call "online optimality analysis". We look for the online algorithm that outperforms other online algorithms in terms of expected objective value. Our analysis on a single machine problem has demonstated the effectiveness of the new measurement.

3 — Computational Issues in Distributed Scheduling
Erhan Kutanoglu, University of Texas, Assistant Professor , Austin, TX, 78712, USA, erhank@mail.utexas.edu., S. David Wu

Pricing-based market mechanisms such as auctions have been proposed to coordinate distributed scheduling agents. We discuss the challenges when the outcome of such a mechanism is desired to be of guaranteed quality and accuracy, potentially achieved in short time. We discuss several strategies for improving solution quality and computation time performances, such as scaling of processing times and separating schedule generation from schedule valuation.

■ TB11

Center-Room C1

Issues in Automobile Manufacturing

Contributed Session

Chair: Ghorbanali Mohammadi, Brunel University, Uxbridge, Middlx, UB8 3PH, United Kingdom, empggkm@brunel.ac.uk

1 — Forecasting Automobile Sales
Syed Shahabuddin, Central Michigan University, Mt Pleasant, MI, 48858, USA, shaha1s@cmich.edu.

Automobile industry is a major component of the US economy and is susceptible to economic fluctuations. Therefore, it is critical for the industry and the government to know the effect of economic factors on the automobile industry. My paper analyzes the automobiles sales over the last 40 years in orders to find relevant economic factors that will help predict the sales of the automobile.

2 — Analysis of Products-based and Parts-based Schedules in Two-stage JIT Supply Chains
Henry O. Aigbedo, Oakland University, Rochester, MI, 48309-4493, United States, haigbedo@oakland.edu.

In some JIT supply chains, frequent parts deliveries occur only between direct supplier plants and the final assembly plant. Based on measures such as coefficient of variation in inventory levels, we analyze the effect of supply frequency on products-based and parts-based sequence schedules.

3 — Simulated Annealing Scheme for Sequencing Mixed-model Production Lines
Ghorbanali Mohammadi, Brunel University, Uxbridge, Middlx , UB8 3PH, United Kingdom, empggkm@brunel.ac.uk.

Simulated annealing, an analogy between statistical mechanics and combinatorial optimization, has attracted considerable attention due to its potential in dealing with certain traditional optimization problems. The present paper reports on a new approach to applying this method to a class of mixed-model sequencing problems, i.e., the set-up cost problem. This approach combines the simulated annealing methodology. Two annealing methods are proposed based on this approach, which differ only in cooling and freezing schedule. The second method produces high quality solutions. The performance of the two methods was numerically tested on standard problems.

■ TB12

Fairmont-Regency 1

Population-based Cancer Models

Sponsor: Health Applications Section
Sponsored Session

Chair: Sylvia Plevritis, PhD, Stanford University, Assistant Professor, Stanford, CA, 94305, USA, sylvia.plevritis@stanford.edu

1 — Overdiagnosis in PSA Testing: Lessons from US Prostate Cancer Incidence Trends
Ruth B. Etzioni, Fred Hutchinson Cancer Research Center, Seattle, WA, 98109-1024, USA, retzioni@fhcrc.org.

Overdiagnosis of insignificant prostate cancer is considered a major drawback of PSA screening. The objective of this study was to identify overdiagnosis rates due to PSA that are consistent with recent prostate cancer incidence trends observed in the US. We developed a computer simulation model of PSA testing, cancer incidence and overdiagnosis. Results indicated that the observed incidence trends are consistent with non-trivial frequencies of overdiagnosis among PSA-detected cases.

2 — Stochastic Models of Progression of Cancer and their Use in Controlling Lung Cancer-related Mortality
Marek Kimmel, PhD, Rice University, Professor, Houston, TX, 77005, USA, kimmel@rice.edu., Olga Gorlova

The talk is a review of statistical and health policy problems related to early detection of lung cancer using mass screening. A model of lung cancer involves genetic and behavioral determinants of susceptibility, progression of the disease from precursor lesions to localized tumors to disseminated disease, detection, and intervention. The model predicts mortality reduction caused by early detection. Estimation techniques are needed to obtain distributions of the parameters of the model.

3 — Simulating Breast Cancer Epidemiology in Wisconsin
Natasha K. Stout, University of Wisconsin Medical School, Graduate Student, Madison, WI, 53705, USA, nkstout@students.wisc.edu., Dennis G. Fryback, Patrick L. Remington, Lorne Tappa, Marjorie A. Rosenberg, Amy Trentham-Dietz

Breast cancer mortality has declined in Wisconsin over the past decade, from 29 to 23/100K, and similarly in the US. Screening, treatment improvements, and changing risk factors may explain this decline. We explore the relative contributions of these factors to breast cancer incidence and mortality using discrete-event simulation to generate population-level statistics . Hypotheses about the contributions of the various factors in reducing mortality are explored.

4 — Analysis of Breast Cancer Trends via Stochastic Simulation
Sylvia Plevritis, PhD, Stanford University, Assistant Professor, Stanford, CA, 94305, USA, sylvia .plevritis@stanford.edu., Peter W. Glynn, Peter Salzman, Sanatan Rai, Slava Sigal, PhD, Jarrett K. Rosenberg

A simulation model is presented to explain the impact of screening mammography on current US trends in breast cancer incidence and mortality and to predict future trends. The model follows US female birth cohorts starting calendar year 1887 and computes annual age-adjusted incidence and mortality rates from year 1973 onwards. The mortality effect from screening is computed from a natural history model that relates tumor growth rate to breast cancer survival.

■ TB13

Center-Room D

Fractional Programming and Generalized Convexity II

Sponsor: Optimization Section - Nonlinear Programming
Sponsored Session

Chair: Hong Seo Ryoo, University of Illinois at Chicago, Assistant Professor, Chicago, IL, 60707-7022, USA, hryoo@uic.edu

1 — On Deterministic Algorithms for the Sum-of-Ratios Problem
Takahito Kuno, University of Tsukuba, Professor, Ibaraki, 305-8573, Japan, takahito@is.tsukuba.ac.jp.

Most of fractional programs can be solved rather efficiently in spite of their non-convexity. The sum-of-ratios problem, however, is an exception, and efficient solutions have been sought for a long time. In this talk, we make a comparison among recent deterministic algorithms based on lower envelopes of a single ratio.

2 — An Algorithm for Maximizing the Sum of Several Quadratic Ratios
Jianming Shi, Tokyo University of Science, Kuki, ST, Saitama, Japan, j.shi@ms.kuki.sut.ac.jp., Kazuyuki Sekitani

In this talk, we consider maximizing the sum of several quadratic ratios over a polytope which is given by linear inequalities. We reformulate it into a problem of maximizing a linear objective function over a feasible region defined by multiple reverse convex functions. We present several approving optimal conditions and properties. We employ a quasiconjuagte method to propose an algorithm for solving the problem.

3 — A Branch and Bound Method for the Sum of Quadratic Ratios
Yang Dai, University of Illinois at Chicago, Assistant Professor, Chicago, IL, 60607, USA, yangdai@uic.edu., Satoru Suda

The problem of maximizing the sum of quadratic ratios with a convex feasible region is considered. Each ratio involves a concave numerator and a convex denominator. A branch-and-bound is proposed based on the heuristic framework of Falk and Palocsay for the sum of linear ratios. The computational results will be presented.

4 — A Compact Mean-variance-skewness Portfolio Selection Model and Its Application to NYSE
Hong Seo Ryoo, University of Illinois at Chicago, Assistant Professor, Chicago, IL, 60707-7022, USA, hryoo@uic.edu.

A new measure of Skewness, expressed as a ratio of two quadratics , is developed. Based upon this, a compact mean-variance-skewness portfolio optimization model is developed for large-scale portfolio selection. Extensive computational results with the proposed model on daily NYSE data are reported. These results show that portfolios selected by the model possess ideal characteristics and perform well in future trading days.

■ TB14

Center-Room E

Graph Theory

Contributed Session

Chair: Illya Hicks, Texas A&M University, assistant professor, College Station, Tx, 77843-3131, United States, ivhicks@tamu.edu

1 — Frequency Assignment in Satellite Communications
Yiming Yao, Lawrence Livermore National Laboratory, Livermore, CA, 94550, US, yao3@llnl.gov.

Frequency assignment in a satellite communications system is formulated as a graph coloring problem. Simulation is used to set up the graph, and a backtracking sequential algorithm is used to find an optimal solution.

2 — Characterising Bipartite Dimension of Graphs
Denis Cornaz, University Paris 6, and France Telecom R&D, montrouge, 92120, france, denis.cornaz@francetelecom.com., Jean Fonlupt

We focus on minimum cardinality families of complete bipartite subgraphs covering the edges of a graph G, namely the bipartite dimension of G. The maximum multicommodity flow problem motivates this study. We investigate edge coloring characterizations so that the chromatic number equals its bipartite dimension. Our results answer open problems by Hammer and Fishburn.

3 — A New Interpretation for the Connectedness Reliability Polynomial
Manoj K. Chari, Louisiana State University, Baton Rouge, LA, 70803, USA, chari@math.lsu.edu.

The connectedness reliability is the probability that an undirected network is connected, in presence of independent edge failures with a common failure probability. The reliability is known to be a polynomial in the edge failure probability and its coefficients have been studied in many different mathematical contexts. We give a new graph theoretic interpretation of these coefficients that is derived from work on chip-firing games on graphs.

4 — Stochastic Minimum Spanning Trees
Kevin R. Hutson, Furman University, Greenville, SC, 29613-6666, USA, kevin.hutson@furman.edu., Douglas R. Shier

We present and compare several algorithms for computing the distribution of the minimum spanning tree weight in a network where edge weights are determined by a discrete random variable. Graph-theoretic results are presented that enable fast updating of MSTs. Easily computable bounds on the distribution will also be given.

5 — Max Weight Planar Subgraph Problem and Branch Decompositions
Illya Hicks, Texas A&M University, assistant professor, College Station, Tx, 77843-3131, United States, ivhicks@tamu.edu.

Branch decompositions were first introduced by Robertson and Seymour in their work proving Wagner's Conjecture. Branch decompositions based algorithms have been theoretically proven to efficiently solve NP-complete problems but the question about the practicality of these algorithms is somewhat unchartered territory. In this talk, we try to address this issue of practicality for the maximum weight planar subgraph problem.

■ TB15

Center-Room B4

Telecommunication Networks

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Richard Wong, Telcordia Technologies, Inc., Senior Systems Engineer, Piscataway, NJ, 08854, USA, rwong1@telcordia.com

1 — A New Heuristic Approach to the Minimum Discrete Cost Multicommodity Flow Problem
Michel Minoux, Universite Pierre et Marie Curie - CNRS, Professor, Paris, F-75252, France, Michel.Minoux@lip6.fr.

We show how, starting from an exact solution method based on cutting-plane generation, approximate solution methods can be derived for solving larger instances of the discrete cost multicommodity flow problem. Computational results on a series of test problems up to about 50 nodes and 90 links with cost functions featuring an average 6 steps per link, are reported.

2 — Solving Group Steiner Problems as Steiner Tree Problems on Graphs
Stefan Voss, Univ of Tech Braunschweig, Professor, Braunschweig, D38106, Germany, stefan.voss@tu-bs.de., Cees Duin, Anton Volgenant

The Generalized Spanning or Group Steiner Tree Problem (GSP) generalizes the Steiner problem in graphs (SP) requiring a tree spanning (at least) one vertex of each subset of a family of vertex subsets. We investigate a straightforward solution procedure, exploiting a known transformation of the GSP to the SP.

3 — Graceful Reassignment of Out-of-kilter Communications Paths in Networks
Hanan Luss, Director, Piscataway, NJ, 08854, USA, hluss@telcordia.com., Richard Wong

Over time, IP networks with label switched paths tend to have excessively long paths, resulting in poor service performance and wasted network resources. We formulate the problem of reassigning long paths to alternate routes as a multicommodity, multiperiod network flow problem with integer variables. We provide an effective search heuristic solution technique.

■ TB16

Center-Room C4

Mixed Integer Programming I

Cluster: Discrete Optimization
Invited Session

Chair: Ismael de Farias, CORE, Louvain-la-Neuve, 1348, Belgium, defarias@core.ucl.ac.be

1 — A Modified Lenstra Method for Mixed-integer Programming
Sanjay Mehrotra, Northwestern University, Professor, Evanston, IL, 60208-3119, USA, mehrotra@iems.nwu.edu., Huanyuan Sheng, Zhifeng Li

We discuss modifications of Lenstra's method for developing its practical implementations. We will present our computational results based on our branching-disjunction method for mixed-integer programming problems.

2 — On Gomory Mixed-integer Cuts
Yanjun Li, GSIA, Carnegie Mellon University, Dr., Pittsburgh, PA, 15232, USA, yanjun@andrew.cmu.edu., Kent Anderson, Gerard Cornuejols

Gomory Mixed-Integer Cuts (GMIC) are equivalent to split cuts and mixed-integer rounding cuts. In this talk we first review some recent results about GMIC from the view of cut recognition, separation and closure characterization. Then we report our up-to-date attempt from improving GMIC from the LP tableau.

3 — Solving Quadratic Programming Problems over a Box Using Branch-and-cut
Dieter Vandenbussche, Georgia Institute of Technology, Atlanta, GA, 30332, USA, dieter@isye.gatech.edu., Ismael de Farias, George Nemhauser

We study the convex hull of relaxations of the KKT conditions. Using the inequalities obtained as strong cuts, we solve difficult nonconvex QP's over a box using a branch and cut scheme .

■ TB17

Center-Room B1

Analysis of Bucket Brigades and Worksharing Systems

Cluster: Manufacturing Systems
Invited Session

Chair: Esma Gel, Arizona State University, Assistant Professor, Tempe, AZ, 85287-5906, USA, esma.gel@asu.edu

1 — An Evaluation of Handoff Rules in Multistage Worksharing Systems
Ron Askin, University of Arizona, Tucson, AZ, 85721, USA, ron@sie.arizona.edu., Jiaqiong Chen

We consider the problem of real-time allocation of tasks to workers in serial systems with limited cross-training, random task times, a CONWIP system policy, and discrete time work elements. We compare the throughput performance of several rules for deciding when a worker should pass their current production unit along to the next workstation for processing.

2 — Chaos and Convergence in Bucket Brigades with Finite Walkback Velocities
John Bartholdi, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, john.bartholdi@isye.gatech.edu., Donald Eisenstein

In some implementations of "bucket brigade'' assembly significant time is required to walk back to get more work. We extend the standard model of bucket brigades to capture this complication and, in so doing, discover that long-run dynamical behavior depends critically on the extent to which each worker is slowed by his workload. We observe both chaotic and stable behavior.

3 — Use of Dynamic Work Allocation Strategies to Minimize the Impact of Labor Turnover
J. Rene Villalobos, Arizona State University, Tempe, AZ, 85287-

5906, USA, rene.villalobos@asu.edu., Luis Mar, Adrian Montano, Marco Gutierrez

In this presentation we compare the performance of assembly lines working under three different work allocation strategies: fixed-balanced, Bucket Brigades and a hybrid system. Preliminary results show that no single strategy is optimal under the different labor turnover rates analyzed. However, the hybrid strategy emerges as a good strategy for assembly line design when labor turnover is present.

4 — Dynamics of Bucket Brigades When Ranking of Worker Speeds Varies

Dieter Armbruster, Arizona State University, Tempe, AZ, 85287-1804, USA, armbruster@asu.edu., Esma Gel

We study the dynamics of bucket brigades when the ranking of workers according to their speeds varies over time due to learning. We show that the bucket brigade selforganizes irrespectively of worker order with passing rules. A rigid bucket brigade may become chaotic for bad choices of initial worker ordering.

■ TB18

Center-Room J2

Harvey Wagner Prize Competition, Awards Ceremony

Sponsor: CPMS, The Practice Section of INFORMS
Sponsored Session

Chair: Joseph Discenza, jpd7@alumni.cwru.edu

■ TB19

Fairmont-Regency 2

Methods for Optimizing Reservoir Operation and Power Production

Sponsor: Energy/Natural Resources/Environment Section - Electricity Markets and Energy Modeling
Sponsored Session

Chair: Bernard Lamond, Universite Laval, Professor, Quebec, QC, G1K 7P4, Canada, bernard.lamond@fsa.ulaval.ca

1 — Practical Application of Probabilistic Approaches to the Daily Operation of Reservoirs

Andre Turgeon, Hydro-Québec (IREQ), Varennes, Qc, J3X 1S1, Canada, Turgeon.Andre@ireq.ca.

The presentation will deal with the problem of determining the optimal daily operation of one or two reservoirs in series on a river for a period of a year when the stochasticity of the river flows must be taken into account. The major difficulty with this problem is to take into account the persistence of the river flows, that is the fact that there are usually long periods of low flows and high flows in the historical daily record.

2 — Valuation and Optimal Control of Electrical Power Plants in Deregulated Markets

Matt Thompson, Dept. of Applied Math, Doctoral Candidate, London, On, N6A5B7, Canada, mthompso@uwo.ca.

We derive nonlinear partial-integro-differential equations for valuation and optimal control of power plants in deregulated electricity markets with realistic price dynamics. We model operational characteristics of real power plants. For thermal power plants we include variable start-up times and costs, control response time lags, minimum generating levels, nonlinear output functions, and structural limitations on ramp rates.

3 — Some Bounds and Approximations in Stochastic Hydropower Optimization

Bernard Lamond, Universite Laval, Professor, Quebec, QC, G1K 7P4, Canada, bernard.lamond@fsa.ulaval.ca., Abdeslem Boukhtouta

We review several models for optimizing the electricity production of a single hydroplant with a single reservoir under various assumptions about the physical and economic characteristics of the system. We discuss the main analytical properties of the models and show how they can be exploited algorithmically (e.g., piecewise polynomial approximation, neural network).

■ TB20

Fairmont-Hillsborough

Auction Experiments

Cluster: Auctions
Invited Session

Chair: James Cox, University of Arizona, jcox@bpa.arizona.edu

1 — Barking Up the Right Tree: Are Small Groups Rational Agents?

James Cox, University of Arizona, jcox@bpa.arizona.edu., Stephen Hayne

Economics and its critics have focused on individual rational agents. But important decisions are made by groups, which may limit the relevance of economics and its critics. This paper compares group and individual economic behavior in common value auctions, where there is a quantitative measure of deviation from rational decisions.

2 — How Effective are Online Reputation Mechanisms? An Experimental Investigation

Elena Katok, Penn State University, University Park, PA, 16802, USA, ekatok@psu.edu., Gary Bolton, Axel Ockenfels

Online feedback mechanisms mitigate the moral hazard problems encountered in trading between strangers by providing information typically available in small groups where members are frequently involved in one another's dealings. We investigate feedback mechanisms in the laboratory and find that they greatly improve transaction efficiency.

3 — Predicting Sniping in eBay Auctions

Stephen Hayne, Colorado State University, hayne@acm.org.

Data from eBay shows that sniping occurs in 25% of the auctions. We hypothesize that sniping behavior is explained by the numbers of bids and bidders, seller and buyer ratings, relative bid price , and product type. We test our hypotheses using logistic regression and offer a predictive model of sniping.

■ TB21

Fairmont-Glen Ellen

Financial Engineering, Session 04

Cluster: Financial Engineering
Invited Session

Chair: John R. Birge, Northwestern University, jrbirge@northwestern.edu

1 — Estimating the Term Structure of Credit Spreads: Callable Corporate Debt

Antje Berndt, aberndt@stat.stanford.edu.

We consider the extraction of credit pricing information from the prices of callable corporate debt, with a method designed to disentangle the components of the bond price associated with discounting at market interest rates, discounting for default risk, and optionality. The approach is demonstrated through an empirical case study.

2 — How Many Seasons are There in a Stock Market?

Xin Guo, xinguo@us.ibm.com., David Chan

We report on applying statistical estimation methodology to fit the stock price hidden markov model (HMM) proposed by Guo and Shepp (1999). We further describe a numerical integration technique used to estimate the marginal likelihood of the model for a given number of mixtures and hence infer the optimum number of states in the HMM. We will discuss some of the challenges in the relevant (financial) time series change point detection problems.

3 — Portfolio Optimization with Consumption and Transaction Costs

Christopher Donohue, christopher.donohue@db.com., John R. Birge

We present a stochastic programming approach to an optimal consumption and investment problem where consumption rate decreases are constrained and penalized. We compare results with other approaches and consider the effect of transaction costs.

■ TB22

Fairmont-Paseo

Auctions and Bidding

Contributed Session

Chair: Jinbaek Kim, U.C.Berkeley, Ph.D Candidate, El Cerrito, CA, 94530, USA, jinbaek@ieor.berkeley.edu

1 — Bidding Decision Analysis Based on Rival Bidders' Incomplete Data

Gang Feng, Southeast University, Nanjing, P.R. China, cleverfy@jlonline.com., Senfa Chen

This paper presents both asymmetric bidding decision methods, when a bidder doesn't know complete data about his rival bidders. One method recasts incomplete data set into complete one, and the other learns directly from incomplete data set. Furthermore, both methods are compared in bidding decision analysis

2 — Multi-component Contingent Auction: A Mechanism for Selection and Coordination of the Suppliers

Jinbaek Kim, U.C.Berkeley, Ph.D Candidate, El Cerrito, CA , 94530, USA, jinbaek@ieor.berkeley.edu., Arie Segev

In this paper, the problem of selecting the optimal combination of suppliers when the suppliers have interoperability and cost dependency issue is considered. We approach the problem from the auction mechanism perspective and propose a modified version of combinatorial auction as a solution. The new procurement mechanism is named MCCA (Multi-Component Contingent Auction). The

MCCA is an auction mechanism for procurement of many components. The MCCA leads to the optimal interoperable supplier combination by providing a special form of bids to the suppliers: contingent bid. In the contingent bid, a supplier can specify the condition that make the bid binding. Suppliers can also implement package bidding by the contingent bidding. Therefore, it is a super set of combinatorial auction. A problem in the MCCA is the computational complexity in calculating the optimal supplier combination, because a supplier can submit as many bids as the possible supplier combinations. We examine the structures of interoperability and cost dependency among the suppliers that are reasonable and guarantee the computational upper bound.

3 — On the Impossibility of the Impossibility of Predation: An Experimental Investigation
Andrew Tunnercliffe, MRC Consultants, East Lansing, MI, 48823, USA, tunnercliffe@yahoo.com.

Economists have often noted that predatory pricing is not observed in standard single-good posted-offer laboratory markets (e.g. Davis and Holt 1993). Strong theoretical objections to predation have also been put forward. However, the present research finds that predation is not "rare like the unicorn" in posted-offer markets.

■ TB23

Center-Room L

MSOM Fellows' Lectures

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Sridhar Tayur, Carnegie Mellon University, Professor, Pittsburgh, PA, 15213, USA, stayur@andrew.cmu.edu

1 — MSOM S38 Fellows' Lecture #1
Evan Porteus, Stanford University, Stanford, CA, 94305-5015, USA, eporteus@stanford.edu.

2 — MSOM S38 Fellows' Lecture #2
Marshall Fisher, The Wharton School, University of Pennsylvania, Philadelphia, PA, 19104-6366, USA, fisher@opim.wharton.upenn.edu.
Abstract not supplied

■ TB24

Hilton-Pacific

Spreadsheet Research: Opportunities and Interest Group

Sponsor: Education
Sponsored Session

Chair: Thomas A. Grossman, University of Calgary, Thomas.Grossman@haskayne.ucalgary.ca

1 — Opportunities and Challenges for Spreadsheet Research
Thomas A. Grossman, University of Calgary, Thomas .Grossman@haskayne.ucalgary.ca.

Spreadsheets dominate business and finance, but have mostly been ignored by researchers, providing opportunities for interesting research can change managerial practice. In one hour, we'll survey the scant research results, including billion dollar errors and evidence that users do not learn with experience. We'll discuss theoretical and empirical research questions across disciplines, and deployment of research results.

2 — Spreadsheet Productivity Research Interest Group (SPRIG)
Stephen G. Powell, Tuck School of Business, Hanover, NH, 03755, sgp@darmouth.edu., Thomas A. Grossman

SRIG is an informal industry/government/academic collaboration to stimulate and disseminate research, teaching and discussion on any aspect of spreadsheets, with emphasis on their use in OR/MS. We will discuss topics of interest, network, and explore becoming an INFORMS Subdivision. http://www.ucalgary .ca/mg/grossman/spreadsheetresearch

■ TB25

Center-Room F2

New Methods and Applications in DEA

Cluster: Data Envelopment Analysis
Invited Session

Chair: Tim Anderson, Dept. of Engineering & Technology Mgmt., Associate Professor, Portland, OR, 97207-0751, USA, tima@etm.pdx.edu

1 — Flexibility, Efficiency, and Performance of Enterprises: An Optimization Framework and Simulation Te
Fred Phillips, Oregon Health & Science University, professor, Beaverton, OR, 97006, USA, fphillips@admin.ogi .edu., Gary Summers

This paper describes the use of simulated markets to validate an optimization-based characterization of organizational flexibility , which we call Relative Variety Analysis. Results suggest that RVA is highly correlated with absolute flexibility (in a simulation whose underlying processes are known and where the idea of absolute flexibility is thus meaningful); is itself a good predictor of enterprise performance; and complements DEA to predict the performance of an enterprise.

2 — Using DEA to Measure the Effects of NAFTA on the Mexican Economy
Keith Hollingsworth, Morehouse College, Atlanta, GA, 30314, USA, khollingsworth@morehouse.edu., Raymond Robertson

NAFTA was expected to increase the productivity of the Mexican economy by providing it with easy access to larger markets and suppliers. We tested this hypothesis by using DEA to measure the productivity of various sectors of the Mexican economy both before and after NAFTA was implemented.

3 — Comparative Analysis of the Military Forces vis-a-vis the Nation's
Ken Nakabayashi, National Graduate Institute for Policy Studies, Tokyo, Japan, tone@bh.mbn.or.jp., Kaoru Tone, Biresh Sahoo

This study makes an attempt to newly design and quantitatively measure the performance index of 'the amount of the military forces compared to the nations's resorces', which is equivalently interpreted as the nation's dependency on the military instruments.

4 — A Comparison of DEA to Conventional Means of Technology Forecasting
Tim Anderson, Dept. of Engineering & Technology Mgmt., Associate Professor, Portland, OR, 97207-0751, USA, tima@etm.pdx.edu., Lane Inman

Using data envelopment analysis (DEA) to construct a state of the art (SOA) surface, provides a means to address many limitation of conventional technological forecasting and monitoring. This work compares a proposed method with currently available means to track the SOA.

■ TB26

Hilton-San Carlos I

Telecommunications Session 3

Sponsor: Telecommunications
Sponsored Session

Chair: Kerem Tomak, University of Texas, Austin, TX, USA, kerem.tomak@bus.utexas.edu

Abstract not supplied

■ TB27

Center-Room C2

Bullwhip Effect

Contributed Session

Chair: Paulo Goncalves, Sloan MIT, PhD Candidate, Cambridge, MA, 02139, USA, paulog@mit.edu

1 — Vendor Managed Inventory and Bullwhip Effect in Supply Chain
Da Qingli, Nanjing, 210096, China, Dql@public1.ptt.js.cn.

This paper studies that the bullwhip effect arises within the supply chain when the demand model is ARIMA(0,1,1) and the forecast method is a simple exponentially weighted moving average . The paper also examine VMI program to determine how it can alleviate negative effects, and gain some good results.

2 — The Impact of Shortages on Push-Pull Production Systems
Paulo Goncalves, Sloan MIT, PhD Candidate, Cambridge, MA, 02139, USA, paulog@mit.edu.

This paper considers the tradeoff faced by a semiconductor manufacturer between adopting a lean inventory strategy and running a hybrid push-pull production system, when variable service level impacts retailer defection. Our results suggest that shortages may shift the supply chain's production system from a hybrid push-pull to a pure push, increasing demand variability and decreasing manufacturers' service level. This study sheds some light on the true costs of lean inventory strategies.

3 — Bullwhip Effect Measure for ARMA Demand Processes
Xiaolong Zhang, Fairleigh Dickinson University, Madison, NJ, 07940, USA, zhang@fdu.edu.

This paper derives a procedure that can be used to derive measures of bullwhip effect for ARMA demand processes. Sufficient conditions are established for determining if shortening leadtime reduces demand volatility and bullwhip effect. The linkage between bullwhip effect and parameters of the underlying demand processes is established.

■ TB28

Center-Ballroom A1

Tutorial: A Demand-focused Decentralization Scheme for Serial Supply Chain

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Yu-Sheng Zheng, University of Pennsylvania, Associate Professor, Wynnewood, PA, 19096, USA, zheng@wharton.upenn.edu

1 — Demand-focused Dencentralization Scheme for Serial Supply Chains
Yu-Sheng Zheng, University of Pennsylvania, Associate Professor, Wynnewood, PA, 19096, USA, zheng@wharton.upenn .edu.

The existing decentralization schemes are all order-focused, meaning that the stage managers manage their local stock to meet the orders placed by their downstream stages. These order-focused schemes require the owner to know the demand process and are subject to error compounding, which is well known in the sense of bullwhip effect.. We propose a demand-focused scheme that let all stage managers manage their respective echelon stocks to meet the customer demand. Our scheme overcomes the above drawbacks inherent to the order-focused scheme.

■ TB29

Center-Ballroom A5

Operations Economics

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Martin Lariviere, MEDS - Kellogg School of Management, Evanston, IL, 60208, USA, m-lariviere@kellogg.nwu.edu

1 — Coordination of Categories in Retail Assortment Planning
Gerard Cachon, The Wharton School, Professor, Philadelphia, PA, 19104, USA, cachon@wharton.upenn.edu., Gurhan Kok

The assortment planning problem for a retailer is to select the categories to offer, and the depth of variety and price within each category. We study this problem where multiple categories interact due to the effects of basket shopping consumers and limited shelf space. We compare different category management regimes and analyze the depth (of categories) vs. breadth (of the assortment) trade-off in this setting.

2 — Supply Chain Coordination with Multiple Products Competing on Price
Goker Aydin, Stanford University, Ph.D. Candidate, Stanford, CA, 94305, USA, goker@stanford.edu., Evan Porteus

We examine a retailer's one-period inventory and pricing problem. The retailer sells multiple products competing on price. The stochastic demand for each product depends on all products' prices, but there is no substitution upon stockout. We then consider coordination issues in a supply chain where distinct manufacturers provide each product.

3 — Adaptive Trade Models
Gallien Jeremie, MIT Sloan School of Management, Cambridge, MA, 02142, USA, jgallien@mit.edu.

In most Pricing and Auction Theory models, the structure and parameters of demand are assumed to be known. This is only valid in when the demand distribution can be fully estimated before the transaction(s) of interest. E-commerce technology enables to improve this method. I present some original dynamic market mechanisms adapted to sequential demand processes and relying on statistical Bayesian Theory in order to perform trading and estimation simultaneously.

4 — Timing is Everything: Strategic Arrivals to Avoid Congestion
Martin Lariviere, MEDS - Kellogg School of Management, Evanston, IL, 60208, USA, m-lariviere@kellogg.nwu.edu., Jan Van Mieghem

A delay-sensitive customer prefers arriving for service when few or no other customers are in the system. We consider how such a customer should strategically arrive to a service system. We present a model in which strategic customers acting in a self-interested fashion give rise to Poisson arrivals.

■ TB30

Center-Ballroom A6

Coordination Issues In Supply Chain Management

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Yunzeng Wang, Case Western Reserve University, Cleveland, OH, 44106, yxw36@po.cwru.edu

1 — Horizontal and Vertical Inventory Competition in a Multi-Channel System
Tamer Boyaci, McGill University, Montreal, Canada, boyaci@management.mcgill.ca.

We consider a manufacturer who sells its product through two competing channels, one of which is owned by the manufacturer. We discuss the inefficiencies caused by competition and propose coordinating contract based on inventory compensation and sales commissions. We also investigate the manufacturer's strategic supply chain design problem.

2 — Drivers of Diffusion of ISO 9000 and ISO 14000: Findings from a Global Survey
Charles J. Corbett, UCLA, charles.corett@anderson.ucla .edu.

We examine whether management standards as ISO 9000 diffuse through global supply chains. Using data from a survey of over 5000 firms in 9 countries, we find that export pressure was a key driver of global diffusion of ISO 9000, suggesting that management practices do diffuse through global supply chains.

3 — Competition on Inventory Availability and Supply Chain Efficiency: Complements, Substitutes, and Product Life-cycle.
Serguei Netessine, University of Pennsylvania, Philadelphia, PA, netessin@wharton.upenn.edu., Fuqiang Zhang

We analyze the impact that the nature of downstream competition has on the supply chain performance and show that it depends critically on whether stocking decisions of competing retailers exhibit complementarity or substitutability. We find that supply chain coordination is much more important in the former case than in the latter. Our results imply that coordinating contracts should be more aggressively used in the early stages of the product life-cycle.

4 — Consignment Sales, Price-Production Decisions and Channel Performances
Yunzeng Wang, Case Western Reserve University, Cleveland, OH, 44106, yxw36@po.cwru.edu., Li Jiang, Zuo-Jun (Max) Shen

Under consignment-sales, a supplier retains ownership of inventory and makes inventory and price decisions. For each unit sold, the retailer deducts an agreed percentage from the selling price and remits the balance to the supplier. We build models to characterize, and design mechanisms to improve, channel performances under such arrangements.

■ TB31

Center-Room J3

Parallel Metaheuristics

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Teodor Gabriel Crainic, U.Q.A.M., Professor, Montreal, QC, H3C 3P8, Canada, theo@crt.umontreal.ca

1 — Interactions between Search Mechanisms in a Parallel Cooperative Multi-Search Method for the VRPTW
Alexandre Le Bouthillier, CRT, University of Montreal, student, Montreal, QC, H3C3J7, Canada, alexleb@crt .umontreal.ca., Teodor Gabriel Crainic

We outlined the difference in the global behavior when an existing Tabu Search is replaced with a improved version. Interaction between different qualities of algorithms influences the speed-up and convergence property of the central memory approach in which several search processes cooperate by asynchronously exchanging information about the best solutions. Variation in frequency exchanges of solutions are compared with the quality of solutions obtained. New best results where found.

2 — Sequential and Parallel Scatter Search Algorithms for the Quadratic Assignment Problem
Tabitha James, Virginia Tech, tajames@vt.edu., Cesar Rego, Fred Glover

A sequential scatter search algorithm developed for the QuadraticAssignment Problem will be presented, along with parallel implementations for two different parallel computing platforms. This presentation outlines the design of these algorithms and provides computational results on a set of quadratic assignment problem from QAPLIB.

3 — A Cooperative Multilevel Algorithm for the Capacity Multicommodity Network Design
Michel Toulouse, University of Manitoba, Assistant professor, Winnipeg, MB, R3T 2N2, Canada, toulouse@cs .umanitoba.ca., Ye Li, Teodor Gabriel Crainic

We present a cooperative parallel search heuristic. Each search process is a tabu search heuristic that uses a cycle-based neighbourhood structure to explore the design space of a multicommodity network. The cycle-based neighbourhood structure is constrained by fixing open some arcs in the multicommodity network. Each process cooperates with only two neighbors by exchanging attributes

of good designs. An overall multilevel structure of the design spaces is obtained by indexing the processes in increasing order and by letting the number of fixed-open arcs increases according to the process' index.

4 — Task Allocation and Scheduling by Cooperative VNS Procedure
Tatjana Davidovic, Mathematical Institute SANU, Belgrade, Yu, 11001, Serbia, tanjad@crt.umontreal.ca,tanjad@mi.sanu .ac.yu., Teodor Gabriel Crainic

Metaheuristics proved themselves as a powerful tool for solving NP--hard combinatorial problems. Task allocation and scheduling for execution on multiprocessor systems fall into this class even when communication times are neglected. Based on sequential implementation of Variable Neighborhood Search (VNS) metaheuristic for solving Multiprocessor Scheduling Problem with Communication Delays (MSPCD), we proposed two variants of Cooperative Parallel implementations. We present the results of comparison of these parallel methods with each other and with the sequential and independent parallel executions.

■ TB32

Center-Room J4

New Initiatives in Global Optimization

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Leon Lasdon, University of Texas, Professor, Austin, TX, 78731, USA, lasdon@mail.utexas.edu

1 — Global Optimization in Microsoft Excel
Daniel Fylstra, Frontline Systems Inc., President, Incline Village, NV, 89450, USA, dfylstra@frontsys.com.

The Premium Solver Platform for Excel makes it easy to apply multiple global optimizers to spreadsheet models. We will compare the algorithmic approaches and performance of (i) a Multistart method used with classical GRG and SQP Solvers, (ii) a Lipschitz Global Optimizer due to Pintér, (iii) Frontline's new Interval Global Solver, (iv) the OptQuest Solver, based on tabu search and scatter search, and (v) Frontline's hybrid Evolutionary Solver, using both genetic algorithms and classical methods.

2 — OptTek Systems & Optimal Methods Create New Optimization Software- OptQuest® NLP
James Kelly, OptTek Systems, Inc., CEO, Boulder, CO, 80302, USA, kelly@opttek.com., Jay April, Manuel Laguna, Fred Glover, Leon Lasdon, Zsolt Ugray

OptQuest® NLP is a heuristic algorithm designed to efficiently search for global optima of smooth constrained nonlinear programs (NLPs) and mixed integer nonlinear programs (MINLPs). OptQuest NLP utilizes the gradient-based LSGRG2 solver to investigate multiple starting solutions suggested by OptQuest — a global optimization algorithm based on Scatter Search. In this session we will describe the algorithm and show its capabilities and advantages by drawing on examples from applications.

3 — Quality Assurance and Global Optimization
Michael R. Bussieck, GAMS Development Corp., Washington, DC, 20007, USA, mbussieck@gams.com., Steven Dirkse, Alex Meeraus, Armin Pruessner

Spurred by customer demand, we have undertaken research and development in the global optimization area, adding new global codes to our portfolio of optimization solvers. Subsequent integration and testing of these new solvers have resulted in an open architecture for reliability and performance testing of mixed-integer nonlinear optimization codes. This testing framework has been placed in the public domain (www.gamsworld .org), thus making reproducible testing a practical proposition.

■ TB33

Hilton-University

Decision & Risk Applications

Contributed Session

Chair: Marc Sachon, IESE Business School, Barcelona, 08034, Spain, msachon@iese.edu

1 — Decision Analysis for the Site Imbalance Problem of Semiconductor Final Testing Machine
Chen-Fu Chien, National Tsing Hua University, Taiwan, ROC , cfchien@mx.nthu.edu.tw., Jei-Zheng Wu, Chung-Jen Kuo

A Testing machine tests multiple IC at different sites simultaneously. Unusual yield deviations imply a fault in specific testing sites of the machine. A decision analysis framework is developed to model the alternatives and the involved uncertainties in site-unbalance situations. An empirical study is conducted to validate this approach.

2 — Managing Technology Development for Safety-Critical Systems
Marc Sachon, IESE Business School, Barcelona, 08034, Spain, msachon@iese.edu., Elisabeth M. Pate'-Cornell

This paper presents a model that determines the optimal budget allocation strategy for the development of technologies for safety-critical systems, over multiple decision periods. The model takes into account the probability of technology development success as a function of the allocated budget and the probability of operational performance.

3 — Petri Nets-Based Risk Management and Decision-Making Method in Information System Development
Ly Zhang, Wuhan University, Wuhan City, P.R. China, lyzhang@wuhee.edu.cn.

Risk exists in information system development in China. This paper discusses an effective risk management and decision-making method developed using Fuzzy Petri Nets. A mathematical model is constructed. An algorithm is developed based on the model. The application of the method is illustrated as well using a case study.

4 — OR/MS in Disaster Response and Emergency Management
Nezih Altay, University of Richmond, Richmond, VA, 23173, USA, naltay@richmond.edu., Walter G. Green

The last decade has had frequent and very costly disasters. Future events, as population grows in areas at risk, have the potential to have even greater financial and human impact. In this context, OR/MS models for emergency management are needed to increase effectiveness and efficiency of response to disasters.

5 — Modeling the Human Health Risks from Antibiotic Use in Chickens
Tony Cox, Cox Associates, Denver, CO, 80218, USA, tony@cox-associates.com.

Banning antimicrobial use in animals may reduce resistant bacteria in humans, creating health benefits. But bans may also worsen human health. Simulation modeling of "farm to fork" microbial loads and attributable risks for Virginiamycin and Enrofloxacin, two chicken antimicrobials, show that banning use in chickens will increase human illness.

■ TB34

Hilton-Plaza

Intrapersonal (behavioral) Environment II: Epistemic and Aleatory Uncertainty in Rational Decision-Making and Risk Analysis

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Seth Guikema, Stanford University, Stanford, CA, 94305-4026, USA, sguikema@stanford.edu

1 — A Method for Probability Assessment of Uncertain Decision Models
Neil Stiber, Carnegie Mellon University, Pittsburgh, PA, 15213-3890, USA, Martin Schultz, Mitchell Small

A logistics regression model is estimated using site-use characteristics from historical data to predict the probability of industrial site contamination. These predicted probabilities are uncertain due to limited data. Value-of-information is computed for site characteristics and logistic model parameters. Strategies for decision making and seeking more information are presented.

2 — Difficulties in Modeling Epistemic Uncertainty: The Situational Aspects of Attitudes Toward Ambiguity
Russ Garber, Stanford University, Stanford, CA, 94305-4026, USA, rgarber@stanford.edu., Elisabeth M. Pate'-Cornell

The Ellsberg paradox showed that people were generally averse to ambiguity and did not always act in accordance with Savage's rules for rational decision-making. Since then, many detailed mathematical models have been developed to predict behavior under uncertainty. A problem with this is that attitude towards ambiguity is often situational in nature and not easy to predict. In this paper, we discuss many of the factors that affect attitude towards ambiguity.

3 — Epistemic, Aleatory, and Uncertain Probabilities: A Decision Analysis View
Ali Abbas, Stanford University, Stanford, CA, 94305, USA, aliabbas@stanford.edu.

We comment on the use of aleatory and epistemic probabilities and the notion of "uncertainty about probability" from the viewpoint of decision analysis. We also discuss some common misconceptions about the use of reliability measures on probability estimates. We present a Bayesian viewpoint and compare to classical statistics.

4 — Classifying Uncertainty by How You Reduce It
Max Henrion, Lumina Decision Systems, Los Gatos, CA, 95033, USA, Henrion@lumina.com.

Debates continue to rage about how to classify types of uncertainty. Pragmatically, it is useful to classify uncertainty by the types of method that can reduce it -- for example, gathering data, eliciting expert probabilities, or prefer-

ence models, or exploring other formulations -- and by the reasons that you cannot.

■ TB35

Hilton-Almaden II

Statistical and Systems Reliability Modeling

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Jason Rupe, Qwest Modeling and Optimization, Director, Boulder, CO, 80303, USA, jason.rupe@qwest.com

1 — Physical Foundations for Lifetime Distributions
John Shortle, George Mason University, Fairfax, VA, USA, jshortle@gmu.edu., Max Mendel

This talk lays a foundation for deriving physically meaningful lifetime distributions. We argue that Euclidean space is not a correct representation for the underlying lifetime space and give an alternative structure. We illustrate with familiar quantities associated with lifetimes and show that some are physically meaningful, but others are not.

2 — Operation Cost Deduction Through RAS Performance Improvement
Wei Hou, Sun Microsystems, Milpitas, CA, 95035, USA, hou@eng.usf.edu.

The total operation cost deduction has been one of the top priorities of corporate operations, especially for telco carriers and equipment suppliers that have been heavily impacted by the economy recession and hi-tech market weakness in recent years. This document will present a method of analyzing the field reliability, availability and serviceability (RAS) performance which can help improving the component and system reliability, faulty FRU detection and isolation, on-line diagnostics, and reducing unnecessary FRU usage, FE/SSE dispatches and thus lower the service cost. Correlation of RAS and cost will be developed and the analysis process will be illustrated by some sample system data.

3 — Extension of Probabilistic Risk Assessment Methodology to Management Decisions with an Application to Restructured Electric Power Systems
Frank A. Felder, Manhattan College, Arlington, MA, 02476, USA, fafelder@erols.com.

Probabilistic Risk Assessment (PRA) has been a successful and widely employed analytical tool used in engineering analyses to evaluate the probability of system failure. This paper extends the PRA methodology to address decision-making needs and applies these methodological advances to the management of the reliability of restructured electric power systems.

4 — State Based Reliability Modeling and its Impact on Manufacturing Quality
Brock Osborn, GE Global Research & Development Center, Schenectady, NY, USA, osborn@crd.ge.com., John Hershey

This talk will focus on the development of state based statistical models for relating the reliability of individual parts to the long term reliability of a complex system (locomotive, aircraft engine, etc.). We will utilize data collected from industrial applications and will relate the results to manufacturing quality improvement strategies.

■ TB36

Center-Room F1

Brownian Motion Models of Stochastic Networks

Sponsor: Applied Probability Society
Sponsored Session

Chair: John Hasenbein, University of Texas, Austin, TX, 78712-1063, USA, jhas@mail.utexas.edu

1 — Drift Control of Regulated Brownian Motion on a Bounded Interval
Baris Ata, Stanford University, Stanford, CA, 94305-5015, USA, bata@stanford.edu., J. Michael Harrison

Let Z be a regulated Brownian motion on a finite interval, and suppose that one can control its drift by selecting one of m possible values at each point in time. Under natural cost assumptions, we construct an optimal stationary policy that involves at most m critical numbers.

2 — Asymptotically Optimal Dynamic Pricing for a Telecommunications Service Provider
Martin Reiman, Lucent Technologies, Bell Labs, Murray Hill, NJ, 07974, USA, marty@research.bell-labs.com.

We consider a model of a telecommunications service provider that serves both wholesale (advanced reservation) and retail customers . Retail customers have a fixed price and arrival rate, while the arrival rate of wholesale customers depends on the price. We consider the problem of dynamically choosing the wholesale price, and provide asymptotically optimal pricing policies based on fluid and diffusion limits.

3 — Dynamic Control of Queues: Strong Approximation Analysis of a Parallel Server System
Hong Chen, University of British Columbia, Professor, Vancouver, BC, Canada, hchen@se.cuhk.edu.hk., Jihong Ou

The work applies the strong approximation framework proposed by Chen (2002) to analyze a two-server queueing system, which is studied in Bell and Williams (1999) for asymptotically optimal dynamic scheduling. Giving a precise definition of asymptotic optimality in the strong approximation framework, we show that the threshold control policy is asymptotically optimal, and that the result implies that of Bell and William (1999).

4 — Managing Parallel-Server Operations: Insights from Heavy Traffic Theory
Melanie Rubino, Stanford University, Stanford, CA, 94305-4025, USA, rubino@stanford.edu., J. Michael Harrison

We consider a system with several non-identical servers processing time-sensitive jobs from several classes. For a variety of different model formulations, heavy traffic theory provides striking insights about how to manage the workflow.

■ TB37

Center-Room J1

Multi-item Inventory Systems

Contributed Session

Chair: Powell E. Robinson, Texas A&M University, College Station, TX, 77843, USA, probinson@cgsb.tamu.edu

1 — Economic Order Quantity Models for Interdependent Items
Prafulla Joglekar, LaSalle University, Philadelphia, PA, 19141, United States, joglekar@lasalle.edu.

One shortcoming of the standard EOQ model is the assumption that there are no interdependencies among various items in the inventory. Because interdependencies of many types do exist, industry prefers the MRP approach to inventory model. However, in general, MRP models do not attempt to minimize costs. I propose models that not only account for the interdependencies but also seek to minimize the inventory costs of all the items under consideration.

2 — Ordering Rules for Multi-Item Inventory Systems Subject to Multiple Resourse Constraints
John Moussourakis, Rider University, Lawrenceville, 08648 , United States, moussourakis@rider.edu., Cengiz Haksever

In this paper we examine the multi-item inventory problem subject to several constraints.In the case of a single constraint,the Langrangian and the fixed-cycle method is commonly used.In this study we extend these approaches to include any number of constraints and suggest a model that will determine optimum policies.

3 — Vendor-Multibuyers Coordination through Common Replenishment Epochs under Dynamic demand
Juan Gaytan, ITESM Campus Toluca, Toluca, 50110, MEXICO, jgaytan@campus.tol.itesm.mx., Braulio Pliego

This paper proposes coordinated inventory policies among a vendor and multibuyers for a single product under dynamic demand. The vendor establishes replenishment epochs in return for giving price discounts to the buyers. A mathematical programming formulation and heuristic algorithm are provided. A numerical analysis is conducted to evaluate policy benefits.

4 — Modeling and Heuristic Methods for the Capacitated Multi-Item Dynamic Demand Coordinated Replenishment Problem
Li-Lian Gao, Hofstra University, Hempstead, NY, 11549, USA, Li-Lian.Gao@Hofstra.edu., Powell E. Robinson

We represent the capacitated multi-item dynamic demand coordinated replenishment problem as an arborescent fixed-charge network model and present the computational experience of solving the problem with heuristic methods.

5 — A Multiperiod Lot Sizing Problem with Supplier Selection
Chuda Basnet, University of Waikato, Hamilton, New Zealand, chuda@waikato.ac.nz., Janny Leung

This paper presents a multi-period inventory lot-sizing scenario, with multiple products and multiple suppliers. The products can be sourced from a set of approved suppliers, and a supplier-dependent transaction cost applies for each period in which an order is placed on a supplier. A product-dependent holding cost per period applies for each product in the inventory . An enumerative search algorithm and heuristics are presented to address the problem.

■ TB38

Center-Room N

Student Paper Contest II

Sponsor: Railroad Applications Section
Sponsored Session

Chair: Chip Kraft, chipKraft@aol.com

1 — Solving Real-Life Locomotive Scheduling Problems
Jian Liu, University of Florida, Gainesville, FL, 32611, US, liu-jian@ufl.edu.

The locomotive scheduling problem is to assign locomotives with sufficient power to trains on a pre-planned train schedule. In this paper, we report the results of a study of the locomotive scheduling problem faced by CSX Transportation. We developed a solution technique that uses ideas from problem decomposition, linear programming, integer programming, and neighborhood search. Comparing our solution with that of in-house software developed by CSX showed that we obtained a savings of over 400 locomotives, which translates into a savings of over one hundred million dollars annually.

2 — Shunting Passenger Train Units in the Netherlands
Ramon M. Lentink, PhD student, Rotterdam, 3000 DR, The Netherlands, rlentink@fbk.eur.nl., Leo G. Kroon

Outside the rush hours, almost all passenger train units need to be parked at shunt yards. Important subproblems are the matching of arriving and departing trains, the routing of train units, the order of parking the units and cleaning. In this talk, we discuss mathematical formulations of several subproblems with computational results.

3 — A Heuristic for Switch Engine Scheduling
Jodelson Sabino, Federal University of Espirito

The "Ant Colony" method is used to solve a problem of assigning switch engines in a railroad terminal yard to a set of transportation requests. Each engine has a tractive effort that must never be exceeded and each request has a time interval within which it must be attended. We aim to attend to all requests with the minimum path length for all the engines and with the minimum number of engines.

■ TB39

Center-Room K

Pricing and Acceptance in Freight Transportation

Sponsor: Transportation Science Section
Sponsored Session

Chair: Athanasios K., Ziliaskopoulos, Northwestern University, Evanston, IL, 60208, USA, a-z@northwestern.edu

1 — Accept/Reject Decisions for Home Delivery Problems
Ann Campbell, University of Iowa, Martin Savelsbergh

With home delivery businesses such as Webvan closing their doors, we examine policies for such businesses to accept or reject orders as they arrive to improve expected profit. Decisions are based on creating routes including accepted deliveries as well as forecasted deliveries. Computational results will be presented to demonstrate their impact.

2 — Revenue Management through Load Acceptance Decisions with Priority Demands in Real-Time Truckload Routing and Scheduling
Yongjin Kim, University of Texas at Austin, Austin, TX, 78712, yongjin@mail.utexas.edu., Hani S. Mahmassani, Patrick Jaillet

Revenue management strategies through load acceptance decisions are presented for a real-time truckload routing and scheduling problem, in which information about the demands (pick-up and delivey location, time windows, priority vs. regualr status) is revealed as the routes are executed. The demand classes correspond to various customer requirements in terms of time sensitivity vs. price sensitivity.

3 — Service Guarantee and Capacity Planning under Uncertainty
Yuwei Li, University of California at Berkeley, Berkeley, CA, 94720-1720, yuli@uclink4.berkeley.edu., Carlos Daganzo

Under demand uncertainty, transportation firms tradeoff the costs for building capacity, hiring temporary help and paying penalties for not fulfilling guaranteed services. We study the problems of multi-product, multi-period capacity planning by a package carrier, and show that moderate provision of non-guaranteed services enables a significant reduction in uncertainty-induced costs.

4 — Real Options Approach to Transportation Asset Management
Jeffery B. Fine, Northwestern University, Evanston, IL, j-fine@northwestern.edu., Athanasios K. Ziliaskopoulos, Carlos Daganzo

In many industries in the private sector, real options have been successfully used to manage real (i.e. physical) assets with highly uncertain returns. They provide a quantitative and flexible framework for decision makers to evaluate and manage tangible assets. We explore the use of real options in a new area -- transportation. We explain the concept of real options, explore their application to problems in transportation, and describe a Monte Carlo pricing technique. We then illustrate a practical application of real options to transportation, by formulating and solving the network design problem.

■ TB40

Center-Room G

Integrated Production/Transportation Models

Contributed Session

Chair: Tan Miller, Pfizer, Morris Plains, NJ, 07950, USA, tan.miller@pfizer.com

1 — The Stochastic Multi-period Single-sourcing Problem
Dolores Romero Morales, Maastricht University, Maastricht , 6200 MD, The Netherlands, d.romero@ke.unimaas.nl., H. Edwin Romeijn

We discuss problems in which retailers need to be assigned to production and storage facilities when retailer demand and cost parameters are uncertain. These models are suitable when integrating production and distribution. We will discuss some modeling issues and heuristics yielding good results even when the number of scenarios is large.

2 — Integrated Production & Transportation Scheduling
Tan Miller, Pfizer, Morris Plains, NJ, 07950, USA, tan .miller@pfizer.com., Renato De Matta

We develop integrated production and transportation models that simultaneously schedule production at intermediate and finishing plants, and at the same time these multi-echelon models also schedule the transportation modes that deliver WIP to the finishing plants. Algorithmic considerations and test results are also reviewed.

3 — A Branch and Price Algorithm for Multi-echelon DIstribution System Design
Udatta Palekar, University fo Illinois at Urbana-Champaign, Urbana, IL, 61801, USA, palekar@uiuc .edu., Ankit Agarwal

We consider the problem of optimal tree topology and location of safety stocks for a 3-echelon Distribution System. We assume that a base stock policy is employed and minimize the cost of transportation plus the safety stock costs. We solve the problem using a Branch and Price atrategy where the sub-problem generates subtrees and the master problem selects subtrees to form the optimal topology. Computational experience with the algorithm will also be discussed.

4 — A Capacitated Integrated Location/Inventory Model
Leyla Ozsen, Northwestern University, Student, Evanston, IL, 60208, USA, leyla@iems.nwu.edu., Mark Daskin, Collette Coullard

We formulate a capacitated location-inventory model. Key decisions include the location of distribution centers (DCs), the assignment of demands to DCs and the inventory policy at each DC to minimize cost while satisfying a capacity constraint at each DC. A Lagrangian-based algorithm is outlined and initial computational results are presented.

■ TB41

Center-Room M

Urban Transportation Planning Models II

Sponsor: Transportation Science Section
Sponsored Session

Chair: James Moore, University of Southern California, Professor of Civil Engineering, and Public Policy and Management, Los Angeles, CA, 90089-2531, USA, jmoore@almaak.usc.edu

1 — Spatial Input-Output Models: Solution Existence and Uniqueness
Yong Zhao, The University of Texas at Austin, Austin, TX, 78712, USA, yzhao@mail.utexas.edu., Kara M. Kockelman

Several land use-transportation models make use of input-output theory and seek an equilibrium solution of trade volumes across industries and zones via iterative calculations and a logit formulation of origin choice. This study examines the existence and uniqueness of such solutions by synthesizing the equations into a mathematical programming problem.

2 — Non-equilibrium Pareto Optimal Traffic Flows in a Realistic Traffic Network
Jane Hagstrom, University of Illinois at Chicago, Chicago , IL, 60607-7124, hagstrom@uic.edu., Robert Abrams

The Braess paradox is an example of a situation in which the Wardrop equilibrium is not Pareto optimal, that is, some travelers can have shorter travel times than in equilibrium while no traveler has greater travel time. We use a recently developed method to investigate the occurrence of this phenomenon using somewhat realistic traffic data, in particular, the Sioux Falls data set.

3 — A Multiobjective Programming Method for the Origin Destination Flow Estimation Problem
Xuesong Zhou, University of Maryland, College Park, MD, 20742, USA, xszhou@mail.utexas.edu., Hani S. Mahmassani, Yi-Chang Chiu

The origin destination flow estimation problem can be formulated as a multiobjective decision problem under uncertainty. We propose a multiobjective programming method to generate a representative subset of nondominated solu-

tions, explore the decision maker's preferences, and finally retrieve the best compromise solution.

■ TB42

Fairmont-Belvedere

Product Portfolio Management

Contributed Session

Chair: Eugene Perevalov, Lehigh University, Bethlehem, PA, 18015, USA, eup@lehigh.edu

1 — Digital Convergence: Implications for Product Portfolio and Design
Ravi N. Mantena, Stern School of Business, New York University, New York, NY, 10012, USA, rmantena@stern.nyu .edu.

Digital convergence enables the creation of multifunctional products that combine features from offerings of different industries. While presenting an opportunity for value creation and profit growth, this also poses a significant threat due to the increased substitutability between products. We derive the resulting implications for firms' product portfolio and design choices.

2 — Product Portfolio Selection in Semiconductor Industry
Eugene Perevalov, Lehigh University, Bethlehem, PA, 18015 , USA, eup@lehigh.edu.

We explore analytical techiques that would help semiconductor companies in their decisions of admitting new and terminating existing products with the goal of gradually creating and maintaining a portfolio with financially superior performance. In particular, we adopt the methods used in financial engineering to the problem of product portfolio selection.

3 — Modeling Reliability Issues in New Product Development Process
Janat Shah, Indian Institute of Management Bangalore, Banglore, 560076, India, janat@iimb.ernet.in., N. Viswanadham

New product development process involves strategic reviews during which likely unsuccessful products are weeded out. There is possibility of type-I and type-II error in review process. We build simple model to bring reliability issues in strtegic review decisions. We also look at time-to-market versus development costs tradeoff.

4 — Delayed Multiattribute Product Differentiation
Thomas Weber, The Wharton School, Univ. of Pennsylvania, Philadelphia, PA, 19104-6340, USA, webert@wharton.upenn .edu.

A multiproduct firm positions its top-quality ``flagship'' product in a market with imperfectly known tastes and reservation prices. Then it learns consumer characteristics and has the option of extending its product line by adding a versioned product. Simultaneous differentiation along horizontal and vertical attributes is generally not optimal. I also discuss the effects of delayed differentiation on the firm's development effort and on consumer surplus.

■ TB43

Center-Room H

Quality Control

Contributed Session

Chair: Hsiao-Shen J. Tsao, Department of Industrial and Systems Engineering, San Jose State, University, San Jose, CA, 95192-0085, USA, jtsao@email.sjsu.edu

1 — The Performance of R and S Control Charts for Mixtures of Two Normal Distributions
Abdelaziz Berrado, Department of Industrial and Systems Engineering, San Jose State University, San Jose, CA, 95192-0085, USA, berradoa@yahoo.com., Hsiao-Shen J. Tsao

Quality characteristics featuring bimodal distributions are common in semi-conductor fabrication and medical device manufacturing. We use Monte Carlo simulation to study the operating-characteristics curves of R and S control charts for a mixture of two Normal distributions. We discuss situations where these charts are misleading and ways of mitigation.

2 — Identification of Minimal Sets of Test Conditions in Experimental Design
Hsiao-Shen J. Tsao, Department of Industrial and Systems Engineering, San Jose State University, San Jose, CA, 95192-0085, USA, jtsao@email.sjsu.edu., Irene Wibowo

When m interactions of a two-level factorial design are known to be zero, the number of necessary test conditions can be reduced by m. Neither the classical fractional factorial designs nor the Taguchi designs take full advantage of this. We propose a method for identifying minimal sets of test conditions.

3 — A Framework for Quality Control in Process Manufacturing
Jane Ji, Scientific Decisions Inc, Watchung, NJ, USA, jxy@scientific-decisions.com., William Wallace

We propose a framework for quality control in process manufacturing with the following properties: 1) APC is used to compensate for predictable variation regardless of causes; 2) SPC is used to monitor the process for controlling false alarm rates; 3) objective and subjective knowledge are combined in a decision model for locating most probable causes of unsatisfactory performance; and 4) a diagnosis can generated at any time with quantifiable confidence and with prespecified precision.

■ TB44

Center-Room B2

Progress in Modeling, Simulation, and Analysis at TRAC-WSMR

Sponsor: Military Applications Society
Sponsored Session

Chair: Peter A. Shugart, TRAC-White Sands, WSMR, NM, 88002, shugartp@trac.wsmr.army.mil

1 — Simulating Target Acquisition within Vegetation
Kevin Young, TRADOC Analysis Center, youngk@trac.wsmr .army.mil.

The focus from combat model scenarios in open/rolling terrain toward a threat which maximizes use of vegetation to mask operations has required enhanced simulation techniques which represent the effects of vegetation on the target acquisition process. The developed methodology decays the visible portion of a target within vegetation as a function of range, posture, and vegetation density.

2 — Recent enhancements to Search And Target Acquisition Models for Force on Force Combat Simulations
David S. Dixon, White Sands Missile Range, dixon@trac .wsmr.army.mil.

This paper discusses several recently developed models for representation of moving target detection, detection of low contrast targets, field of view and field of regard search, and the represen-tation of direct view optical sensors.

3 — EPiCS: A Command and Control (C2) Exercise System for Crisis Managers
Julie A. Seton, White Sands Missile Range, setonj .contractor@trac.wsmr.army.mil.

The Emergency Preparedness Incident Command Simulation (EPiCS) system is a tool for crisis managers and their staffs to exercise command and control (C2) in a realistic environment and to see the results of their decisions in a computer simulation. EPiCS can be used to train/exercise C2 personnel, rehearse operations, evaluate operations plans, analyze systems effectiveness, and de-velop techniques and procedures.

■ TB45

Center-Room B3

Systems Analytic Approaches from a Military Perspective

Sponsor: Military Applications Society
Sponsored Session

Chair: Jon Czarnecki, Joint Military Operations, Monterey, CA, 93943, czarne@nps.navy.mil

1 — Attributes of an Effective Homeland Defense
Jon Czarnecki, Joint Military Operations, Monterey, CA, 93943, czarne@nps.navy.mil.

This paper uses Multiple Objective Analysis to investigate what should the attributes be for an effective Homeland Defense system . In the process of doing so, the paper necessarily develops a strategic perspective, Adaptive Deferment, that must be in place for any investigation of effectiveness of Homeland Defense or the larger Homeland Security systems.

2 — Systems Dynamics Model on the Growth of Al-Qa'ida
Todd Chamberlain, US Northern Command

This paper describes a systems dynamics model developed to better understand how the Al Qa'ida network was able to recruit, train, and fund terrorists capable of carrying out the highly lethal attacks of September 2001. Results from the model help to identify possible leverage points the U.S. could use to reduce future incidents.

3 — JWARS Command and Control, Campaign Modeling
Greg McIntyre, USAF, Arlington, VA, 22209, USA, greg .mcintyre@osd.mil., Chuck Burdick, Harvey Graf

JWARS models theater level operations, including inter-theater logistics activities. One challenge to successfully representing Joint Operations is implementing and executing the associated campaign plan. This presentation focuses on the knowledge base expert system application that enables the model to dynamically control joint forces in an evolving, simulated operational situation.

■ TB46

Center-Room C3

Integer Programming Software

Cluster: State of the Art in Optimization Software
Invited Session

Chair: Alper Atamturk, University of California, Berkeley, CA, 94720-1777, USA, atamturk@ieor.berkeley.edu

1 — The Progress of IP Software
Martin Savelsbergh, George Institute of Technology, Atlanta, GA, 30332-0205, USA, mwps@isye.gatech.edu.

In the past decade we have witnessed significant changes in the commercially available integer programming technology. In this talk, we briefly highlight some of these changes, such as improved linear programming technology, better integer preprocessing, and the incorporation of cutting planes. Next, we provide a personal perspective on what we can expect in the years to come.

2 — Recent Developments in the LINDO MIP Solver
Linus Schrage, University of Chicago, Prof., Chicago, IL, 60637, USA, linus.schrage@gsb.uchicago.edu.

We describe recent enhancements to the LINDO MIP solver in the area of exploiting problem structure, especially structures that arise when trying to represent nonlinearities.

3 — Recent Developments in CPLEX MIP
Ed Rothberg, ILOG, Inc., Mountain View, CA, 94043, USA, erothberg@ilog.com.

This talk will discuss recent improvements in the CPLEX MIP solver.

4 — Progress in Xpress-MP's MIP Solver
Richard Laundy, Dash Optimization, Northants, NN7 3BX, UK , richard.laundy@dashoptimization.com., Bob Daniel

In this talk we describe progress in cutting plane generation within Xpress-MP. We show the performance improvements that can be achieved and give computational results showing the effectivenes of cutting plane generation when combined with branch-and-bound.

■ TB47

Center-Ballroom A8

Software Demonstration Session 10

Cluster: Software Demonstrations
Invited Session

1 — GoldSim Technology Group: An Introduction to GoldSim: Simulation for the Real World
Rick Kossik, GoldSim Technology Group, Redmond, WA, 98052 , USA, rkossik@goldsim.com.

An Introduction to GoldSim: Simulation for the Real World - GoldSim represents the next generation in general simulation software with the functionality that makes it feasible to simulate complex, real-world systems. Key features that differentiate GoldSimóbuilt from the ground up to accommodate uncertainty and random variability; ability to include disruptive events; top-down hierarchical model interface and cloning of model elements. Example models will show how GoldSim can be used to support strategic planning, portfolio management, program planning, risk management, supply chain management, environmental modeling, and engineered systems modeling.

2 — SAS Institute, Inc.: SAS Supply Chain Planning Solutions
Ed Hughes, SAS Institute, Inc., Cary, NC, 27513, USA, ed .hughes@sas.com.

SAS Institute, Inc. - We'll review some of the latest supply chain planning solutions from SAS. These customized, web-based solutions are built on a solid data access and data warehousing foundation, and utilize SAS' unparalleled analytic excellence to help enterprises identify, adjust, and apply the most profitable strategic and tactical supply chain action plans.

■ TB48

Fairmont-Valley

The Vital Need to Brand our Profession

Sponsorr: INFORMS Public Information Committee
Sponsored Session

Chair: Michael A. Trick, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, trick@cmu.edu

1 — The Vital Need to Brand and Market Our Profession, Mark G. Doherty, Randall S. Robinson, Gary Lilien, Barry List, Thomas M. Cook

Many indicators of our profession's health -- such as number of groups employed in organizations and membership counts in professional societies -- show either significant decline or stagnation. Although we do observe growth in some sectors, even there the work usually is not labeled OR or MS or OR/MS. All too often, those who provide our jobs, pay, research funding, courses to teach, and general reputation don't know or don't value our overall profession. INFORMS is considering a major campaign to market the profession to our customers, funders, and others who influence our professional well-being. The panelists will give presentations on our current process and plans for addressing this critical problem, and then seek reactions and suggestions from the audience.

Tuesday 1:30 - 3:00pm

■ TC01

Center -Ballroom A4

Tutorial: Very Large Scale Neighborhood Search

Invited Session

1 — Very Large Scale Neighborhood Search
James Orlin, MIT E40-147, Professor, Cambridge, MA, 02139 , USA, jorlin@mit.edu.

Most heuristic search algorithms for combinatorial optimization problems rely on small-sized neighborhoods that are searched explicitly. We describe very large-scale neighborhood (VLSN) search algorithms where the neighborhoods are of very large size and are searched implicitly. We also describe applications of VLSN search algorithms to several combinatorial optimization problems.

■ TC02

Fairmont-Cupertino

Case: Optimization in Logistics and Supply Chains

Cluster: Practice Track
Invited Session

Chair: Rajiv Saxena, Menlo Worldwide Technologies, Redwood City, CA, 94065, USA, saxena.rajiv@menlolog.com

1 — Case 1: Optimization in Logistics and Supply Chains ñ New Frontiers of Opportunities
Rajiv Saxena, Menlo Worldwide Technologies, Redwood City, CA, 94065, USA, saxena.rajiv@menlolog.com.

Supply chains are constantly evolving and so are the problems and issues associated with them. We will discuss new developments and trends targeted to improve efficiency of supply chains. We will talk about case examples and how they may offer interesting areas for future research.

2 — Case 2: 3PL Engineering — Value Creation Through Optimization Modeling
Carol Havis, Menlo Worldwide Technologies, Redwood City, CA, 94065, USA, havis.carol@menlolog.com., Rajiv Saxena

The communication gap between theory and execution has mistakenly left many feeling like they are on opposing teams. This presentation will share tips and observations on how to create operationally feasible supply chain models that reap the rewards of optimization modeling and provide innovative solutions without over-constraining the model.

■ TC03

Fairmont-Fairfield

Case: A Generalize Framework to Build Optimization-Based Model Applications

Cluster: Practice Track
Invited Session

Chair: Jin Yang, PeopleSoft, Pleasanton, CA, Jin_Yang@PeopleSoft.com

1 — Case Study: A Generalize Framework To Build Optimization-Based Applications
Jin Yang, PeopleSoft, Pleasanton, CA, Jin_Yang@PeopleSoft .com.

In a typical project that applies OR/MS techniques to real world problem, one spends large portion of the effort on gathering quantitative data that feed the model and setting up mechanism to refresh those data. We'll examine PeopleSoft Optimization Framework that allows one to effectively build optimization-based business applications.

■ TC04

Hilton-San Carlos II

Mining of Manufacturing Enterprise Data

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: T. Warren Liao, Louisiana State University, Associate Professor, Baton Rouge, LA, 70803, USA, wliao@arl.army.mil

Co-Chair: Evangelos, Triantaphyllou, Louisiana State University, Baton Rouge, LA, 70803, USA, trianta@lsu.edu

1 — Discovery of Time-series Patterns with an Integrated Fuzzy Classification Method
Karine Josien, Louisiana State University, Ph.D. Student, Baton Rouge, LA, 70803, USA, kvoino1@lsu.edu.

Finding patterns in time-series data in manufacturing enterprise systems is needed for an optimal planning and control of operations. This study develops an integrated fuzzy classification method with an unsupervised component, fuzzy c-mean (fcm) and a supervised one, fuzzy k-nearest neighbors (fknn). Fcm is first applied to obtain the desired number of clusters. From those, training data are determined and then used with fknn to improve the accuracy. Results of the testing are provided.

2 — Data Mining with a New Classification Quality Measure
Andrew Kusiak, The University of Iowa, Professor, Iowa City, IO, 52242-1527, U.S.A., andrew_kusiak@uiowa.edu., Christopher Caldarone, Alex Burns

A new measure for a priori assessment of the utility of features and their impact on the prediction accuracy is proposed. The combined classification quality metric reduces the cost of cross-validation and more importantly it allows deriving new features that enhance prediction accuracy. The effectiveness of this measure is illustrated with medical and technology examples.

3 — Mining of Fuzzy Due-date Assignment Rules from Simulated Production Data
T. Warren Liao, Louisiana State University, Associate Professor, Baton Rouge, LA, 70803, USA, wliao@arl.army .mil., Pei-Chann Chang

This study discovers fuzzy due-date assignment rules from data generated by a simulated wafer production factory. The data mining technique employs a fuzzy modeling method, which produces rules easily understood by human. The influence of some important fuzzy modeling parameters such as number of terms is discussed. The effectiveness of the fuzzy modeling method is compared with other methods including neural networks and case-based reasoning.

■ TC05

Fairmont-Sacramento

Strategy II

Sponsor: Technology Management Section
Invited and Sponsored Session

Chair: Filipe Santos, Stanford University, Stanford, CA, 94305-4026, USA, GxGxfsantos@stanford.edu

1 — Founders' Impact on Firm Alliances
Kelley Porter, Stanford University, Stanford, CA, 94305-4026, USA, kaporter@stanford.edu.

Individuals need access to required resources of wealth, power and legitimacy in order build organizations. This study considers how founders with different backgrounds combine to form founding teams, how these compositions change over time, and whether any long term outcomes can be predicted from the initial combination of founders' expertise.

2 — Enhancing Multinational Firm Performance: Strategies of Positioning, Fit, Knowledge, and Evolution
Chris Bingham, Stanford University, Stanford, CA, 94306-4026, USA, cbingham@stanford.edu.

The purpose of this paper is to review the diverse literature on MNC performance. Overall, scholars suggest four ways managers can improve MNC performance: (1) having a broad geographic scope of operations, (2) creating structural, capability-based, and cultural fit, (3) possessing and effectively transferring foreign business knowledge, and (4) engaging in continuous evolution.

3 — Entrepreneurship and Network Mobilization in Silicon Valley
Fabrizio Ferraro, Stanford University, Stanford, CA, 94305-4026, USA, ferraro@stanford.edu.

This paper investigates how entrepreneurs in Silicon Valley managed their social networks during the fundraising process, and how they created new connections, built relationships, and mobilized their personal networks to raise financial capital for their start-ups.

■ TC06

Fairmont-Atherton

Management of IT

Contributed Session

Chair: Jiangfan Zhong, University of Southern California, Los Angeles, CA, 90089, USA, Gxjiangfaz@marshall.usc.edu

1 — The Role of Autonomy: Paths to Effective IT Use and Impact
Carlos E. Urcuyo, University of Toledo, Toledo, OH, 43606-3390, USA, carlos.urcuyo@utoledo.edu., William Doll, Xiaodong Deng

In this paper, the role of autonomy, and how it enhances its impact on end-user's computer-related work, is explored. The impact of intrinsic motivation and learning capabilities are also explored. Ideas are drawn from psychology (cognitive learning, empowerment); organizational behavior (innovation, job design); and IT (end-user computing literature). Findings show a direct link between autonomy and IT impact; as well as an indirect link through intrinsic motivation and learning capabilities. Thus, the role of autonomy should be considered in a broader IT context .

2 — Interorganizational Structure Revisited: Knowledge Transaction and IT
Jiangfan Zhong, University of Southern California, Los Angeles, CA, 90089, USA, jiangfaz@marshall.usc.edu., Shaosong Ou

Knowledge has been missing in the long-studied relationship between IT and interorganizational structure. This paper provides a better understanding of the IT-interorganizational structure relationship by including the notion of interorganizational knowledge transaction (IKT). We argue that hierarchy, market, and network structures will be respectively favored when IKT displays different attributes.

3 — Supply Chain Management Effectiveness in E-Business Environments
Germaine H. Saad, Widener University, CHESTER, PA, 19013, U.S.A., Germaine.H.Saad@Widener.edu.

The E-Business systems resulted in dramatic changes in the business environments and in their competitive priorities and needs. A new paradigm for Supply Chain Management (SCM) is introduced which addresses the determinants of SCM effectiveness in this new environment.

4 — Reconfigurable Control of Discrete Event Dynamic Systems
Houshang Darabi, University of Illinois at Chicago, Chicago, Il, 60607, USA, hdarabi@uic.edu.

We use finite automata analysis to reconfigure the control of discrete event system under incomplete information. Examples are provided.

■ TC07

Fairmont-Piedmont

Entrepreneurial Decision-Making

Contributed Session

Chair: Burton V. Dean, San Jose State University, San Jose, CA, 95192, USA, bvdean@aol, Gx.com

1 — Exploding the Myths and Finding the True Process of Creativity
Stuart Wells, San Jose State University, San Jose, CA, 95192, USA, sw@leadingedge.net.

Creativity is not about doing something that is different or having a lot of ideas (i.e., brainstorming is not creativity). Creativity is a disciplined process that only occurs when someone with a passionate concern initiates an activity that culminates when something of sustainable value to others is brought into existence.

2 — Organization Creation: The Entrepreneurial Decision
Michael Meeks, San Francisco State University, San Francisco, CA, 94132, USA, meeks@sfsu.edu.

Why new business organizations are created is a critically important question in modern society, yet, unfortunately, one for which we know very little. This paper examines how best to investigate firm creation, presenting preliminary findings of an ongoing triangulated study: grounded theory, conjoint, and model development/testing of Silicon Valley startups.

3 — Evaluating Methodologies for Start-up Firms
Harold Nissley, Angel Investors, Inc, Los Altos Hills, CA , 94022, USA, hnissley@AngelInvestors.org., Burton V. Dean

This paper considers factors for use in evaluating start-up firms . It is demonstrated that there are only two significant factors of primary importance in affecting the ultimate success of start-up firms: managerial team capability and market growth potential. A scoring method is presented for rating start-up firms using these criteria.

4 — Creativity in Strategic Planning: Process vs. Product
Ronald N. Taylor, Rice University, Houston, TX, 77005, USA, ratylor@rice.edu.

It is important to distinguish between creativity in strategic planning processes and creative strategic planning products. This paper examines creativity in each of these contexts and draws conclusions regarding creative operations in each context and ways to enhance creativity of strategic plans.

■ TC08

Center-Ballroom A2

E-Business Service Pricing and Gx Contracting

Contributed Session

Chair: Abraham Seidmann, Simon School of Business, University of Rochester, Rochester, NY, Gx14627, United States, seidmannav@simon.rochester.edu

1 — Contracting Structures for Application Service Providers (ASPs)
Abraham Seidmann, Simon School of Business, University of Rochester, Rochester, NY, 14627, United States, seidmannav@simon.rochester.edu., Dan Ma

Application Service Providers have adopted untraditional pricing strategies because of the unique nature of their Internet-based operations. We use economics, contracting theory and optimization models to study several service contracting structures that address the unique features of the ASP market. Our findings provide helpful insights for both ASPs and users.

2 — Pricing and Resource Allocation in Caching Services with Multiple Service Levels
Kartik Hosanagar, Carnegie Mellon University, Pittsburgh, PA, 15217, USA, kartikh@andrew.cmu.edu., Vidyanand Choudhary, Ramayya Krishnan

Internet infrastructure is a key enabler of e-business. The infrastructure consists of backbone networks (such as UUNET and AT&T), access networks (such as AOL and Earthlink), Content Delivery Networks (CDNs such as Akamai) and other caching service providers. Together, all the players make up the digital supply chain for information goods. Caches provisioned by CDNs and other entities are the storage centers — the digital equivalent of warehouses.

3 — Nonlinear Pricing of Information Goods
Arun Sundararajan, New York University, New York, NY, 10012, USA, asundara@stern.nyu.edu.

Derives optimal nonlinear pricing for information goods under incomplete information, with general customer distributions. With either usage monitoring costs or multiperiod interaction, unlimited-usage price is always optimal, and accompanying usage-based pricing schedule is independent of unlimited-usage price. Describe method for deriving optimal combination of prices , discuss applications and examples.

4 — Syndicated Sourcing on B2B Exchanges
Sudhi Seshadri, Indian School of Business, Hyderabad, AP, 500019, INDIA, sudhi_seshadri@isb.edu.

Using a model of bid pricing combined with risk sharing in syndicates, I analyze the circumstances under which web exchanges provide viable markets for vendors. I find syndicate sharing rules mediate prices and participation, and the reverse-auction yields key information necessary to implement the syndicate's sharing rule.

■ TC09

Center-Ballroom A3

E-Business Collaboration and Information Sharing

Contributed Session

Chair: Naga K. Krothapalli, University of Massachusetts Amherst, Amherst, MA, 01002, USA, naga@farm.ecs.umass.edu

1 — Towards Exploring the Effect of the Internet on Research Collaboration
Henry Kim, York University, Asst Prof, Toronto, ON, M3J 1P3, Canada, hkim@ssb.yorku.ca., Markus Biehl

It seems apparent to claim that the widespread use of the Internet and WWW, and globalization have fundamentally changed nature of knowledge-based collaborative work. In this project, this claim is tested by analyzing co-authorships and citations in leading management and information systems journals over the past fifteen years.

2 — Value of Information in Task Allocation in Multi-Agent Systems
Naga K. Krothapalli, University of Massachusetts Amherst, Amherst, MA, 01002, USA, naga@farm.ecs.umass.edu., Abhijit Deshmukh

We present a distributed task allocation method for multi-agent systems in dynamic and uncertain environments, which explicitly considers the cost of exchanging information between agents. We also present methods to evaluate information in distributed task allocation procedures.

3 — Design of Business Process for 4PL Collaborative e-Logistics using ebXML BPSS
Jung-woon Yoo, ETRI(Electronics and Telecommunications Research Institute), Member of Engineering Staff, Daejeon , CN, 305-350, Republic of Korea(South Korea), jwyoo@etri .re.kr., Sang-yong Park, Insoo Kim

The minimization of cost through the collaboration between logistics companies is a hot emerging issue in the 4PL industry. This paper focuses on how to design business processes for collaboration. As a result, 4PL BP for a collaborative e-logistics is introduced in this paper. First, appropriate BP definition, including the domain, requirement, and transaction analysis is proposed. Second, BPS implementation, which is based on ebXML specification, is presented.

■ TC10

Center-Ballroom A7

Stochastic Scheduling

Cluster: Scheduling
Invited Session

Chair: Xiaoqiang Cai, Chinese University of Hong Kong, Shatin N.T., Hong Kong, xqcai@se.cuhk.hk

1 — Optimal Replenishing Policy for a Stochastic Inventory System with Random Setup Cost
Y. Y. Feng, Chinese University of Hong Kong, Sha Tin, Hong Kong, yyfeng@se.cuhk.edu.hk., Frank Y. Chen

This study explores optimal ordering policies for a system with random setup ordering cost. The system is offered randomly two different setupcosts K1 and K2 with occurring fequency 0<p<1. The operation cost of the system will be minimized by a three parameter policy (s,c,S): when inventory position is upon or below s order up to S; when inventory position is upon c or between c and s, and face cheap setup cost K2, order up to S. We create an efficient algorithm to determine optimal (s,c,S) policy and verify its global optimality

2 — Stochastic Scheduling with Preemptive-repeat Machine Breakdowns
Xiaoqiang Cai, Chinese University of Hong Kong, Shatin N .T., Hong Kong, xqcai@se.cuhk.hk., Xiaoqian Sun, Xian Zhou

We consider the problems of scheduling a set of jobs stochastically on a single machine. The machine is subject to random breakdowns and the pattern of the breakdowns may depend on different jobs. We focus on the preemptive-repeat model for breakdowns, that is, if the machine has a breakdown during the processing of a job, the work done on this job is lost and the job will have to be processed from the beginning again when the machine resumes work. We derive the optimal policies for a couple of situations.

■ TC11

Center-Room C1

Scheduling in the Semiconductor Industry

Contributed Session

Chair: Thomas W. Sloan, University of Miami, Coral Gables, FL, 33124, USA, tsloan@miami.edu

1 — Systems of Multiple Cluster Tools: Configuration , Reliability, and Performance
Samuel C. Wood, Cardean University, Deerfield, IL, 60015, USA, wood@cardean.edu., Marcel J. Lopez

The emergence of single-wafer cluster tools in semiconductor manufacturing heightens the role of configuration in fab operation. We derive optimal configuration, lot sizing, and lot release policies for systems undergoing scheduled maintenance. We predict a migration from parallel configurations to serial as tools become reliable and/or cycle time becomes crucial.

2 — Downstream Effects of Manufacturing Times on Overall Delivery Lead Times
Marcel J. Lopez, University of California, San Diego, La Jolla, CA, 92093-0519, USA, martylopez@ucsd.edu.

Motivated by examples from the semiconductor industry, we present a mathematical model of a serial supply chain and measure the effects of fab time (and its variability) on downstream processing and shipment times. We identify the most significant sources of delay and suggest ways to improve overall delivery lead time.

3 — Optimal Inspection, Maintenance, and Production Schedules for a Multi-stage, Re-entrant Flowline with Variable Yield
Thomas W. Sloan, University of Miami, Coral Gables, FL, 33124, USA, tsloan@miami.edu.

We develop a stochastic DP model of a multi-stage, multi-product, re-entrant flowline. Yield is variable and depends on the equipment condition as well as the product type. In addition to determining the production schedule, decision variables related to inspection, scrap, and equipment maintenance are incorporated into the decision process.

4 — Improving Overall Equipment Effectiveness in Semiconductor Wafer Fabrication through Material Scheduling
Brian Neureuther, Indiana State University, Assistant Professor, Terre Haute, IN, 47809, USA, sdbrian@isugw .indstate.edu., George Kenyon

This study assesses the impact that material scheduling has on the operational variables that most influence overall equipment effectiveness (OEE); variables such as cycle-time, throughput, work-in-process levels, and operating expenses. In a multiple operation system, where both discrete and batch processing are utilized, the interactions between products, product lot size, and equipment are examined to determine the effect they have on cycle time and its components, throughput, and work-in-process inventory levels. Contrary to conventional

wisdom, progressively smaller lot sizes do not provide continuous improvements in cycle time, throughput, work-in-process inventories, operating expenses, or net profits.

■ TC12

Fairmont-Regency 1

Operations Research and Community Health Services

Sponsor: Health Applications Section
Sponsored Session

Chair: Michael Carter, University of Toronto, Professor, Toronto, ON, M5S 3G8, Canada, carter@mie.utoronto.ca

1 — Optimizing the Blood Supply Chain in Canada
John Blake, Dalhousie University, Assistant Professor, Halifax, NS, B3J 2X4, CANADA, john.blake@dal.ca.

Canada's blood supply chain is a $650 million business. In this paper we discuss a network flow model to optimize the blood product supply chain in Canada. The model provides an optimal flow of products, from collection through distribution, under the assumption of a nationally integrated network and a medium term planning horizon.

2 — A Decision Support Model for Home Care Resource Allocation
Carolyn Busby, University of Toronto, Doctoral student, Toronto, ON, M5S 3G8, Canada, busby@mie.utoronto.ca., Michael Carter

We discuss forecasting and analytical queueing models to help Home Care administrators predict and control the waiting time of their patients. The model allows them to determine which factors have the greatest affect on waiting times and to see the balance between cost and quality.

3 — A Model for Emergency Vehicles Management with Limited Relocations
Michel Gendreau, Universite de Montreal, Professor, Montreal, QC, H3C 3J7, Canada, michelg@crt.umontreal.ca. Emilie Frot, Frédéric Semet, Gilbert Laporte

We present a planning model for real-time fleet management systems for emergency vehicles. The distinctive feature of this model is that it explicitly constrains the relocation of vehicles after a service request. An application to the fleet of doctor vehicles of Urgences-Santé in Montreal will be presented.

■ TC13

Center-Room D

Fractional Programming and Generalized Convexity III

Sponsor: Optimization Section - Nonlinear Programming
Sponsored Session

Chair: Siegfried Schaible, University of California Riverside, Professor, Riverside, CA, 92521, USA, siegfried.schaible@ucr.edu

1 — Pairs of Compact Convex Sets
Diethard Pallaschke, University of Karlsruhe, Karlsruhe, D-76128, Germany, lh09@rz.uni-karlsruhe.de., Ryszard Urbanski

For a locally convex topological vector space the family of all nonempty compact convex subsets endowed with the Minkowski sum is a commutative semigroups with cancellation property. From this space the Radstrom-Hormander lattice is obtained by introducing an equivalence relation on the pairs of compact convex sets. This is done in the following way: To each pair of compact convex sets the difference of its support functions is assigned. Now two pairs of compact convex sets are called equivalent if the differences of their support functions is equal.

2 — Generalized Subconvexlike Set-valued Maps and Applications to Vector Optimization
Yong Wei Huang, The Chinese University of Hong Kong, Ph. D. student, Shatin, NT, Hong Kong, China, ywhuang@cuhk .edu.hk.

By Using the relative interiors, we define subconvexlike set-valued maps and generalized subconvexlike set-valued maps. The relationships between them and some important properties of them are shown. Applying convex set separation theorems involving the relative interiors, a Gordan type alternative theorem is established. Finally a necessary optimality condition theorem is proved for a general class of set-valued vector optimization in a sense of weak E-minimizers.

3 — G-Monotonicity and G-Convexity
Chanchal Singh, St. Lawrence University, Canton, NY, 13617, USA, csingh@stlawu.edu., Rita Pini

The concept of monotonicity and its various extensions existing in the literature in the classical setting are generalized in finite dimensional Euclidean spaces. With examples, as support to the proposed structure, it is shown when the traditional development fails but the proposed one works. As an application, the computation of probability under finite pairwise disjointness and mutual independence is shown to be tied to the proposed framework.

4 — Sum-of-ratios Fractional Programs
Siegfried Schaible, University of California Riverside, Professor, Riverside, CA, 92521, USA, siegfried .schaible@ucr.edu.

In multi-ratio optimization the sum-of-ratios fractional program is a particularly difficult problem. It has interesting applications, but only a few theoretical properties are known. We survey various solution methods which have been proposed in recent years.

■ TC14

Center-Room E

Networks

Contributed Session

Chair: Luciana S. Buriol, UNICAMP and AT&T Research, Florham Park, NJ, 07932, USA, buriol@research.att.com

1 — Randomized Heuristics for the Max-cut Problem
Paola Festa, DMA - University of Naples FEDERICO II, Napoli, 80126, Italy, festa@cao.ise.ufl.edu., Mauricio G.C. Resende, Celso C. Ribeiro, Panos M. Pardalos

Given an undirected graph with edge weights, the max-cut problem consists in finding a partition of its node set into two subsets , such that the sum of the weights of the edges having endpoints in different subsets is maximized. It is a well-known NP-hard problem with applications in several fields, including VLSIdesign and statistical physics. While some successful solution approaches based on semidefinite programming have been reported, the use of metaheuristics has not been deeply investigated yet.

2 — Dynamic Shortest Path Algorithm for Unit Weight Change
Luciana S. Buriol, UNICAMP and AT&T Research, Florham Park, NJ, 07932, USA, buriol@research.att.com., Mauricio G.C. Resende, Mikkel Thorup

We consider updating the shortest path graph when the weight of a single arc is changed by a unit. Extensive computational experiments show that the new algorithm can be up to 2 orders of magnitude faster than the standard algorithm of Ramalingam and Reps (1996).

3 — Genetic Algorithm Approach for Proportional Cost Edge-Disjoint Path Problems
Burcu Ozcam, North Carolina State University Industrial Engineering Department, Raleigh, NC, 27606, USA, bozcam@eos.ncsu.edu., Shu-Cherng Fang, Henry L.W. Nuttle

This paper tackles the NP-Hard problem of finding edge-disjoint paths in an undirected network with proportional path-costs. We develop two genetic algorithms with 'priority-based' and 'variable-length' path encoding for solving this problem. The performances of both algorithms are tested on small, medium and large complete graphs using different cost structures.

4 — A Shortest-path Method for Grid-graph Partitioning
William Donaldson, University of Wisconsin, Lewis Center, 43035, USA, wwd@cs.wisc.edu., Robert R. Meyer

Researchers have shown that the technique of dividing a grid-graph-partitioning problem into smaller and similiar problems leads to very good and sometimes optimal solutions. In our paper, we show how to transform the original problem into a shortest-path problem; the shortest path corresponds to the best stripe-based solution.

5 — Effective Algorithms for Query in Large-Scale Spatial Networks
Paul T.W. Fung, The Chinese University of Hong Kong, Student, Shatin, NT, Hong Kong, twfung@se.cuhk.edu.hk., C.H. Cheng

Spatial network databases have multiple indices and connectivity information, making storage and query difficult. This presentation will talk about some modifications of well-known storage and query algorithms (e.g. R-Tree, R+ Tree and STR R-Tree Packing) to specifically apply to large spatial networks. Shortest Path and Nearest Neighbor problems will be discussed.

■ TC15

Center-Room B4

Network Design

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Cynthia Barnhart, MIT, Cambridge, MA, 02139, USA, cbarnhar@mit.edu

1 — Enhanced Network Flow Models for Diameter-constrained Spanning Trees
Luis E. Gouveia, DEIO and CIO, Lisbon, 1749-016, Portugal , lgouveia@fc.ul.pt., Thomas Magnanti, Cristina Requej

Enhancements of a Network Flow formulation for Diameter-Constrained Minimum Spanning Tree Problem are discussed. These enhancements are based on giving an extended description of the convex hull of the integer solutions associated to a subproblem of the previous formulation.

2 — Survivable Network Design: Simultaneous Routing of Flows and Slacks
Alper Atamturk, University of California, Berkeley, CA, 94720-1777, USA, atamturk@ieor.berkeley.edu., Deepak Rajan

We describe a new model for the survivable design of networks. In contrast with the failure scenario models, the new model has almost the same number of constraints as the regular network design problem. We will present computational results on a column and cut generation method for solving the model.

3 — Decomposition Methods for Weakly-coupled Network Design Problems
Amr Farahat, MIT, Cambridge, MA, 02139, USA, afarahat@MIT .EDU., Cynthia Barnhart

Many network design problems of practical interest arising in transportation and logistical systems are weakly coupled. We present a methodology for identifying and solving such problems through a combined decomposition / approximation scheme. We discuss network topologies where such methods are most effective and present an application drawn from the airline industry.

■ TC16

Center-Room C4

Combinatoric Network Optimization

Cluster: Discrete Optimization
Invited Session

Chair: J. Cole Smith, University of Arizona, Tucson, AZ, 85721, USA, cole@sie.arizona.edu

1 — Robust Models for the DWDM Routing and Privisioning Problem
Jeff Kennington, SMU, jlk@engr.smu.edu., Eli Olinick, Augustyn Ortynski, Gheorghe Spiride

The DWDM routing and provisioning problem with uncertain demands is modeled as a multiobjective optimization problem. The primary objective minimizes a regret function that models the amount of over/under provisioning resulting from demand forecast uncertainty. The secondary objective minimizes the equipment cost that achieves the optimal value for regret.

2 — Optimal Design of Survivable Multicommodity Flow Networks under General Failure Scenarios
Manish Garg, University of Arizona, J. Cole Smith

The design of multicommodity flow networks is considered, wherein (fixed cost) capacitated arcs must be constructed such that a feasible flow exists under any of a set of given failure scenarios (subsets of failed arcs). Novel integer Benders' decomposition techniques and heuristics are required to obtain a practical exact algorithm.

3 — A Facility Location Problem to Expedite Disaster Relief
Esma Gel, Arizona State University, Assistant Professor, Tempe, AZ, 85287-5906, USA, esma.gel@asu.edu., J. Cole Smith, Filiz Ozel

Consider a set of possible disasters, each of which destroys certain passageways and renders areas in need of emergency supplies. We determine the optimal placement of relief facilitites in order to minimize the expected disaster relief time. Our methodology is illustrated using real economic and fault line analysis in Turkey.

■ TC17

Center-Room B1

Planning and Control of Pull or Hybrid Systems

Cluster: Manufacturing Systems
Invited Session

Chair: Sarah Ryan, Iowa State University, Associate Professor, Ames, IA, 50011-2164, USA, smryan@iastate.edu

1 — Comparison of Push, Pull and Hybrid Material Control Strategies: Issues and Insights from Simulation Experiments
Ananth Krishnamurthy, University of Wisconsin, Madison, WI, 53706, USA, akrishna@cae.wisc.edu., Rajan Suri, Mary Vernon

We address conceptual issues in developing models for making fair comparisons of push (MRP), pull (Kanban) and hybrid strategies such as CONWIP and POLCA. Through simulation experiments we show that the performance of pull strategies deteriorates considerably in certain environments while CONWIP and POLCA are more robust.

2 — Demand Driven Networks: Centralized Control with Maintenance and Down-Time Constraints
Mike Chen, University of Illinois at Urbana-Champaign, Urbana, IL, 61801, USA, mikechen@uiuc.edu., Richard Dubrawski, Sean Meyn

We describe policy synthesis techniques for resource management in large networks in which the policies may be designed to minimize the impact of rare or unexpected events on network performance. Specific examples are scheduled maintenance; unanticipated breakdown; or sudden change in the demand profile. We also describe methods for approximating sensitivity of performance with respect to hard constraints or rare events.

3 — Analysis of Delayed Product Differentiation with Pull Control
Heedong Kim, Iowa State University, Doctoral Candidate, Ames, IA, 50011-2164, U.S.A., hdkim@iastate.edu., Sarah Ryan

Delayed product differentiation (DPD) system poses design and control questions in a pull environment. We develop an performance analysis model and compare systems with and without DPD. The model can obtain expected throughput for given fixed numbers of kanbans or determine minimum numbers of kanbans for a target throughput.

4 — Allocating Work in Process in a Multiple Product CONWIP System with Lost Sales

We model a multiproduct CONWIP system as a multiple chain closed queuing network. A nonlinear program evaluates its performance and finds an allocation WIP to product types to minimize the maximum lost sales across types. Results are compared with a more restrictive analytical model as well as simulation.

■ TC18

Center-Room J2

50th Anniversary of the Founding of ORSA: Past President Session I

Cluster: ORSA 50th Anniversary
Invited Session

Chair: Saul Gass, University of Maryland, College Park, MD, 20742, USA, sgass@rhsmith.umd.edu

1 — F. W. Lanchester, His Influence on OR: Yesterday, Today and Tomorrow
Joseph Engel, Silver Spring, MD, 20906, USA, jhengel@erols.com.

I shall discuss the concept of combat model validation, via my analysis of Lanchester's Laws and the Battle of Iwo Jima, and the impact of that analysis on subsequent OR work. I will close with additional comments on other OR topics and some remarks about the future of OR.

2 — The Army and OR: Is the Marriage Over?
Seth Bonder, Ann Arbor, MI, 48105, USA, sbonder@comcast .net.

For over 50 years the U.S. military establishment was one of the most sophisticated and extensive users of operations research. Based on my experience with the Army, I will summarize why Army use of OR has been so successful and suggest reasons for its apparent decline in recent years.

3 — We Have No Choice -- Health Care Delivery Must be Improved: The Key Lies In The Application of Operations Research
William Pierskalla, University of California-Los Angeles, Los Angeles, CA, 90095-1481, USA, william .pierskalla@anderson.ucla.edu.

Our health care system faces fundamental change over the next ten years. Quality gaps are everywhere. Costs are projected to increase at near double-digit rates. Waste is extensive. Delivery systems are outmoded. The keys to improvement are information and decision-aiding models coupled with outcome measures and systems accountability.

■ TC19

Fairmont-Regency 2

Environmental Hazard Modeling

Contributed Session

Chair: Yupo Chan, University of Arkansas, Little Rock, AR, 72204-1099, USA, yxchan@ualr.edu

1 — Modeling Nitrate Concentration in Ground Water in Selected Areas of Sussex County, Delaware
Nachammai Ramasamy, University of Delaware, Newark, DE, 19717, United States, nacha@udel.edu., Palaniappa Krishnan, John C. Bernard, William F. Ritter

Delaware's broiler production generates poultry manure. This could produce excessive levels of nitrate concentration in ground water. This study models nitrate concentration as a function of iron concentration, season and distance of the well from the poultry farm using regression and neural networks. Results from both these techniques will be presented.

2 — Modeling Nitrogen Loading Rate to Delaware Lakes and Streams
Prachi Sudhakar, University of Delaware, Student, Newark, DE, 19717, Unites States of America, prachi5@yahoo.co.uk., Palaniappa Krishnan, John C. Bernard, William F. Ritter

Nitrogen Loading Rate (NLR) to Delaware lakes was predicted using regression and neural network models. NLR has been modeled using cropland, soil type and the presence of broiler production. Regression and neural network models were

developed using Statistical Analysis System (SAS) and NeuroShell Easy Predictor respectively. Both models performed equally well.

3 — Recognizing Pollution Patterns using Spatial Time Series
Yupo Chan, University of Arkansas, Little Rock, AR, 72204-1099, USA, yxchan@ualr.edu., Thomas S. Kelso, Sam Wright

Application of spatial time-series to underground water pollution yields interesting insights. Ordinary models used in hydrological studies are typically ill-at-ease in handling precipitous events such as pumping, particularly when transient effects are of interest. In our study, a regular draw down equation is supplemented by intervention analysis. Pollution diffusion was modeled by transfer functions.

4 — Multiple Emission Strategies for Electric Generators
Robert T. Eynon, U.S. Dept of Energy, Washington, DC, 20585, USA, reynon@eia.doe.gov.

Proposed legislation requires reductions in emissions of sulfur dioxide, nitrogen oxides, mercury and carbon dioxide. This paper addresses economically efficient choices in complying considering options such as fuel switching, emission control equipment, generator replacement and conservation. It reports impacts on fuel consumption, generator technology choice, and prices to consumers.

■ TC20

Fairmont-Hillsborough

Empirical Investigations into Auction Mechanisms

Cluster: Auctions
Invited Session

Chair: Joni Jones, University of Michigan, Ann Arbor, MI, 48109, USA, jonij@umich.edu

1 — The Effect of Auction Mechanism on Bidder Participation
Elena Katok, Penn State University, University Park, PA, 16802, USA, ekatok@psu.edu., Richard Engelbrecht-Wiggans

Oral auctions are more common in practice than first price auctions in a wide variety of settings, ranging from art to cattle. One explanation is that oral auctions are easier to bid in, than sealed bid auctions. Higher participation implies higher seller revenues. We investigate this question in the laboratory.

2 — I Name My Price But Don't Want the Prize: Information Presentation and the Winner's Curse in the Name-your-own-price Mechanism
Kevin Kuan, University of Michigan, Ann Arbor, MI, 48109, USA, kkuan@umich.edu., Joni Jones

This study investigates the role of information presentation in affecting decision making in the name-your-own-price mechanism. In general, subjects were found to fall prey in the winner's curse in this mechanism but to a different degree, depending on the type of recommendation and past transactions they were provided.

3 — Switching to Electronic Auctions: An Empirical Investigation of Traditional and Electronic Bidders in the Dutch flower Auctions
Otto Koppius, Erasmus University, Rotterdam, 3000 DR, Netherlands, o.koppius@fbk.eur.nl., Eric van Heck

Electronic auctions have rapidly increased in popularity, but the consequences of switching to an electronic auction are unclear. In this paper, we report on a combined study of changing bidding behavior at a large Dutch flower auction. We compare electronic bidders with traditional bidders and analyze the effect of product quality information and market state information.

4 — The Information Architecture of Multidimensional Auctions: Supply-side vs. Demand-side Information
Otto Koppius, Erasmus University, Rotterdam, 3000 DR, Netherlands, o.koppius@fbk.eur.nl.

We investigate how revealing two different categories of information in a multidimensional auction affects bidding behavior. Bidders had information about either the bid taker's utility function (demand-side information) or about their relative position vis-a-vis their competitors (supply-side information). The effects on several market performance measures are explored.

■ TC21

Fairmont-Glen Ellen

Financial Engineering, Session 05

Cluster: Financial Engineering
Invited Session

Chair: John R. Birge, Northwestern University, jrbirge@northwestern.edu

1 — Weighted Monte Carlo Estimators in Option Pricing
Bin Yu, by52@columbia.edu., Paul Glasserman

Motivated by problems arising in finance, we analyze weighted Monte Carlo estimators based on weights chosen to minimize a convex function subject to constraints on weighted averages of control variables. The constraints may equate the controls to their expected values or to some other values (e.g., to market prices), either for variance reduction or model correction. We establish the limiting behavior for both cases.

2 — Spectral Expansions in Financial Engineering and Applied Probability
Vadim Linetsky, linetsky@iems.northwestern.edu.

In this talk we will survey recent results in the theory and applications of the Spectral Expansions Method (SEM) for continuous-time Markov processes in financial engineering. We focus on the case of one-dimensional diffusions and show that SEM is a powerful tool to derive analytical solutions to difficult pricing problems.

3 — Option Pricing with Mean Reversion and Jump Risk and Its Application to Electricity Options
Steven Kou, kou@ieor.columbia.edu., John R. Birge

We propose two models for assets pricing with both mean reversion and jump risk, one suitable for electricity and the other suitable for gas prices. Closed form solutions for call, put and exchange options, and for options on futures contracts are obtained under both models. Application to pricing of various electricity options will also be presented. The mathematical techniques used are the change of numerical argument, jump diffusion, and Laplace transform.

■ TC22

Fairmont-Paseo

Global Economic and Trade Issues

Contributed Session

Chair: Sak Onkvisit, San Jose State University, San Jose, CA, 95192-0069, USA, onkvisit_s@cob.sjsu.edu

1 — Application of Random-utility-based Multizonal Input-output Models: Production, Trade, Travel and Location Choice in the State of Texas
Kara M. Kockelman, The University of Texas at Austin, Austin, TX, 78712, USA, kkockelm@mail.utexas.edu., Ling Jin

This spatially disaggregate model of location choice and trade flows in Texas derives from a standard input-output framework but recognizes interzonal interactions and producer utility maximization through choice of input origins and travel modes via nested logit models. The empirical application investigates the sensitivities of trade flows and other model outputs to various inputs and parameters.

2 — An Evaluation of Export Processing Zones in Developing Countries: The Case of India
Sak Onkvisit, San Jose State University, San Jose, CA, 95192-0069, USA, onkvisit_s@cob.sjsu.edu., Howard W. Combs, Sukhdeep P. Saroya

This study was conducted to explore the evolution and to evaluate the performance of EPZs (Export Processing Zones) in India. The findings reveal that the performance of EPZs has been mixed. Global implications for developing economies along with characteristics for successful EPZs are provided. The future of EPZs is discussed.

3 — Globalization and Strategic Alliances: Critical Success Factors in Lebanon
Nouri Beyrouti, Lebanese American University, Beirut, Lebanon, nbeyruti@lau.edu.lb.

Heavy competition, low profitability, technological innovations and speedy entry into new markets have led to the contention that the key to success in the coming years lies in the creation of collaborative advantage through Strategic Allicances. Globalization mandates alliances and no company or nation can stand-alone any longer. The high ground in the world we are entering is going to be held by companies and countries that learn how to work across organizational, national and cultural boundaries and cooperate with each other.

4 — Economics and Meritocracy: An Analysis into Intelligence of Nations.
Waithaka Iraki, Jackson State University, Doctoral Student, Jackson, MS, 39204, USA, xniraki@yahoo.com.

The Paper looks at the relationship between Intelligence as measured by standardized tests such as GMAT and the Economic level of Countries as classified by The World bank. The study follows observations that Intelligence tests are biased against students from low social economic classes. Could this be the case with Countries that have low economic status as indicated by their per capital income? The Study made use of GMAT scores and found significant differences between countries based on their per capita income . These findings put to question the use of such tests in selection for jobs and higher education, particularly where the group has a diversity of background.

5 — The Competitive Dynamics of Foreign Market Entry
Brad Killaly, University of California, Irvine, Irvine, CA, USA, BKillaly@uci.edu.

We extend research into foreign market entry by testing the relative strength of competitor foreign market density and competitor entries on a firm's likelihood of market entry. Whereas prior research has focused on density, we argue that recent competitor entries also affect the entry decision and that the relative strength of these effects varies by firm expansion experience and mode. We test our hypotheses by examining the foreign market entries of all US telecommunications service firms .

■ TC23

Center-Room L

Crew Scheduling

Contributed Session

Chair: Markus P. Thiel, Decision Support & OR Lab, Researcher, Paderborn, D, 33098, Germany, mthiel@upb.de

1 — Crew Scheduling and Assignment at a European Airline
Markus P. Thiel, Decision Support & OR Lab, Researcher, Paderborn, D, 33098, Germany, mthiel@upb.de., Taieb Mellouli, Leena Suhl

We propose a partial integration of crew scheduling and assignment steps based on 2 tightly coupled components: The first constructs chains of crew pairings spaced by weekly rests where crew capacity/availability is considered. The second rearranges parts of these pairing chains into individual crew schedules where flight time and off-duty days are distributed evenly. A combination of optimization models and heuristics are realized and tested with real-life data from a European tourists airline.

2 — Multi-depot Bus Scheduling with Driver Considerations
Achim Koberstein, University of Paderborn, Researcher, Paderborn, 33098, Germany, akober@upb.de., Natalia Kliewer, Leena Suhl

We present a 2-phase method for the integration of driver scheduling considerations into the bus scheduling problem. Our solution approach is based on a time-space network flow model for the MDBSP. From the MDBSP solution we build a set partitioning model for the driver duty generation. The solution procedure has been tested on existing benchmarks as well as on real world data. It yielded fast high quality solutions under direct application of standard optimization software.

3 — Heuristic Approach for Airline Crew Rostering Problem
Jaideep Gupte, University of South Florida(Tampa), Student, Tampa, FL, 33613, USA, gupte@eng.usf.edu., Michael Weng

This research work develops models to solve the airline crew rostering problem. A mixed integer linear programming formulation is presented to find an optimal solution. The objective of this formulation is to minimize the crew cost associated with round trips and the cost of reserve crews in the scheduling horizon. Due to the computational complexity, the MIP is not suitable for solving real size problems; hence a heuristic has been proposed. Computational results are reported and discussed.

4 — Multiple-Depot Integrated Vehicle and Crew Scheduling
Dennis Huisman, Erasmus University Rotterdam, Rotterdam, 3000 DR, The Netherlands, huisman@few.eur.nl., Albert P.M. Wagelmans, Richard Freling

We present two different models and algorithms for integrated vehicle and crew scheduling in the multiple-depot case. These algorithms are based on a combination of column generation and Lagrangain relaxation. Furthermore, we compare those approaches with eachother and with the traditional sequential one on several datasets.

5 — An Integrated Approach for Crew Pairing with Teaming
Curt Hjorring, Carmen Systems, Gothenburg, Sweden, curt .hjorring@carmen.se., Cecilia Hansryd

An aircraft flight is often covered with a number of different pairings since cockpit and cabin crew are subject to different rules, costs, and constraints. Minimizing direct crew costs can lead to pairings with very little teaming, i.e. many crew changes . We describe an integrated approach that dynamically adds crew change constraints to produce low cost solutions with high teaming. The high teaming improves operational robustness, and is desirable from the crew point of view.

■ TC24

Hilton-Pacific

Spreadsheet Research

Sponsor: Education
Sponsored Session

Chair: Thomas A. Grossman, University of Calgary, Thomas.Grossman@haskayne.ucalgary.ca

1 — Nu-kote's Spreadsheet Linear Programming Model for Supply-Chain Optimization
Larry J. LeBlanc, Vanderbilt University, Nashville, TN, 37203, USA, Larry.LeBlanc@Owen.Vanderbilt.edu., James A. Hill, Gregory W. Greenwell, Alexandre O. Czesnat

Nu-kote manufactures a variety of laser and ink-jet printer cartridges and related items. We describe the spreadsheet LP model for optimizing shipments between vendors, manufacturing plants, warehouses, and customers. This LP has approximately 6 ,000 variables and 2,500 constraints. Nu-kote used this model to identify improved shipments which greatly reduced its shipping costs.

2 — Cellular Automata in Spreadsheets: The New Science?
Sam L. Savage, Duxbury/Thomson Learning, savage@stanford .edu.

At last something is making the science news that spreadsheets are ideally suited for: Cellular Automata. From Conway's Game of Life to Wolfram's New Science, cellular automata provide a new perspective on the world. Amaze your frields and waste hours of time exploring this facinating paradigm.

3 — Spreadsheet Lifecycle Models
Stephen G. Powell, Tuck School of Business, Hanover, NH, 03755, sgp@darmouth.edu., Thomas A. Grossman

Software engineering lifecycle models (such as the well-known "waterfall" model) are powerful tools for managing software development. We survey existing models, discuss how they apply to spreadsheets, consider the undesirable "don't select a model" model that is the de facto standard, and propose models that might usefully be adopted by spreadsheet users.

■ TC25

Center-Room F2

Dynamics and Productivity

Cluster: Data Envelopment Analysis
Invited Session

Chair: Timo Kuosmanen, Wageningen University, Wageningen, NL, 6706 KN, The Netherlands, Timo.Kuosmanen@wur.nl

1 — Productivity Measurement of Non-market Public Services in Finland
Tarmo Räty, Government Institute for Economic Research, Dr, Helsinki, 00531, FINLAND, tarmo.raty@vatt.fi.

Statistics Finland, Center for social and health reasearch (STAKES) and Government institute for economic research (VATT) have developed a set of indicators to meet increased demand for productivity measures in Finland. Statistics Finland collects information from individual government and municipal agencies and measures productivity changes in each service. STAKES and VATT take gain of comparative measures and detailed databases in health care sector. A more comprehensive system to follow productivity changes based on product indicators is under development.

2 — Does Diffusion Cause Innovation? A Non-Parametric Approach
Vincent Otto, Wageningen University and Research Center, Ph.D. student, Wageningen, 6706 KN, The Netherlands, vincent.otto@wur.nl., Timo Kuosmanen, Ekko van Ierland

We examine whether there is positive feedback from diffusion to innovation. Components of the Malmquist index are used as measures of innovation and diffusion. We then study the feedback using panel data regressions. Empirical results for OECD countries are presented, and routes for new applications are suggested.

3 — Scale Effect in Malmquist Productivity Indexes — Applications to Finnish Agriculture
Timo Sipiläinen, sipilain@millipede.helsinki.fi.

Scale or volume effect is one of the sources of productivity change. The role of this effect seems to have been partially neglected in the productivity analysis. Several methods and decompositions have been suggested for analyzing the sources of productivity change. In this paper input oriented Malmquist productivity index is adopted and it is decomposed according to Färe, Grosskopf, Lindgren and Roos (1994), Ray and Desli (1997) and Lovell (2001). FGLR approach starts from the changes in the benchmark (constant returns to scale) technology when the starting point of RD is the best practice (variable returns to scale) technology. In the latter approach it is possible to take into account the scale effect in the form of scale change factor instead of scale efficiency change (FGLR), in addition to technical change and technical efficiency change. In multi-input multi-output case input mix and output mix effects have to be determined when analyzing the scale and volume effect (L). In the empirical data indexes are calculated applying DEA (data envelopment analysis) based input distance functions. The decompositions are calculated and compared in a sample of Finnish dairy farms for 1989-2000. The period is of interest because of the drastic change in agricultural policy when Finland joined the European Union in 1995.

4 — Synthetic Meta-index of Sustainable Development: A DEA Approach
Timo Kuosmanen, Wageningen University, Wageningen, NL, 6706 KN, The Netherlands, Timo.Kuosmanen@wur.nl.

Environmental Sustainability is a complex issue impossible to capture in a single index. Yet, many believe that even rough proxies are better than nothing. The quest for SD index has yield many different alternatives. This paper applies DEA

to construct a synthetic meta-index from a sample of SD indices. DEA weights have an attractive benefit-of-the-doubt interpretation, which forms an attractive basis for aggregation.

■ TC26

Hilton-San Carlos I

Telecommunications Network Design

Sponsor: Telecommunications
Sponsored Session

Chair: Joel Sokol, Georgia Institute of Technology, Atlanta, GA, 30332-0205, USA, jsokol@isye.gatech.edu

1 — Computational Investigation of Survivable Network Problems
Anant Balakrishnan, University of Texas, Professor, Austin, TX, 78712, USA, anantb@mail.utexas.edu., Prakash Mirchandani

Survivable network design seeks the least cost set of edges containing a pre-specified number of paths between node-pairs of a given graph. We develop several families of inequalities to strengthen the flow-based formulation for this difficult problem, assess their computational effectiveness, and propose and test variants of an LP-rounding heuristic.

2 — Optimal Clustering of Base Stations in Cellular Telephony
David Shallcross, Telcordia Technologies, Research Scientist, Morristown, NJ, 07960, USA, davids@research .telcordia.com., Eric van den Berg

Under GSM, a Base Station Controller (BSC) may control many Base Transceiver Stations (BTSs), each of which controls a cell. When a mobile phone moves between cells, a handover is performed, which imposes a load on the BSCs associated with the originating and destination cells. This load is reduced if the same BSC controls both cells. We consider the problem of reassigning BTSs to BSCs to reduce handover load, subject to other limitations.

3 — Heuristics for the Multi-level Capacitated Minimum Spanning Tree Problem
S. Raghavan, University of Maryland, College Park, MD, 20742-1815, USA, raghavan@umd.edu., Ioannis Gamvros, Bruce Golden

We consider the Multi-Level Capacitated Minimum Spanning Tree Problem (MLCMST), a generalization of the well-known CMST Problem . We describe a construction heuristic for the MLCMST problem. We also present a genetic algorithm, based on the notion of grouping, that uses the construction heuristic as a subroutine. Computational results will be presented.

4 — Minimizing Maximum Indegree
Venkat Venkateswaran, AT&T Labs, Principal Technical Staff Member, Middletown, NJ, 07748, USA, vvenkateswaran@att.com.

We study the problem of orienting the edges of a given simple graph so that the maximum indegree of nodes is minimized. We also develop an algorithm to produce such an extremal orientation on any given simple graph. Such problems arise in designing survivable telecommunication networks.

■ TC27

Center-Room C2

VMI and Information Sharing

Contributed Session

Chair: Susan X. Li, School of Business, Adelphi University, Associate Professor, Garden City, NY, 11530, U.S.A., li@adelphi.edu

1 — Value of Information Sharing in VMI: Benefit and Benefit Distribution
Yuliang Yao, University of Maryland, College Park, MD, 20740, USA, yyao@rhsmith.umd.edu., Martin Dresner

The paper construct an analytical model to study the value of information sharing in VMI. In particular, the paper articulate the benefits generated from implementation of VMI and information sharing, and how the benefits are distributed between participants. different VMI strategies and managerial implications are discussed.

2 — Value of Information Sharing and Coordination in a Vendor-Manufacturer Supply Chain
Funda Sahin, University of Tennessee, Knoxville, TN, 37996, USA, fsahin@cgsb.tamu.edu., Powell E. Robinson

This research investigates the value of information sharing and coordination in a make-to-order vendor-manufacturer environment. We develop alternative information sharing/coordination strategies, mathematically formulate the strategies, develop rolling horizon algorithms, solve the problems to optimality and conduct experiments to test the impact of environmental factors. Results indicate a potential 47.5% cost reduction for the integrated strategy over traditional approaches.

3 — Supply Commitments with Discounts
Zhaotong Lian, University of Macau, Dr., Macao, China, lianzt@umac.mo., Liming Liu, Xiang Zhu

In this paper we study an important class of production planning contract. Under such a contract a buyer has to commit requirements for components, for all periods, at the beginning of the horizon. Unit cost is discounted per period. The buyer can update the ordering quantities for the current period and future periods by paying the reorder cost. We present a general model for the supply contract. We also study several heuristics to approach the model.

4 — Manufacturer-Retailer Supply Chain Coordination with the Impact of Information Technology
Susan X. Li, School of Business, Adelphi University, Associate Professor, Garden City, NY, 11530, U.S.A., li@adelphi.edu., Yao Chen

Utilizing information technology and a full information-sharing rule, this paper develops a framework that explores the issues and conclusions that result from coordinating the relationship between the manufacturer and the retailer in a supply chain. Our analyses demonstrate that supply chain coordination can be achieved by utilizing well-known bargaining models.

■ TC28

Center-Ballroom A1

Auctions and Supply Contracts

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Terry Taylor, Columbia University, Graduate School of Business, Assistant, Professor, New York, NY, 10027-6902, USA, tat2002@columbia.edu

Co-Chair: Erica Plambeck, Stanford University, Assistant Professor, Stanford, CA, USA, plambeck_erica@gsb.stanford.edu

1 — Contracting in the Presence of Private Exchanges
Tunay Tunca, Stanford University, Stanford, CA, USA, tunay@stanford.edu.

Using a model based on Mendelson and Tunca (2001), we examine the impact of the existence of a private exchange on the procurement process of a large buyer. We derive the dynamic equilibrium with contracting and the exchange and examine its characteristics including the impact of the exchange on the buyer's surplus.

2 — Relationships Versus Contracts in Supply Chain Management
Erica Plambeck, Stanford University, Assistant Professor, Stanford, CA, USA, plambeck_erica@gsb.stanford.edu., Terry Taylor

The supply chain contracting literature has focused on legally binding (formal) contracts and has ignored informal understandings and agreements that are facilitated by ongoing relationships. We examine the implications of these informal agreements for supply chain structure and sourcing decisions (e.g, sole-sourcing, dual-sourcing, and auctions) by employing a formal model of ongoing relationships.

3 — Auctioning Supply Contracts
Fangruo Chen, Columbia University, fc26@columbia.edu.

A firm requires an input for its production. There are multiple potential suppliers with private information about their cost structures. The firm's objective is to choose a supplier and an input quantity to maximize its expected profits. We solve this problem and discuss various implications of the solution.

4 — Sale Timing in a Supply Chain: When to Sell to the Retailer
Terry Taylor, Columbia University, Graduate School of Business, Assistant Professor, New York, NY, 10027-6902, USA, tat2002@columbia.edu.

A fundamental decision for any manufacturer is when (i.e., how close to the selling season) to sell to a downstream retailer. We provide widely-applicable results regarding the manufacturer's sale timing preference. We examine the sale timing decision when the retailer exerts sales effort and when the retailer possesses superior demand information.

■ TC29

Center-Ballroom A5

Information and Supply Chain Management

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Ozalp Ozer, Stanford University, Stanford, CA, 94305, USA, ozalp.ozer@stanford.edu

1 — Stationary Base Stock Policies for Multiple Procurement Modes
Guillermo Gallego, Columbia University, Professor, New York, NY, USA, ggallego@ieor.columbia.edu., Suresh P. Sethi, Zheng Wang, Houmin Yan

We show how to evaluate the cost of using base-stock policies in deciding how much to order from different procurement modes. The evaluation is similar to that of multi-echelon serial systems except that the cost is exact only under limited conditions. We find through a simulation study that minimizing this restricted cost function results in near-optimal solutions.

2 — Market Segmentation on The Basis of Product Delivery Delays,
Yuanjie He, Jeannette Song, Yunzeng Wang

Customers can voluntarily accept delays in service/product delivery when a price discount is offered. Such delivery delays help to reduce a firm's operating costs. We build models to shed insights on how a firm, facing customers with different price-delay preferences, can jointly optimize its discount offerings and inventory policy.

3 — Towards a Networked Supply Chain
Jochen Kleinknecht, Stanford University, Stanford, CA, 94305, USA, jochenk@stanford.edu., Ron Akella

Today's supply chains are very complex and highly interconnected. We propose an analytical framework to describe supply chains as networks of basic nodes, similar to the concept of queuing networks, where each node simultaneously determines the optimal policies for procurement of production inputs, for inventory, for production, and for sales/pricing.

4 — Information Acquisition Prior to Capacity Planning: When to Stop and Act?
Ozalp Ozer, Stanford University, Stanford, CA, 94305, USA , ozalp.ozer@stanford.edu.

Consider a firm that decides on the optimal production capacity prior to the sales season. We show that inducing customers to place firm orders via a discount schedule results in better capacity planning, hence improved profits. We investigate the characteristics of the best time to act on this information.

■ TC30

Center-Ballroom A6

The Economics of E-Markets for Supply Chain Management S37

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Joseph Milner, University of Toronto, milner@rotman.utoronto.edu

1 — Optimal Contract and Spot-Market Mix for Buyers in the Presence of Uncodifiable Transaction Knowledge
Moti Levi, Tualne University, New Orleans, LA, USA, mlevi@tulane.edu., D. J. Wu, Paul R. Kleindorfer

E-Exchanges allow firms to fulfill requirements for which they have not contracted long-term. Using real options framework we explore optimality of the mix between long-term contracts and spot markets for both buyers and suppliers. We focus on the role of codifiability of transaction knowledge, and provide empirical evidence.

2 — Risk Analysis: The Impact of Spot Markets on Equilibrium Contracts
Liniu Dong, Washington University in St. Louis, St. Louis, MO, dong@olin.wustl.edu., Hong Liu

This paper studies the risk hedging opportunities brought by the online spot market to a contractual relationship. In a one-supplier-one-manufacturer setup, through the comparison of the equilibrium contracts in two cases: without spot market vs. with spot market, the paper reveals the interplay between the demand risk and price risk.

3 — Speculative Markets and Supply Contracts
Joseph Milner, University of Toronto, milner@rotman.utoronto.edu., Panos Kouvelis

We study and N-firm model where supply is provided by a long-term contract or a spot market, where competition among speculators determines price. We investigate the appropriate reliance on either mode and demonstrate network benefits leading to decreasing prices and increasing reliance by firms on the spot market.

■ TC31

Center-Room J3

Merging Math Programming and Constraint Programming I: Modeling

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: John Chinneck, Carleton University, Professor, Ottawa, On, K1S 5B6, Canada, chinneck@sce.carleton.ca

1 — Constraint Programming from an OR Perspective
Robert Fourer, Northwestern University, Professor, Evanston, IL, 60208-3119, USA, 4er@iems.nwu.edu.

The commercial development of constraint programming methods is changing the way that people approach optimization modeling, especially for highly combinatorial problems. This survey addresses the implications of CP from the standpoint of potential users whose backgrounds are in operations research and whose experience is with conventional mathematical programming systems.

2 — Foundations of Constraint Programming
Pascal Van Hentenryck, Brown University, Professor, Providence, RI, USA, pvh@cs.brown.edu.

This tutorial reviews the basic principles of constraint programming, including the general architecture of constraint programming systems and the constraint programming approach to combinatorial optimization. The tutorial contrasts constraint programming to integer programming to highlight their complementarity and their possible synergies.

■ TC32

Center-Room J4

Applied Probability Models

Sponsor: Applied Probability Society
Sponsored Session

Chair: Andrew Ross, Lehigh University, amr5@lehigh.edu

1 — Analysis of Random Sets and their Application to Cloud Coverings
L. D. Servi, MIT Lincoln Laboratory, Lexington, MA, servi@ll.mit.edu.

Transient state probabilities, first passage times, and depletion times of a finite state Markov chain are investigated to serve as ingredients to the analysis of the probability of a hole in a random cloud covering over a specified window. New theoretical results, simplifying approximations, and numerical results will be presented for various applications.

2 — Function-Theoretic Approach to Laplace Transform , with Applications to Stochastic Models
Beny Neta, Naval Postgraduate School, Monterey, CA, 93943, James Taylor

This paper announces new theoretical approach to Laplace transform and uses its results to compute exact distribution of time to kill an acquired target and also expected engagement time before either target is killed or line of sight lost. Applications to stochastic duels and Lanchester attrition-rate coefficients are discussed.

3 — Approximations for Queue Design under Arrival Rate Uncertainty
Andrew Ross, Lehigh University, amr5@lehigh.edu., J. George Shanthikumar

We consider designing a call center system under uncertainty in the Poisson arrival rate. Given a prior distribution on traffic, we determine the number of servers and buffer spaces needed to satisfy upper bounds on the probabilities of blocking or delay. For infinite-buffer systems, previous heuristics under-estimate the needed servers.

■ TC33

Hilton-University

Modeling Utility

Contributed Session

Chair: Ali Abbas, Stanford University, Stanford, CA, 94305, USA, aliabbas@stanford.edu

1 — Maximum Entropy Utility
Ali Abbas, Stanford University, Stanford, CA, 94305, USA, aliabbas@stanford.edu.

We introduce a geometric representation to the utility elicitation problem and an optimal question selection algorithm to elicit utility values from an information theoretic point of view. We propose a new maximum entropy utility principle to assign minimally prejudiced utility values and provide axiomatic justification for its use.

2 — Aspiration Level and Decision Making: a Descriptive Extension of RDU
Enrico Diecidue, INSEAD, Singapore, 138687, Singapore, enrico.diecidue@insead.edu., Jeroen van de Ven

This paper presents an extension to the rank-dependent utility model to take into account the intuitively appealing concept of aspiration level. We provide an explicit functional form, still lacking in the literature. Our model can explain a number of paradoxes and puzzles in decisions, welfare, and health economics , and offer a flexible tool to explain everyday life decisions.

3 — Untangling the Box Paradox
John L. Simons, University of Groningen, Groningen, 9700AV, Netherlands, j.l.simons@bdk.rug.nl.

In the classic box paradox (one box with $X and one with $2X) after choice, you should always trade without inspection and add 25% to your expected profit. Recently prior probabilities are introduced. We introduce types of distributions and explain when the box paradox remains or vanishes.

4 — Decision Making using Likelihood Function without Prior Probability
Phan H. Giang, University of Kansas, Lawrence, KS, 66045, USA, phgiang@ku.edu., Prakash Shenoy

Based on the likelihood principle together with some reasonable assumption, we show how the likelihood information obtainable from an experiment could be used for making decision without refering to prior probability. We propose a novel solution to statistical inference problem. Comparing with minimax solution, our solution makes use of likelihood information provided by the observation. Compared with Bayes solution, our one does not require prior probability.

5 — Hierarchical Decision Principle Under Uncertainty
Junwen Feng, Nanjing University of Science and Technology , Portland State University, Portland, 97201, USA, fengjunwen8@hotmail.com.

As far as the uncertain decision analysis problems are concerned, a decision principle called Hierarchical Optimism Index Decision Principle is proposed, based on which a decision analysis method under uncertainty called Hierarchical optimism index Method labeled HOIM is developed, in which the hierarchical optimism index of the decision maker for the uncertain states is obtained in an interactive way involving the dialogue between the decision analysis and decision maker.

■ TC34

Hilton-Plaza

Technological Environment

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Jeffrey Keisler, University of Massachusetts, Boston, MA, 02467, USA, jeff.keisler@umb.edu

1 — Preventing Disaster by Design: Managing Strategic Behavior in Risk Analysis
Seth Guikema, Stanford University, Stanford, CA, 94305-4026, USA, sguikema@stanford.edu., Elisabeth M. Pate'-Cornell

Abstract: Strategic behavior may arise in probabilistic risk analysis for technical systems when individual engineers and managers compete for resources that can be used to manage risk. We briefly discuss our previous work showing how this problem can arise and the impacts that strategic behavior can have on the resulting risk levels. We then use a game theoretic approach to analyze methods for avoiding the problems of strategic behavior.

2 — Working Within a Budget: The Allocation of Limited Resources within Large Organizations
Greg Parnell, U.S. Military Academy, West Point, NY, 10996-1779, USA, gregory.parnell@usma.edu., Brian Stokes

Large organizations face cyclical resource allocation problems choosing funding levels for sets of possible projects within budget constraints. They also face challenges defending allocation decisions to various stakeholders - investors, trustees, or constituents. We study the underlying decision problem, approaches for determining funding levels and their usefulness for various stakeholders.

3 — Multiattribute Preference Analysis with Performance Targets
Robert Bordley, General Motors Renaissance Center, Detroit, MI, 48265-1000, USA, robert.bordley@gm.com., Craig Kirkwood

An approach is presented based on performance targets to assess a preference function for a multiobjective decision under uncertainty. The approach has particular applicability for resource allocation decisions where the decision outcome is significantly impacted by multiple stakeholders, such as new product development or in a controversial regulated environment.

4 — Value of Information in Portfolio Decision Analysis
Jeffrey Keisler, University of Massachusetts, Boston, MA, 02467, USA, jeff.keisler@umb.edu.

A portfolio is simulated in which project costs and values may be estimated using random (no information), intuitive (partial information), or decision analytic ("complete" information). Projects are then prioritized and funded in order of investment productivity. The value added from the prioritizing step often exceeds that from obtaining complete information.

■ TC35

Hilton-Almaden II

Model-Based Diagnosis of Engineering Systems

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Shiyu Zhou, University of Wisconsin, Madison, WI, 53706-1572, USA, zhous@engin.umich.edu

1 — Wavelet Based Monitoring of Nanoscale Machining in Chemical Mechanical Planarization (CMP) Process
Rajesh Ganesan, University of South Florida, Tampa, FL, 33620, USA, rganesan@eng.usf.edu., Arun Sikder, Ashok Kumar, Tapas K. Das

Wavelet based multiscale approaches have revolutionized the field of signal processing. But their scope in the areas of statistical applications, such as process monitoring, density estimation, and defect identification remains largely unexplored. Recent literature contains some applications of multiscale methods to monitor tool-life, bearing defects, and ultra-precision processes . This research examines a wavelet based method in the monitoring of a nanoscale machining process of wafer manufacturing (CMP) using acoustic emission (AE) signal.

2 — Dynamic Modeling and Monitoring of Free-form Fabrication Operations
Satish Bukkapatnam, Univeristy of Southern California, Los Angeles, CA, 90089-0193, USA, satish@usc.edu., Ben Clark, Randi Chang, Daniel Epstein

This paper presents the methodology involved with the development of a mathematical model for the vibration signature of Contour Crafting (CC), a solid free-form fabrication process invented and developed at the University of Southern California. The validation methods and procedures of this nonlinear dynamic model are also presented.

3 — Nonlinear Principal Components Analysis for Diagnosing Manufacturing Variation
Feng Zhang, Texas A&M University, College Station, TX, 77843-3131, USA, zhangfeng@tamu.edu., Daniel Apley

The use of nonlinear principal component (principal curve) analysis for modeling and identifying major variation sources in manufacturing is discussed. A technique for improving accuracy and reducing computational expense in nonlinear principal curve estimation is proposed. The technique is based on pre-processing the data via linear principal component analysis.

4 — Simultaneous Tolerance Synthesis and Process Improvement through Variation Propagation Modeling of Multistage Manufacturing
Qiang Huang, University of Michigan, Jianjun Shi

We demonstrate the advantages of developing tolerance stackup models through multistage process modeling. With a model developed from a block part machining process, product tolerance and process selection are simultaneously determined by a general two-step optimization procedure. Furthermore, design improvement is performed by analyzing the sensitivity of process parameters.

■ TC36

Center-Room F1

Operational Models in Semiconductor Manufacturing I

Sponsor: Applied Probability Society
Sponsored Session

Chair: Emmanuel Fernandez, University of Cincinnati, Assoc. Prof., Cincinnati, OH, 45221-0030, emmanuel@ececs.uc.edu

Co-Chair: Michael Fu, University of Maryland, mfu@isr.umd.edu

1 — FORCe : A Factory Operations Research for Semiconductor Manufacturing Excellence
Mani Janakiram, Intel Corporation, Chandler, AZ, USA, mani.janakiram@intel.com., Frank Robertson, John W. Fowler, K. J. Stanley

The semiconductor industry witnessed a greatest market decline in 2001 and ran into severe issues with demand and capacity management. Year 2002 will witness technology acceleration as per International Technology Roadmap for Semiconductors (ITRS). The Factory Operations Research Center (FORCe) is a 3 year, approx $1million/year, collaborative effort between Semiconductor Research Corp. (SRC) and International Sematech (ISMT), formed in 2001 by the semiconductor manufacturers to specifically address the factory operations challenges as indicated by the ITRS factory integration. The objective of FORCe is to conduct applied research on factory operations at universities and work with suppliers to convert research into software tools for use by the industry.

2 — Performance Analysis of Demand Planning Approaches for Aggregating, Forecasting and Disaggregating Interrelated Demands
Argon Chen, National Taiwan University, Taipei, 106, Taiwan, achen@ccms.ntu.edu.tw., Jakey Lan

Results of demand planning serve as the basis of every planning activity in a demand-supply network and ultimately determine the effectiveness of manufacturing and logistic operations in the network. The uncertainty of demand signals, that are propagated and magnified over the network, becomes the crucial cause of ineffective operation plans. To manage the demand variability, appropriate

demand aggregation and statistical forecasting approaches are known to be effective. This paper will use the bivariate VAR(1) time series model as a study vehicle to investigate the effects of aggregating and disaggregating two interrelated demands. We show that the coefficient of variation (CV) of a time serious is conserved after mean-proportional disaggregation.

3 — Strategic Capacity Planning for the Semiconductor Industry: Current Industrial Practice and New Directions
Robin Roundy, Cornell University, robin@orie.cornell.edu., Woohnghee Huh

Capacity planning decisions in the semiconductor industry are crucial and challenging. The business environment is volatile, but equipment has long procurement lead times and is extremely expensive. capacity planning in a stochastic environment. We present a novel approach for multi-dimensional demand modeling, and discuss practical and algorithmic implications of different stockout cost models. We present efficient algorithms for provably solvable versions of the capacity planning problem, and summarize the current status of research on versions that are not provably solvable.

4 — Incorporating Production Planning into Preventive Maintenance Scheduling in Semiconductor Fabs
Xiaodong Yao, University of Maryland, xdyao@isr.umd.edu., Emmanuel Fernandez, Michael Fu, Steven Marcus

Preventive Maintenance (PM) is a vital activity in semiconductor manufacturing. It is crucial for increasing the availability and thus the throughput of equipment in the fabs. In this paper, a general mathematical model aiming at the optimization of PM scheduling is proposed. We formulate the problem as a finite-horizon Markov Decision Process (MDP) that incorporates equipment dynamics and production system dynamics. Unlike most work in the literature, this model will take into account information from both production planning data such as Work in Process (WIP) and process data such as PM window and statistics of "out of control" events.

■ TC37

Center-Room J1

Stochastic Inventory Models I

Contributed Session

Chair: Wooseung Jang, University of Missouri-Columbia, Assistant Professor, Columbia, MO, 65211, USA, jangw@missouri.edu

1 — Integrated Production and Distribution Policies under Multiple Stochastic Demands
Wooseung Jang, University of Missouri-Columbia, Assistant Professor, Columbia, MO, 65211, USA, jangw@missouri.edu., Cerry M. Klein

We consider a single period problem in which a supplier faces stochastic demands and customer specific waiting costs from multiple customers. The objective is to develop integrated production, allocation, and distribution policies. We present an optimal policy for the two customer problem, and derive a heuristic for a general problem.

2 — Inventory Control with Markovian Capacity and the Option of Order Rejection
Jian Yang, New Jersey Institute of Technology, Newark, NJ , 07102, US, yang@adm.njit.edu., Xiangtong Qi, Yusen Xia, Gang Yu

We consider a stochastic inventory control problem with Markovian capacity and the option of order rejection. We show its optimal policy to be the combination of a capacity-dependent modified base stock production policy and a reasonable capacity-dependent order acceptance policy. When capacity is furthermore stochastically monotone, we show that the policy parameters change over the current capacity level in an intuitive trend.

3 — Inventory Control with Heterogeneous Variance in Demand
Xiaolong Zhang, Fairleigh Dickinson University, Madison, NJ, 07940, USA, zhang@fdu.edu.

This paper studies the effect of ARCH demand on single installation inventory models. The impact of ARCH variance in demand on standard inventory control policies are examined.

4 — The Multiple-Family ELSP with Safety Stocks
Serge Karalli, Case Western Reserve University, Ph.D. Candidate, Cleveland, OH, 44106, USA, smkaralli@ameritech .net., A. Dale Flowers

The ELSP with normally distributed, time-stationary demand is considered in a manufacturing setting where the relevant costs include family setup costs, item setup costs, and inventory holding costs for both cycle and safety stocks. Each item within the family may have its own setup time and setup cost. The safety stock level for any item is a function of the time interval between production runs for the item, the service level specified, and the variance of its demand.

5 — Production Planning Under Yield and Demand Uncertainty with Yield-Dependent Cost and Price
Burak Kazaz, University of Miami, Assistant Professor, Coral Gables, FL, 33124, USA, bkazaz@miami.edu.

We investigate production-planning decisions when the sale price and purchasing cost change with the yield. The study finds a focused application in the olive oil industry and determines the amount of farm space to be leased by oil producers and the amount of olive oil to be produced under yield and demand uncertainty. Unlike traditional yield uncertainty studies, we find that higher yield variance does not necessarily increase the production quantity.

■ TC38

Center-Room N

Vehicle Routing I

Contributed Session

Chair: Gilbert Laporte, HEC Montreal, Montreal QC, H3T 2A7, Canada, gilbert.laporte@hec.ca

1 — m-TSPTW: Bounds for the Number of Vehicles
Snezana Mitrovic-Minic, Simon Fraser University, Burnaby, BC, V5A 1S6, Canada, smitrovi@cs.sfu.ca., Ramesh Krishnamurti

We have used two precedence (directed) graphs to find a lower and an upper bound for the minimum number of vehicles needed to serve all locations of the multiple traveling salesman problem with time windows (m-TSPTW). The bounds were determined by solving the minimum cover by chains of directed graphs generated from the precedence graphs. Classes of instances will be shown for which the bounds are equal.

2 — The Vehicle Routing Problem with Time Windows and Multiple Use of Vehicles
Zhihong Jin, Nagoya Institute of Technology, Nagoya, 466-8555, JAPAN, zhihong@system.nitech.ac.jp., Kastuhisa Ohno, Takahiro Ito

We deal with the vehicle routing problem with time windows and multiple use of vehicles (VRPTWMU). The VRPTWMU is formulated as a mixed integer program. A hybrid metaheuristic algorithm is proposed for large-sized problems. Computational experiments on benchmark problems of the standard VRPTW show its efficiency.

3 — A Tabu Search Heuristic for the Static Multi-Vehicle Dial-a-Ride Problem
Jean-Francois Cordeau, HEC Montreal, Montreal, QC, H3T 2A7, Canada, jean-francois.cordeau@hec.ca., Gilbert Laporte

We present a formulation and a solution approach based on tabu search for the dial-a-ride problem with vehicle capacity, time window, route duration and maximum onboard time constraints. Computational results are reported on both randomly generated instances and real-life datasets.

4 — EDGAR, Inc. — Optimum Transport Scheduling with OR and MS

Optimum Transport Scheduling with OR and MS - Discussion of transportation computerized management systems, including simulation of vehicle transport through arterial street network with optimal travel time, multiple pickup and delivery, precise time windows, trip consolidation and driver assignment. Utilization of cluster, linear programming and combinatorial algorithms for trip and route development, precise stop timing and management control. Peter Caswell is in the forefront of the computerized transportation scheduling industry.

■ TC39

Center-Room K

Optimization of Freight Transportation Systems

Sponsor: Transportation Science Section
Sponsored Session

Chair: Karen Smilowitz, Northwestern University, Evanston, IL, 60208, ksmilowitz@northwestern.edu

1 — Efficient Container Security Operations at Transshipment Seaports
Brian Lewis, Georgia Institute of Technology, Ph.D. Pre-Candidate, Atlanta, GA, 30332-0205, USA, blewis@isye .gatech.edu., Alan Erera, Chelsea C. White

The efficiency of global intermodal transportation systems is currently threatened by important growing freight security challenges. We present methodologies that allow us to investigate the trade-off between measures of efficiency and security at seaports. Specifically, we focus on optimal container management problems in transshipment seaports in which a subset of containers require security inspections during the transshipment process.

2 — Performance of Continuous Approximations for Deliveries in Finite Service Zones with Discrete Service Stops
Wei-Hua Lin, University of Arizona, Tucson, AZ, 85721-0020

We examine the use of continuous approximations in delivery services from a single depot to a finite zone with discrete stops . The weight of key decision variables (e.g. the service frequency and service tour partition, the lot size and fleet size) in contributing to the total cost will be assessed.

3 — Reducing Ship Turn-Around Time with Double Cycling
Anne Goodchild, University of California at Berkeley, Berkeley, CA, 94720, Carlos Daganzo

Ship turn-around time can be reduced by double cycling; using a standard crane to load a container and unload another one in a single cycle. We analyze the economic and productivity gains from double-cycling using simple loading/unloading sequencing algorithms.

■ TC40

Center-Room G

Warehousing and Material Handling

Contributed Session

Chair: Rene B.M. de Koster, 2nd author, Rotterdam, 3000 DR, The Netherlands, rkoster@fbk.eur.nl

1 — Travel Distance Models in ABC — Storage Strategy Warehouses
Tho Le Duc, 1st author, Rotterdam, 3000 DR, The Netherlands, tleduc@fbk.eur.nl., Rene B.M. de Koster

In this paper we propose models for calculating the expected length of multiple stop tours in several typical picker-to-part narrow-aisle ABC-storage strategy warehouses. The accuracy of the models is ensured by simulation experiments. As a result, we use these models to develop a framework for layout design in these environments.

2 — New Approaches for Solving the Pallet Loading Problem
Gustavo H. Martins, Brazilian Navy, Centro de Analises de Sistema Navais, Rio de Janeiro, 20091, Brazil, gustavo@casnav.mar.mil.br.

We extend the concept of equivalence classes of instances of the Pallet Loading Problem (PLP), introducing the idea of relaxed and restricted classes, showing how to generate better bounds on PLP solutions. We also present a new set of heuristic procedures, solving to optimality 99.77% of all PLP instances with up to 100 loaded boxes.

3 — Determination of AGV Fleet Size in an FMS
Mustafa Ozbayrak, Lecturer, Uxbridge, Middlesex, UB8 3PH, England, mustafa.ozbayrak@brunel.ac.uk., Ijeoma Ihezue

This paper offers a framework to determine the AGV fleet size in an FMS based on a mathematical and a simulation model. A hypothetical FMS is used to illustrate the fleet sizing, as this is crucial to the system performance under different real-life like scenarios.

4 — Material Handling Activities in Integrated Manufacturing Systems
Sheo G. Misra, Misra Associates, MORGANTOWN, WV, 26505-3677, U.S.A., misra@rtc1.icdi.wvu.edu., Sita Misra

A systems view of manufacturing is presented from a material handling (MH) perspective. The role of MH in manufacturing and the need for integrated systems (IS) are discussed. Various aspects of designing, selling, specifying, and implementing ISs are treated. Finally, the status of the analytic techniques and the development needs for MH are assessed.

5 — Hybrid Dispatching Rules for Vehicle-Based Internal Transport Systems
Tuan Le Anh, 1st author, Rotterdam, 3000DR, The Netherlands, LTuan@fbk.eur.nl., Rene B.M. de Koster

On-line dispatching rules are widely used to control vehicles in vehicle-based internal transport systems. In this paper, new hybrid dispatching rules are proposed to improve the performance of vehicle-based internal transport systems. These rules perform very well compared with some commonly used rules such as the nearest-workstation-first rule.

■ TC41

Center-Room M

Using OR/MS Techniques for Public Transit

Sponsor: Transportation Science Section
Sponsored Session

Chair: Mark Hickman, University of Arizona, Tucson, AZ, 85721, mhickman@engr.arizona.edu

1 — Crew-shift Design for Single-hub Transit Systems under Uncertainty, Juan Carlos Munoz, Carlos Daganzo

Crews account for up to 80% of transit agencies' budgets. Therefore, deciding how many crews to hire and under which shifts is an important design decision. We show how to design "optimum" shifts and estimate the resulting cost, recognizing the possibility of absenteeism and the use of temporary workers.

2 — Real-time Routed Transit Systems-routing Control Schemes
Cristian Cortes, University of California, Irvine, Irvine , CA, 92697, ccortes@translab.its.uci.edu., R. Jayakrishnan

This presentation is on an innovative design of high-coverage transit systems with real-time routing, that allow point to point travel with at most one transfer. Simulations have shown that careful operational designs can yield system efficiency. Real-time data can be used for online routing of the vehicles, and we describe the associated algorithmic schemes.

■ TC43

Center-Room H

Probability Distributions

Contributed Session

Chair: Nobuhiko Terui, Tohoku University, Graduate School of Economics, Sendai, 980-8576, Japan, terui@econ.tohoku.ac.jp

1 — Using Bilinear Transformations to Induce Probability Distributions
Paul Minh, California State University, Fullerton, CA, 92834, dminh@fullerton.edu., Nicholas R Farnum

We use bilinear transformations to map a point z on the unit circle into a point x on the real line. Given the density function g(a) of a=arg(z), we show how the corresponding density function f(x) in can be obtained. As examples, we obtain the Cauchy and the t-distributions. Based on this property, we derive a very efficient algorithm to generate t-distributed random variates.

2 — A Fast Algorithm for Parameter Estimate of Gaussian Distribution
Yuan H. Wang, NetDecide Corporation, Falls Church, VA, 22043, USA, haley.wang@netDecide.com., J. R. Reagan, Robert Groat, Raghu Chintala

In this paper, we create a small and fast algorithm to compute the parameter of a Gaussian distribution. The algorithm can replace the Guassian distribution table so that programmers can avoid to use the database. It will benefit many users since the Guassian distribution is frequently used.

3 — Testing Multivariate Gaussianity by Hermitian Polynomials Transformation and Its Application
Nobuhiko Terui, Tohoku University, Graduate School of Economics, Sendai, 980-8576, Japan, terui@econ.tohoku.ac .jp., Yuki Imano

Based on a characterization of orthogonarity of Gaussian random variates after Hermitian polynomials transformation, we develop a Gaussianity test for multivariate stationary timse series. Our simulation study shows that the proposed test has reasonable power and outperforms multivariate bispectrum test available in the literature when the innovation series of the time series is symmetric, but non-Gaussian.

■ TC44

Center-Room B2

Analytical Modeling of Force-on-Force Combat Attrition

Sponsor: Military Applications Society
Sponsored Session

Chair: James Taylor, Naval Postgraduate School, Monterey, CA, 93943, jtaylor@nps.navy.mil

1 — The Lanchester Attrition-Rate Coefficient
James Taylor, Naval Postgraduate School, Monterey, CA, 93943, jtaylor@nps.navy.mil.

This paper discusses the theoretical basis for the Lanchester attrition-rate coefficient, the rate at which a given firer type kills enemy targets of a particular type. Use of such coefficients in opera-tional combat models is considered, as well as representation of relevant operational factors. Ex-plicit analytical results are given.

2 — Analytical Modeling of Air-to-Air Engagements
David A. Lee, Technology Assessment Group, McLean, VA, 22102, dlee@lmi.org.

The paper explores some ways in which differing stochastic models of air-to-air engagements can overcome limitations of the classic stochastic Lanchester model, such as the mode at zero for the Poisson distribution of times-to-kill, while treating effects of such features as track-while-scan radars and missile-carrying capacity.

3 — Development of Stochastic Aerial Combat Models
Yoon G. Hong, School of ISE, Hansung University, Seoul, 136-792, Korea, yhong@hansung.ac.kr.

Heterogeneous stochastic aerial combat models are considered. Both missile types and limited number of missiles loaded are taken into consideration. The combat is composed of three states: radar contact, search, and dogfight. Combat measures are obtained using state probabilities based on interfiring or interkilling density functions.

■ TC45

Center-Room B3

Innovations in Military Simulation Modeling Session

Sponsor: Military Applications Society
Sponsored Session

Chair: Arnold Buss, Naval Post Graduate School

1 — Validation and Evaluation of Multi-Agent System Models for Combat Simulations
Simon Goerger, Naval Postgraduate School, Monterey, CA

The goal of this paper is to outline some of the current deficiencies with the verification, validation and accreditation (VV&A) process for cognitive models. Which is neither well defined nor extendable for human behavior. Shortcomings in current procedures are identified using insight from operations research and psychology.

2 — Dynamic Allocation of Fires and Sensors
Michael Havens, Defense Supply Center, Columbus, Columbus , OH

This paper evaluates factors associated with networking assets in the U.S. Army's Future Combat Systems (FCS). The framework consists of a Simulation Model, XML input and output modules, and an output analysis package. The model goes beyond normal implementations of both simulation and optimization by incorporating optimization within the simulation.

3 — Discrete Event Modeling of Movement and Detection
Arnold Buss, Naval Post Graduate School

This paper presents a pure Discrete Event approach to movement and sensing. This approach avoids many of the difficulties present in the traditional time step approach. The Event approach also gives a more solid methodological basis as well as the ability to exploit component modeling.

■ TC46

Center-Room C3

Stochastic Programming Software

Cluster: State of the Art in Optimization Software
Invited Session

Chair: Alan King, IBM Research, Research Staff Member, Yorktown Hts., NY, 10590, USA, kingaj@us.ibm.com

1 — On the Computational Performance of a Volumetric Center Algorithm for Stochastic Programming
K. A. Ariyawansa, Washington State University, Pullman, WA, 99164-3113, USA, ari@math.wsu.edu., A. J. Felt, J. J. Sarich, R. O'Fallon

Ariyawansa and Jiang have shown that volumetric center cutting plane algorithms for stochastic programming have polynomial complexity linear in the number of realizations. We present results of computational experiments performed to investigate whether this theoretical advantage of such algorithms relative to simplex-based L-shaped algorithms translate into practical performance improvements.

2 — Solving Hard Stochastic Integer Programs using OSLSE
Gyana Parija, IBM, Yorktown Heights, NY, 10598, USA, parija@us.ibm.com., Monalisa Mohanty

We present a stochastic integer programmming model arising from an important e-commerce application and discuss our computational experience (failures as well as successes) and our recommendations in solving this class of hard optimization problems using IBM's OSL Stochastic Extensions (OSLSE) as an advanced modeling and solutions platform.

3 — A Modular Approach to Multi-Granular Stochastic Programming
Suvrajeet Sen, University of Arizona, Tucson, AZ, 85721-0020, USA, sen@sie.arizona.edu., Lihua Yu

In many large scale models, it is convenient to model different aspects of the application at different levels of detail. For instance in models involving both financial and operational issues, these two classes of decisions are best modeled at different time-scales. Hence modular models are appropriate. We will discuss methods for coordinating this class of models.

4 — Modeling and Solution Capabilities of OSLSE
Alan King, IBM Research, Research Staff Member, Yorktown Hts., NY, 10590, USA, kingaj@us.ibm.com.

We present an overview of the IBM OSLSE package and discuss its capabilities for the modeling and solutions of multiperiod stochastic programs.

■ TC47

Center-Ballroom A8

Software Demonstration Session 11

Cluster: Software Demonstrations
Invited Session

1 — Frontline Systems, Inc.: Premium Solver Platform V5.0
Daniel Fylstra, Frontline Systems Inc., President, Incline Village, NV, 89450, USA, dfylstra@frontsys.com.

Frontline Systems, Inc. - We'll demonstrate the new Premium Solver Platform V5.0, featuring its model diagnosis and automatic differentiation facilities, and its groundbreaking new Interval Global Solver, plus new versions of six Solver Engines. Also featured: Our versatile Large-Scale SQP Solver, with superb performance on linear, quadratic, and nonlinear models up to 100 ,000 variables.

2 — Optimum Transport Scheduling with OR and MS
Peter Caswell, EDGAR Management Consulting Engineers, Inc, San Francisco, CA, 94104, peter@edgar-inc.com.

Discussion of transportation computerized management systems, including simulation of vehicle transport through arterial street network with optimal travel time, multiple pickup and delivery, precise time windows, trip consolidation and driver assignment. Utilization of cluster, linear programming and combinatorial algorithms for trip and route development, precise stop timing and management control. Peter Caswell is in the forefront of the computerized transportation scheduling industry.

■ TC48

Fairmont-Valley

Panel: INFORMS and The OR Entrepreneur

Cluster: Practice Track
Invited Session

Chair: Thomas M. Cook, CALEB Technologies Corp, Austin, TX, 78759, tom.cook@calebtech.com

1 — INFORMS and The OR Entrepreneur
Thomas M. Cook, CALEB Technologies Corp, Austin, TX, 78759, tom.cook@calebtech.com.

Entrepreneurs have used OR as a foundation for their companies for the past several decades. In this session, we will discuss how INFORMS can help support these entrepreneurs in making these ventures successful. Panelist (OR entrepreneurs) will discuss their experiences and opinions and then an open discussion involving the audience will be held. The focus will be on the role that INFORMS has played, can play, and should play. This session is a follow-up to the well attended session in Montreal and should prove valuable for those involved in running an OR based business or those thinking of starting one.

Tuesday 4:30 - 6:00pm

■ TD01

Center -Ballroom A4

Tutorial: Bio-informatics and Management Science: The common Tools and Techniques

1 — Bio-informatics and Management Science: The Common Tools and Techniques
Ali Abbas, Stanford University, Stanford, CA, 94305, USA, aliabbas@stanford.edu., William Swope, Susan Holmes

The idea is to give people with an OR and Management Science backgrounds a quick introduction of how the tools they know well, (like Dynamic Programming, Simulation and some information theory) can be applied to Bioinformatics. Also talking in a way a management scientist would understand. We plan to talk about the following: 1) Introduction to Bio-Informatics,simulation and protein structure prediction. 2) Dynamic Programming, Information theory, scoring rules and sequence alignment 3) Bootstrap and the geometry of phylogenetic trees

■ TD02

Fairmont-Cupertino

Case: Optimization in Logistics—State of the Art in Practice and Research

Cluster: Practice Track
Invited Session

Chair: Rajiv Saxena, Menlo Worldwide Technologies, Redwood City, CA, 94065, USA, saxena.rajiv@menlolog.com

1 — Case 1: Logistics Research at TLI
Martin Savelsbergh, George Institute of Technology, Atlanta, GA, 30332-0205, USA, mwps@isye.gatech.edu.

Today's global economy relies on the rapidly expanding field of logistics. As our world shrinks, industry and consumers are demanding efficient logistics solutions. The Logistics Institute (TLI) is leading the way with pioneering research

and education programs with active participation of the industry community. Examples of research activities are presented.

2 — 4PL Engineering — Application of Optimization Tools in Logistics Industry
Vinayaka Athreya, Vector SCM, Novi, MI, 48377, USA, vinayaka@vectorscm.com.

4PL Engineering focuses on the evaluation and redesign of a customers' supply chain / logistics networks, its processes, rates and routes, with the primary objective of reducing total costs at the preferred service levels using a variety of analytical tools. In this presentation, we will talk about 4PL engineering approaches to analytical solution development for three different cases.

■ TD03

Fairmont-Fairfield

Panel: Embedding OR/MS Techniques in Enterprise Software Applications

Cluster: Practice Track
Invited Session

Chair: Jin Yang, PeopleSoft, Pleasanton, CA, Jin_Yang@PeopleSoft.com

1 — Panel Discussion: Embedding OR/MS Techniques in Enterprise Software Applications,
Panelists: Omer Bakkalbasi, i2 Technologies; Bor-Ruey Fu, PeopleSoft; Scott Malcolm, Oracle; Donald Ratliff, Velant; Jin Yang, PeopleSoft.

Applying OR/MS techniques in real world is difficult. Building an application software that applies OR/MS techniques to a real world problem for many companies is more difficult. We'll discuss the challenges that face enterprise software vendors who want to embed OR/MS techniques in many of their mainstream business applications.

■ TD04

Hilton-San Carlos II

Modeling and Algorithm in Data Mining

Cluster: Data Mining and Knowledge Discovery
Invited Session

Chair: Yang Dai, University of Illinois at Chicago, Assistant Professor, Chicago, IL, 60607, USA, yangdai@uic.edu

1 — Neural Network and Data Mining
Mahdi Nasereddin, Pennsylvania State University, Reading, PA, 19610, USA, mxn16@psu.edu.

We consider the use of different types of neural networks for data mining. Backpropagation neural networks are compared with evolutionary neural networks in terms of their performance as a data mining tool.

2 — Feature Selection in Tumor Classification using Microarray Gene Expression Data
Yang Dai, University of Illinois at Chicago, Assistant Professor, Chicago, IL, 60607, USA, yangdai@uic.edu., Mike Ladis

Feature selection is the process of choosing a subset of the original predictive variables through the elimination of redundant and uninformative representatives. An example of the importance is the analysis of gene expression data from DNA microarray hybridization experiments. We propose a procedure for feature selection based on a voting scheme. This method has been tested on the classification of human tumor samples based on a microarray data for normal tissue and colon tumors.

3 — Wavelet-based Methods for Mining Large Nonstationary Data
M.K. Jeong, Georgia Institute of Technology, Student, Atlanta, GA, 30332-0205, USA, mkjeong@isye.gatech.edu., J.C. Lu

We propose discrete wavelet based data reduction methods capable of reducing massive data sets into smaller size data in a multi-resolution fashion.Then, the traditional methods in data mining are used to explore knowledge hidden in the reduced-size data.This is effective for data with possible nonstationary and dynamically changing trends.Effective decision rules for monitoring and classifying abnormality in dynamically changing processes can be constructed from these reduced-size data.

■ TD05

Fairmont-Sacramento

Engineering Management

Sponsor Cluster: Technology Management Section
Invited and Sponsored Session

Chair: Dundar Kocaoglu, Portland State University, Portland, OR, 97207-0751, USA, kocaoglu@etm.pdx.edu

1 — Research and Educational Trends in Engineering & Technology Management
Dundar Kocaoglu, Portland State University, Portland, OR, 97207-0751, USA, kocaoglu@etm.pdx.edu., Halime Inceler Sarihan, Iwan Sudrajat, Patricio Hernandez

The Engineering and Technology Management (E&TM) field is continuing to grow. There have been dramatic increases in growth pattern in this field as represented by the number of educational programs, PhD dissertations, research projects, publications and conferences. This paper presents the findings of a year-long, global study conducted among the educational institutions offering degree programs in this field.

2 — Value Synthesis: A New Strategy Paradigm
Al Herman, Quantric Corp. & Portland State Univ., Portland, OR, 97207-0751, USA, al.herman@gte.net.

After four decades of tweaking SWOT-based methodologies, we may be seeing a fundamental change in the way business strategies are conceived and developed. In recent years, conventional strategy development practices have come under growing criticism. During the same time, a number of new approaches have been proposed in strategic management literature, most of which are situation specific and stand-alone. This article discusses four current themes in the literature and arranges them in a way that forms the basis of a new, broadly applicable approach to competitive strategy development.

3 — Technology Management Concerns over Shifts in Innovation Trajectories in the Transition to the New Economy in Japan
Kumiko Miyazaki, Tokyo Institute of Technology, Tokyo, Japan, kmiyazak@esp.titech.ac.jp.

An analysis is made of the technology mangement and policy concerns in the transition to the new economy in Japan. A particular phenomenon in industrial evolution called shifts in 'innovation trajectory' is presented. The emerging shifts at different decision making hierachical levels are identified and policy recommendations are discussed.

4 — Punctuated Learning as a Source of Profitability in High-Velocity Manufacturing Environments
Charles Weber, MIT, Sloan School of Management, Cambridge , MA, webercm@attglobal.net.

A numerical model of a high-velocity manufacturing environment (e .g. Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989b) demonstrates that the ability to conduct punctuated learning determines profitability more than any other factor does. Factors such as ramping up to production early; adding factory capacity; maximizing quality efforts, and designing more robust products all yield diminishing returns.

■ TD06

Fairmont-Atherton

TQM

Contributed Session

Chair: Prakash J. Singh, Queensland University of Technology, Brisbane, 4001, Australia, p2.singh@qut.edu.au

1 — QS-9000 Registration: An Automotive Parts Supplier's Experience
Jayanta K. Bandyopadhyay, Central Michigan University, Midland, 48640, USA, Bandy1jk@cmich.edu., Mathew Roe

This paper describes the step by step process of QS-9000 registration of an automotive parts supplier with various implications.

2 — A Systemic Frame for TQM Modelling.
Guillermo T. Granados, Monterrey Institute of Technology, Tlalpan, 14380, Mexico, ggranado@mati.net.mx.

TQM is an evolving concept related to business sustainability and generated by successful practices. However, a Systems Thinking based semantic analysis on National Quality Awards facilitates its comprehension, evolution and adaption to non-business organizations. Examples of applications in TQM and Management of Technology modelling are detailed.

3 — TQM — A Journey Towards Excellence
Prabhushankar G Virupakshipura, Siddaganga institute of technology, Tumkur, Tumkur, 572103, India, gvpshankar@hotmail.com., Rajeshwar S. Kadadevaramath

Quality has become one of the most important consumer decision factors in the selection among competing products and services. Understanding and improving quality is key factor leading to business success, growth and an enhanced competitive position. There is a substantial return on investment from improved quality and from successfully employing quality as integral part of overall business strategy.

4 — After Lean Manufacturing and Six-Sigma: Self-Organization?
Luis A. Borges, Technology Institute of Monterrey, campus estado de Mexico, Atizapan de Zaragoza, 52929, Mexico, jonesborges@hotmail.com.

In the last twenty years manufacturing experimented many techniques and tools such as Total Quality Management, ISO 9000, Just-in-Time/Kanban, MBNQA criteria. More recently lean and six-sigma approaches were introduced to the shopfloor. After those attempts, companies are ripe to start a new era: self-organization. It includes preliminary results of a survey.

5 — Which Quality Management Practices Matter?
Prakash J. Singh, Queensland University of Technology, Brisbane, 4001, Australia, p2.singh@qut.edu.au.

Relationship between quality management practices and performance of organizations is unclear. Using data from 418 Australian manufacturing organizations, relationships between seven QM constructs and five performance constructs were examined. Results showed that "hard," tools and techniques type QM constructs had stronger relationships with performance than "soft," tacit behavioral type constructs.

■ TD07

Fairmont-Piedmont

Knowledge Sharing in Innovation

Contributed Session

Chair: Prescott C. Ensign, San Jose State University, San Jose, CA, 95192-0070, USA, ensign_p@cob.sjsu.edu

1 — Framework and Taxonomies for Entrepreneurial Body of Knowledge (EBOK)
Raja K. Iyer, San Jose State University, San Jose, CA, 95192-0244, USA, iyer_r@cob.sjsu.edu.

This research paper presents frameworks and taxonomies for organizing the Entrepreneurial Body of Knowledge (EBOK). Given the growing emphasis on traditional and e-learning, frameworks and taxonomies are essential to define linkages among concepts and best practices, which are defined in general case and for the EBOK in particular.

2 — Technological Knowledge Sharing among R&D Scientists in the Multinational Enterprise
Prescott C. Ensign, San Jose State University, San Jose, CA, 95192-0070, USA, ensign_p@cob.sjsu.edu., Louis HÈbert

This study explores exchange of technological knowledge among R&D scientists. It focuses on how social connections among scientists impact the decision to transfer technological knowledge to co-workers where these fellow R&D scientists may be in other physical locations, organizational units, and work in different areas of technology or science.

3 — The Role of Knowledge Utilization in the Evaluation of Competing Technological Innovations
Shekhar Jayanthi, Colorado School of Mines, Golden, CO, 80401, U.S.A., sjayanth@mines.edu., Edwin C. Witt

The effective management of technological innovations is an important aspect of technology strategy of governmental organizations. We evaluate competing innovations using the extent of knowledge utilization by 22 manufacturing R&D projects in the US photovoltaics industry. Our analysis indicates that the evaluation is consistent with those of an expert panel.

■ TD08

Center-Ballroom A2

E-Commerce Consumer Pricing

Contributed Session

Chair: Jan M. Edman, Penn State University, Dunmore, 18512, USA, jme22@psu.edu

1 — A Description of Price Competition on Internet
Jan M. Edman, Penn State University, Dunmore, 18512, USA, jme22@psu.edu.

With e-business, firms post information about their products on the internet. Consumers can conveniently compare competing firms' products and prices. A unique data set is used to describe price competition on the internet, over time and between different countries, of some popular electronic products.

2 — Online Price Competition Strategies
Cenk Kocas, Michigan State University, East Lansing, MI, 48824-1121, USA, kocas@msu.edu.

On line markets for homogenous goods are characterized by lower search costs, customer loyalty, multi item purchases, various search methods and specific retailer strategies. We analyze the competitive pricing dynamics in these markets and examine the prevailing prices.

3 — A Negotiation Agent for Order Transaction in the Electronic Commerce Environment
Young Jae Park, Department of Management Information Systems, Candidate of Ph.D, Busan, BS, 604-714, South Korea, b990006@daunet.donga.ac.kr., Hyung Rim Choi, Hyun Soo Kim, Byoung Joo Park

Today, there are several markets in cyber space where companies trade electronically due to the development of Information Technology. On the other hand, the most important thing in trades is negotiation. So, in order to support current business practices as well as new ones on the Internet, electronic commerce systems need an ability to negotiate.

■ TD09

Center-Ballroom A3

Search Issues in E-Commerce

Contributed Session

Chair: Ramayya Krishnan, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, rk2x@andrew.cmu.edu

1 — Link Restructuring through Web Log Mining
Anita Lee-Post, University of Kentucky, Lexington, KY, 40506, USA, dsianita@uky.edu., Chon Goh

Improving website navigation through hypertext link restructuring is the focus of this research. Web pages that are accessed frequently in a session are identified through web log mining. These pages are then compared with the current link structure so that more efficient linkages can be recommended to facilitate future access.

2 — Supplier Investment in Reduced Buyer Search Cost in Electronic Commerce
Larry R. Arnold, Tulane University, New Orleans, LA, 70118, USA, larnold@tulane.edu.

Bakos concluded suppliers, in the aggregate, would not invest in electronic marketplaces. Using similar models, we conclude that an individual supplier can obtain a first mover advantage from investments reducing buyer search cost. However, investments by competitors can return the market to its previous state from which neither should disinvest.

3 — A Decision Theoretic Approach to Optimal Shopbot design
Ramayya Krishnan, Carnegie Mellon University, Pittsburgh, PA, 15213, USA, rk2x@andrew.cmu.edu., Alan Montgomery, Kartik Hosanagar

A primary tool that consumers have for comparison shopping on the Internet is a comparison-shopping engine, also known as a shopbot . These websites automatically search a large number of vendors for price and availability. Despite their apparent usefulness, these sites are used by less than 4 percent of online shoppers. One reason for the low usage is the poor design of most shopbots.

4 — Duopoly E-retailers' Competition Game: Technology Adoption, Price and Product vailability
Yabing Jiang, University of Rochester, Rochester, NY, 14627, USA, jiangya@simon.rochester.edu.

We apply game theoretic concepts to show that with new characteristics such as reduced search costs and lower menu costs in on-line channel, both e-retailers prefer to adopt the software agent technology to keep track of rival's inventory status and adjust price accordingly when consumer's reservation value is high.

■ TD10

Center-Ballroom A7

Supply Chain Optimization

Cluster: Scheduling
Invited Session

Chair: Lei Lei, Rutgers University, Newark, NJ, 07102, USA, llei@andromeda.rutgers.edu

1 — Inventory Allocation in Supply Chains with Stochastic Lead-time
Yao Zhao, Northwestern University, Evanston, IL, 60208-3119, USA, yzh841@casbah.acns.nwu.edu., David Simchi-Levi

We study an inventory allocation problem for supply chains with general structure and in which lead-times are random variables. Efficient algorithm is developed to optimize the inventory allocation.

2 — Supply Games with Options in E-Business
Jochen Kleinknecht, Stanford University, Stanford, CA, 94305, USA, jochenk@stanford.edu., Ron Akella

We consider long-term contracts with options in an N-period setting where a manufacturer reserves capacity with her supplier by paying an upfront reservation price knowing that she can also access a spot market. The supplier is the Stackelberg leader and sets the parameters of the contracts anticipating the manufacturer's response.

3 — Capacity Investments in Multi-product Supply Chains
Brian Tomlin, The University of North Carolina at Chapel Hill, Assistant Professor of Operations, Chapel Hill, NC, 27599-3490,

USA, brian.tomlin@unc.edu.

We investigate capacity investment decisions in multiple resource production systems that process multiple products facing uncertain demand. Effective solution techniques are developed for both a service level metric and an expected shortfall metric.

4 — On the Order and Delivery Scheduling in Supply Chain Environment

Linguo Gong, Rider University, Lawrenceville, NJ, 08648-3099, USA, lgong@rider.edu.

In this research, we will study and compare three different inventory and distribution systems with different coordination settings between a vendor and retailers supplier and customers, they are called (i) Collaboration; (ii) partial collaboration; (iii) No collaboration models dependent on the levels of collaboration. Quantitative optimization model will be formulated for each system. Discussions and comparisons results will be carried out based on computational experiments.

5 — Optimizing the Facility Location & Capacity Decisions for a Large Supply Chain

Apollo Pil, apollo.pil@aspentech.com., Lei Lei

We study the problem of facility location and capacity decisions for a large supply chain in commoditized industries. A solution approach that aims at maximizing the market share and minimizing the landed cost of customers is analyzed.

■ TD11

Center-Room C1

Supply Chain and CRM

Contributed Session

Chair: Cerry M. Klein, University of Missouri-Columbia, Professor, Columbia, MO, 65211, USA, kleinc@missouri.edu

1 — Supply Chains Issues in Small Agricultural Enterprises

Cerry M. Klein, University of Missouri-Columbia, Professor, Columbia, MO, 65211, USA, kleinc@missouri.edu., Wooseung Jang

Small agricultural enterprises are under immense economic pressures. We believe a favorable impact can be made on these enterprises through the development and implementation of decision-making tools related to their problems. We will present models and solutions for supply chain and contract issues facing small enterprises and cooperatives.

2 — Status of Supply Chain Management in Mexico

Ileana Castillo, ITESM Campus Toluca, Toluca, 50110, MExico, ileana.castillo@itesm.itesm.mx.

The status of SCM in Mexico will be examined. Some e-business issues will be discussed, such as the use of EDI, and customer service. The use of ERP and CRM systems will be explored with case studies. Further, we will discuss the work of the SCC in this country.

3 — Supply Chain Management at Knight Ltd.

Campbell Knight, Knight Ltd., Melrose, MA, 02176, USA, newacct1265673.

I will briefly explain what we do at Knight, Ltd. and describe the downfalls and benefits of doing business using SCM.

4 — Revisiting Supply Chain Performance Measures

Ali Behnezhad, California State University, Northridge, Professor, Northridge, CA, 91330-8378, USA, ali .behnezhad@csun.edu., Pattana Boonchoo

A taxonomy for measuring the performance of supply chains will be presented. We will discuss several metrics and substantiate the merits of each. Recommendations will be made regarding the appropriate use of the performance measures along with application examples.

■ TD12

Fairmont-Regency 1

Health Applications in Scheduling, Screening, and Long-Term Care

Sponsor: Health Applications Section
Sponsored Session

Chair: Sandra Potthoff, University of Minnesota, Associate Professor, Minneapolis, MN, 55455, USA, sandra.j.potthoff-1@tc.umn.edu

1 — Quality Management Practices and Financial Outcomes in Long Term Care

Sandra Potthoff, University of Minnesota, Associate Professor, Minneapolis, MN, 66455, USA, spotthoff@csom .umn.edu., Douglas Olson

This study reports the findings analyzing the relationship between leadership, quality management practices, and financial outcomes, including operating margin, total margin, days cash on hand, and days in accounts receivable, in a sample of 65 long-term care facilities.

2 — An Operations Research Approach to the Mammography Controversy

Julie Simmons, University of Michigan, Ann Arbor, MI, 48109-1234, USA, jsimmons@umich.edu.

We develop an operating characteristic curve as a function of monitoring and treatment costs for breast cancer detection and treatment using a POMDP to model breast cancer progression from non-invasive to invasive stages and determine "cost-effective" policies. Early detection (e.g.,non-invasive stage) has benefits for survival but requires additional resources.

3 — Allocation of Kidneys to Autonomous Transplant Candidates: A Sequential Stochastic Assignment Model

Xuanming Su, Stanford University, Student, Stanford, CA, 94305, USA, xuanming@stanford.edu., Stefanos Zenios

In kidney allocation, transplant candidates sometimes refuse organ offers in anticipation of superior future assignments. This generates welfare losses because kidneys may be discarded when a suitable recipient cannot be identified in time. We will derive the socially optimal allocation policy and discuss its implications.

■ TD13

Center-Room D

Fractional Programming and Generalized Convexity IV

Sponsor: Optimization Section - Nonlinear Programming
Sponsored Session

Chair: Siegfried Schaible, University of California Riverside, Professor, Riverside, CA, 92521, USA, siegfried.schaible@ucr.edu

1 — Optimality and Duality for Nonsmooth Multiobjective Programming

Do Sang Kim, Pukyong National University, Pusan, Pu, Republic of Korea, do@agsmmail.ucr.edu., Siegfried Schaible

We consider nonsmooth multiobjective programming problems involving locally Lipschitz functions with inequality and equality constraints. We establish optimality theorems and duality relations under (generalized) invexity and certain regularity conditions.

2 — Increasing Quasiconcave Production and Utility Functions with Diminishing Returns to Scale

Siegfried Schaible, University of California Riverside, Professor, Riverside, CA, 92521, USA, siegfried .schaible@ucr.edu., Juan Enrique Martinez-Legaz, Alexander Rubinov

In microeconomic analysis functions with diminishing returns to scale (DRS) have frequently been employed. Various properties of increasing quasiconcave production and utility functions with DRS are derived. Furthermore duality is studied for such aggregator functions in producer and consumer theory. The analysis is carried out in the contemporary framework of abstract convexity and abstract concavity.

3 — An Algorithm for Solving Generalized Fractional Programs of Infinitely Many Ratios

Ruey-Lin Sheu, Natinoal Cheng-Kung University; Dept. of Mathematics, Professor, Tainan, 701, Taiwan, rsheu@mail .ncku.edu.tw., Jen-Yen Lin

A generalized fractional programming is to find the minimum of the maximum of finitely many ratios. In this talk, we extend the result to min-max fractional programs of infinitely many ratios. Our proposed algorithm involves a generalized version of Dinkelbach-type algorithm, the method of outer approximations, and an inexact entropic regularization. Each of the above three methods has its own parameter for iterating and we will put all of them together and get the problem solved.

■ TD14

Center-Room E

Network Routing

Contributed Session

Chair: Jose A. Ventura, Pennsylvania State University, University Park, PA, 16802, USA, jav1@psu.edu

1 — Optimizing Routing in Internet Networks

Nawal Bourquia, France Telecom Research & Developpement, Issy les Moulineaux, 92794, France, nawal.bourquia@rd .francetelecom.com., Eric Gourdin, Walid Ben Ameur, Pierre Tolla

In order to face the explosion of Internet traffic, new protocols has to be developed aiming a better control of the routing and a better distribution of the traffic. We investigate the problem of jointly determining network weights and routing paths so as to optimize a network performance criterion.

2 — c-Broadcasting in Trees

Shiwoo Lee, Northeastern University, Boston, MA, 02115, USA, lee@coe.neu.edu., Jose A. Ventura

C-broadcasting is a task, where a message from one originator is transmitted to all other members of network by making at most c simulataneous transmissions at a time. In this research, c-broadcasting in tree has been studied. Given broadcast time and diameter, this research proposes a construction method to produce trees, while completing c-broadcasting within the given broadcast time. Computational results are also provided.

3 — A Reliable QoS Routing Scheme in Virtual Private Networks
Ping-Tsai Chung, Long Island University, Brooklyn Campus, New York, Brooklyn, NY, 11201-5372, U.S.A., pchung@liu .edu.

A Virtual Private Network is a private data network that uses a public Internet backbone to carry its traffic to provide dedicated connectivity for corporate networking between geographically dispersed sites. In this work, we propose algorithms to support QoS in VPNs such as creating VPN topology for Intranet VPN, providing broadcasting and selective forwarding capabilities, routing for network survivability. A optimal VPN topology is created to satisfy the user's requests and the VPN service provider (VSP)'s policies for long-lived VPN's support. For these algorithms, we show their computational complexity and perfomance to approximate the optimal topology.

4 — Survivable Network Design with Hop Limit
Chi-Geun Han, Kyung Hee University, Yong-In-Si, Korea, cghan@khu.ac.kr., Sun-Jung Kwak

For the telecommunications network, time delay of a service will increase as the path length increases. Hence, for realtime multimedia service, the length of a path between two nodes should be restricted. We propose a heuristic method for solving survivable network design problems with hop limit.

5 — Multi-layer Network Dimensioning for MPLS over WDM Networks
Pedro F. PatrÌcio, Faculdade de CiÍncias (DEIO), Universidade de Lisboa, Lisbon, 1749-016Lx, Portugal, pedrofp@yahoo.com., Luis E. Gouveia, Amaro de Sousa

This paper addresses a network dimensioning problem that jointly considers two network layers. More specifically, we consider the dimensioning of an MPLS (Multi-Protocol Label Switching) network that is implemented over a WDM (Wavelength Division Multiplexed) network. We present and discuss several mixed integer programming formulations for this dimensioning problem and present computational results for two different scenarios involving original networks with i) 25 nodes and 50 edges and ii) 50 nodes and 100 edges.

■ TD15

Center-Room B4

Network Flow Algorithms

Sponsor: Optimization Section-Network Optimization
Sponsored Session

Chair: Elif Akcali, University of Florida, Assistant Professor, Gainesville, FL, USA, akcali@ise.ufl.edu

1 — A Least-Squares Network Flow Algorithm
Balaji Gopalakrishnan, Gerogia Institute of Technology, Atlanta, GA, USA, bgopalak@isye.gatech.edu., Ellis Johnson, Joel Sokol, Earl Barnes

A network based implementation of a least-squares primal dual algorithm (LSPD) for solving linear programming problems can be applied to solve mincost flow problems very efficiently by interpreting the core concepts of the LSPD algorithm appropriately as network operations. A psuedo-polynomial time bound on the running time of the algorithm is also given.

2 — New Multiple Pairs Shortest Paths Algorithms
I-Lin Wang, ISyE, GA Tech, Atlanta, GA, 30318, USA, ilin@isye.gatech.edu., Ellis Johnson, Joel Sokol

Single source shortest path (SSSP) and all pairs shortest paths (APSP) algorithms may do unnecessary computation to solve the multiple pairs shortest paths (MPSP) problem. We propose two new shortest path algorithms that could save computational work when solving the MPSP problem especially for applications with fixed network toplogy.

3 — Exact and Heuristic Solution Methods for a Special Class of Degree-Constrained Network Flow Problems
Elif Akcali, University of Florida, Assistant Professor, Gainesville, FL, USA, akcali@ise.ufl.edu., Reha Uzsoy

We study a special class of degree-constrained network flows. We present linear programming relaxation based exact and network flow based heuristic solution methods for a particular mixed formulation of the problem and present computational results on the performance of the solution methods.

■ TD16

Center-Room C4

Mixed Integer Programming II

Cluster: Discrete Optimization
Invited Session

Chair: Ismael de Farias, CORE, Louvain-la-Neuve, 1348, Belgium, defarias@core.ucl.ac.be

1 — A Mixed-integer Programming Approach to Improving Network Security
J. Cole Smith, University of Arizona, Tucson, AZ, 85721, USA, cole@sie.arizona.edu., Benjamin Armbruster, Kihong Park

We propose a methodology to identifying the smallest set of sentries to monitor network traffic, where each transmission has a purported origin and destination, and each sentry disables traffic whose purported origins are inconsistent with the established traffic routing pattern. We tailor this model to protect computer networks against contemporary attacks.

2 — Mixing Two Distinct Sets of MIR Inequalities
Andrew Miller, University of Wisconson, Madison, WI, USA, amiller@ie.engr.wisc.edu., Miguel F. Constantino

We study the polyhedral structure of an MIP model derived from considering stock-minimal solutions of capacitated lot-sizing problems with lower bounds (or startup costs). This research generalizes results of Constantino, Gunluk, Pochet, Wolsey, etc, for lot-sizing problems and general MIPs.

3 — A Branch-and-cut Algorithm to Transportation Problems with Nonconvex Piecewise Linear Costs
Ahmet Burak Keha, Georgia Institute of Technology, Atlanta, GA, 30332, USA, abkeha@isye.gatech.edu., Ismael de Farias, George Nemhauser

We discuss different formulations of transportation problems with nonconvex piecewise linear costs, and we present a polyhedral study of it modelled without auxiliary binary variables. We then present a branch-and-cut algorithm without auxiliary binary variables, and computational results that demonstrate the practicality of this model.

■ TD17

Center-Room B1

Behavioral Modeling and Control of Modern Production and Business Processes

Cluster: Manufacturing Systems
Invited Session

Chair: Spyros Reveliotis, Georgia Institute of Technology, Atlanta, GA, 30039, USA, spyros@isye.gatech.edu

1 — Automated Synthesis of Multi-level Control Logic for Flexible Automation
Placid Ferreira, University of Illinois at Urbana-Champaign, Urbana, IL, 61801, USA, pferreir@uiuc .edu.

With the convergence of infrastructure used for industrial information systems and control systems, the opportunity for integrated synthesis of multiple-levels of control and monitoring logic arises. This paper describes an environment for synthesis of multiple levels of monitoring, control and interaction that are commonly encountered in flexibly automated systems. The problem of generating non-conflicting behavior at different operational levels will also be addressed.

2 — A Discrete Event Dynamic Model For Supply Chain of Business Enterprises
Mohsen Jafari, Rutgers University, Piscataway, NJ, 08854, USA, jafari@rci.rutgers.edu.

We treat supply chain of business enterprises as a distributed system, where the system dynamics is governed by the events that occur within each enterprise and/or across several enterprises. While each enterprise has its own middleware for handling business transactions, we argue that there is also need for a meta-middleware across the whole supply chain. We present a formalism to build the control structure, which must be embedded in such a meta-middleware. We provide an illustrative example.

3 — Deadlock Avoidance for Resource Allocation Systems with Process Synchronization
Mark A. Lawley, Purdue University, malawley@ecn.purdue .edu., Spyros Reveliotis

Automated assembly/disassemby systems require controllers that allocate resources so that these systems do not stall due deadlock, synchronization, or splitting requirements. This work first provides a formal characterization of the underlying control problem, and it analyzes its computational complexity. It turns out that the optimal solution of the general problem formulation is NP-complete, even for the simpler issue of assessing the system “quasi-liveness”, i.e., whether there are adequate resources for each process to execute in isolation. Hence, the second part of the talk discusses the design of efficient sub-optimal control policies that are of polynomial complexity, and therefore, implementable and executable in real-time.

4 — Logical Control of the Emerging 300mm Fab and its Implications for the Fab Scheduling Problem
Spyros Reveliotis, Georgia Institute of Technology, Atlanta, GA, 30039, USA, spyros@isye.gatech.edu.

A key differentiation of the emerging 300mm fab from its 200mm counterpart, is the extensive automation of the underlying material handling operations. The first part of this talk will establish the importance of the structural control paradigm for the effective deployment and support of the sought fab automation , and will summarize the currently available results. The second part of the talk will investigate the integration of the logical control problem with the more traditionally studied performance-oriented control / scheduling problem. An interesting finding is that the more detailed and comprehensive modeling and analysis of the fab operations undertaken in this study negates in a strong qualitative sense some past analytical results regarding the optimality of certain scheduling policies for these production systems.

■ TD18

Center-Room J2

50th Anniversary of the Founding of ORSA: Past President, Session II

Cluster: ORSA 50th Anniversary
Invited Session

Chair: Saul Gass, University of Maryland, College Park, MD, 20742, USA, sgass@rhsmith.umd.edu

1 — Conflicting Objectives, Operating Characteristics and Performance Measures

Stephen M. Pollock, University of Michigan, Ann Arbor, MI , 48109-2117, USA, pollock@umich.edu.

"Optimization" requires careful representation of disparate (perhaps poorly specified and almost always competing) performance measures and their tradeoffs. We discuss the rhetorical and analytical advantages of using Operating Characteristics for this representation, with examples from EOQ (trivial), maintenance monitoring (helpful), radiation treatment planning (important when deterministic, critical under uncertainty).

2 — An Optimal Perspective on Operations Research

Thomas Magnanti, MIT, Cambridge, MA, 02139-4307, USA, magnanti@mit.edu.

Optimization has always been one of the mainstays of operations research/management science. Of course, it arises in many other contexts as well. This talk will provide some historical perspectives on the evolution of optimization, tracing its roots back to ancient times as well as to contributions to the physical sciences (e.g., optics) during the last century. It will also provide some limited comments on the use of optimization (broadly) today.

3 — Party in Honor of 50th Anniversary of the Founding of ORSA

Join the ORSA ex-presidents in celebrating the 50th anniversary of the founding of ORSA. Cake, coffee, and ORSA stories and songs will be served.

■ TD19

Fairmont-Regency 2

Land, Water and Climate Issues

Contributed Session

Chair: Erin Baker, University of Massachusetts, Amherst, Assistant Professor, Amherst, MA, 01002, USA, bakere@stanford.edu

1 — Uncertainty Propagation through an Integrated Transportation-Land Use Model: Application to Austin, Texas

Sriram Krishnamurthy, The University of Texas at Austin, Austin, TX, 78712, USA, sriram_k@lycos.com., Kara M. Kockelman

In this work, a DRAM-EMPAL land use model is linked to a traditional 4-step travel demand model. Monte Carlo simulations mimic uncertainty and covariance in demographic inputs and model parameters while producing variation in final estimates. These future estimates are examined over time and with respect to input values.

2 — Approach to Solve "Smart Growth" a Multi-Objective Land Development Problem

Jose Faria, University of Maryland, Faculty Research Assistance, College Park, MD, 20742, USA, josefaria@compuserve.com., Steven Gabriel, Glenn Moglen

Following Maryland's Governor initiative to create a land development plan under an organized and environmental conscious program called "Smart Growth", we propose an approach of multiple objective optimization where different stakeholders compete to optimize their benefits in a conflicting environment. The objective is to determine from a set of available parcels for land development which ones should be developed and what are the tradeoffs for the interested parties.

3 — Risk and Uncertainty in a Strategic Environment: Global Climate Change

Erin Baker, University of Massachusetts, Amherst, Assistant Professor, Amherst, MA, 01002, USA, bakere@stanford.edu.

Global climate change is rife with uncertainties. Yet, we can expect to learn much over the next 100 years or so. Therefore, current actions should reflect the value of flexibility. Nevertheless, most models of climate change, particularly game-theoretic models, abstract from uncertainty. In this paper, I model the effects of uncertainty and learning in a non-cooperative game, and conclude that the level of correlation of damages across countries is crucial for determining optimal policy.

4 — Optimization of a Multistage Flash Desalination Process

ali elkamel, Kuwait University, associate professor, Kuwait, KW, 53060, Kuwait, alielkamel@hotmail.com., Salah Al-Wadhai, Khawla Al-Shayji

This paper is concerned with optimizing the performance of an existing multistage flash desalination process. A composite objective function that consists of the different plant performance measures was used in conjunction with an ANN that models the plant. The decision variables over which optimization was carried out are subjected to constraints to ensure that maximum and minimum bounds are adhered to as well as safety considerations.

■ TD20

Fairmont-Hillsborough

Business-to-Consumers Online Auctions

Cluster: Auctions
Invited Session

Chair: Paulo Goes, University of Connecticut, Storrs, CT, 06269, USA, paulo@business.uconn.edu

1 — Predicting Bidder Valuations In Online Multi-item Ascending Price Auctions

Ravi Bapna, University of Connecticut, Storrs, CT, 06269, USA, rbapna@business.uconn.edu., Paulo Goes, Alok Gupta, Gilbert Karuga

We develop an economic model for predicting bidder valuations in online ascending price auctions. The model relies on an assumption that bidders use a myopic surplus maximization strategy when constituting their bids. Since not all bidders employ this strategy when bidding, we provide a statistical model for classifying bidding strategies. For bidders that use a myopic surplus maximization bidding strategy, we use the model to predict their valuation. We test and provide results on the accuracy of our valuation prediction model using data collected from online auctions.

2 — Selling Online with Auctions and Fixed-price in Parallel

Edieal Pinker, University of Rochester, Rochester, NY, 14627, USA, pinker@simon.rochester.edu., Hila Etzion, Abraham Seidmann

In the business to consumer market it is possible to find examples of firms that are selling the same or almost identical products online at the same time using auctions and fixed prices. In this talk we develop and analyze a model of the key trade-offs faced by the seller in such a dual-channel setting.

3 — B2C Auction Design: A Complex Systems Approach

Kumar Mehta, University of Connecticut, Storrs, CT, 06269 , USA, kumar.mehta@business.uconn.edu., Sid Bhattacharyya

In the competitive setting of B2C markets, the auctioneer's control is limited to the design of auction as a means for maximizing revenues. A comprehensive agent-based computational model incorporating the behavior of market agents (auctioneer, consumer and retailer) and the market environment is used to design the parameters of Yankee auctions.

■ TD21

Fairmont-Glen Ellen

Financial Engineering I

Contributed Session

Chair: Wenlong Weng, College of Business and Economics, Lehigh University, Bethlehem, PA, 18015, U.S.A., wew4@lehigh.edu

1 — Growth Options and Investment Under Uncertainty

Wenlong Weng, College of Business and Economics, Lehigh University, Bethlehem, PA, 18015, U.S.A., wew4@lehigh.edu, John P. Weyant

Most capital investments not only generate expected cash flows, but also create growth options. In this paper, we develop a capital investment option valuation approach that explicitly takes account of the growth options the investment creates.

2 — Bank Matching Book Problem

HuiChen Chiang, Case Western Reserve University, Cleveland, OH, 44106, U.S.A., hxc30@po.cwru.edu., Matthew J. Sobel

A company may have long-lived equipment to make its product but the demand for the product may vary short-term. Because the income variation is short-term and that of the finance is long-term, it is a challenge for a company to manage its cash flows. Banks too have to manage their cash flows. As a result, the problem of matching the cash flows from a company's perspective is similar to a bank's

problem. Our model can lead us to a more insight to a corporate finance problem.

3 — Hierarchical Utility Maximization
Eric Knyt, Stanford University, Ph.D. Candidate, Stanford , CA, 94309, USA, knyt@stanford.edu., David G. Luenberger

In general, to maximize non-linear functions of non-linear functions, complex numerical methods and/or algorithms requiring iteration are necessary. We show that for a broad class of homogeneous functions a one-step optimization is possible. We illustrate our finding with a "hierarchical" utility maximization .

■ TD22

Fairmont-Paseo

Economics I

Contributed Session

Chair: A.M.M. Jamal, Southeastern Louisiana University, Hammond, LA, 70403, USA, ajamal@selu.edu

1 — A Nonlinear Model of Exchange Rates: The Recent Evidence
A.M.M. Jamal, Southeastern Louisiana University, Hammond, LA, 70403, USA, ajamal@selu.edu.

This paper develops a model for representing the exchange rate of the United States and its major trading partners such as the United Kingdom and Japan. The functional relationship between the exchange rate and its explanatory variables will not be restricted to the standard linear or logarithmic form but will be simultaneously estimated with the rest of the model.

2 — Application of Zero-Sum Game Theory in US Trade
Elliot Levy, U.S. Dept. of Commerce, Reston, VA, 20190, USA, elliot_levy@ita.doc.gov.

The technique was applied in US trade with Brazil for derivation of optimum trade balance under different strategies, e.g. saddle points. The payoff matrices are in terms of the US as Player 1. Outcome scenarios were developed around an actual 1997 trade balance from increased/decreased low- middle- and high-total industrial wage classes.

3 — Telecommunication Technologies for Effective and Pro-Poor Provision of Public Goods and Services
Maja Micevska, Center for Development Research, University of Bonn, Bonn, D, 53113, Germany, micevska@uni-bonn.de.

This paper investigates how ICTs affect provision of public goods and services using health as a key example. I first perform a cross-country analysis to determine the potential use of enhanced and faster information on health services. The second methodology takes advantage of household surveys conducted in Bangladesh, Laos, and Peru. The main objective is to assess which types of households bear greater burden or enjoy most benefits brought about by better information on health services.

4 — A DEA Approach to Describing the Efficiency of the High Technology Economy
Raymond Raab, Univ. of Minn. Duluth, Prof. of Economics, Duluth, Mn, 55812, USA, rraab1@d.umn.edu., Pradeep Kotamraju

We contrast DEA efficiency rankings of high technology industries to the New State Economy Index rankings for the 50 states. The efficiency approach-which maximize industry outputs while minimizing inputs-avoids using equal or subjective weights employed in conventional rankings. The efficiency rankings yields unexpected results and suggests a different way of measuring and evaluating state development policy.

5 — Affine Dynamic Models Of Exchange Rates And Interest Rates:Basic Theory And Kalman Filter Estimation
Bing Han, University of Calgary, Assistant Professor, Calgary, AB, T2N 1N4, Canada, bing.han@haskayne.ucalgary .ca., Peter Hammond

A canonical model of currency exchange rates and the term structure of different nations' interest rates is formulated. This model avoids theoretical or empirical pitfalls in some existing alternatives. Conditional moments of log exchange rates are affine functions of suitably transformed state variables, allowing Kalman filter estimation of the parameters.

■ TD23

Center-Room L

Airport Operations

Contributed Session

Chair: Jennifer N. Rausch, Northrop Grumman Information Technology, Arlington, VA, 22204, USA, jrausch@northropgrumman.com

1 — Effects of Domestic Reduced Vertical Separation Minimum (DRVSM) on Airport Operations
Jerome E. Freedman, MITRE Center for Advanced Aviation System Development, Pleasantville, NJ, 08232, USA, jfreedma@mitre.org., David Maroney

The FAA is evaluating the new DRVSM procedure that reduces en route high altitude separation standards in US domestic airspace , making more flight levels available. It was required to determine any effects on airport operations. Using fast-time simulation tools, unanticipated interactive effects were discovered that on the whole were beneficial.

2 — Baggage Scanner Deployment Planning for Air Transportation
Jennifer N. Rausch, Northrop Grumman Information Technology, Arlington, VA, 22204, USA, jrausch@northropgrumman.com., Anthony Quattromani, Barry Justice

The U.S. Government has mandated that 100% of passenger bags be scanned by explosive detection equipment by the end of 2002. We present a methodology to create initial equipment installation plans and to modify plans based on plan execution variations. We describe data requirements, problem formulation, and implementation issues.

3 — An Optimization-Simulation Model for Labor Scheduling in Spanish Major Airports
Joaquìn Pacheco, University of Burgos, Spain, Associate Professor, Burgos, BU, 09001, SPAIN, jpacheco@ubu.es., Silvia Casado, Manuel Laguna

We analyze the labor scheduling problem for both personal, checking and security, in Madrid-Barajas (Spain) Airport. The objective is minimizing the personal cost and ensuring a level of speed in transit of passengers. We show a 3-phases strategy: Simulation, Optimization-Simulation to obtain personal requests, and shift scheduling problem. For this last phase we propose different efficient algorithms based in Tabu Search and Scatter Search strategies.

4 — Security Queuing Analysis for Vancouver International Airport
Anita Parkinson, UBC Commerce, Student, Vancouver, BC, V6T 1Z2, Canada, aparkinson@coe.ubc.ca., Bailey Kluczny, Mehmet Begen, Derek Atkins

After Sep 11th, tighter security has resulted in queues and longer waiting times at the pre-board screening points. YVR Airport Authority is interested in reducing the waiting time for passengers and a method for scheduling staff. A simulation model of the system was built to provide insight and identify the bottlenecks. Following that, a scheduling methodology was developed consisting of a simple forecasting model, staffing level determination and a linear program for shift determination.

■ TD24

Hilton-Pacific

Where is OR/MS in Undergraduate Business Curriculum? (Panel)

Sponsor: Education
Sponsored Session

Chair: Ronald Wright, LeMoyne College, Syracuse, NY, wright@lemoyne.edu

Co-Chair: Salwa Ammar, LeMoyne College, Syracuse, NY, ammar@lemoyne.edu

1 — Where is OR/MS in Undergraduate Business Curriculum?
Salwa Ammar, LeMoyne College, Syracuse, NY, ammar@lemoyne .edu. Panelists: James Cochran, Louisiana Tech Univ.; Matthew Liberatore, Villanova Univ.; Steven Nahmias, Santa Clara Univ.; Robert Nydick, Vinnanova Univ.; Rose Sebastianelli, Univ. of Scranton; Ronald Wright, LeMoyne College.

In this session the panel will discuss the current status and trends of ORMS education in undergraduate business programs. The discussion is based on a recent study of curricular content for AACSB accredited undergraduate business programs in what are classified as masters granting institutions. A summary of the results is included in an article published in an ORMS Today special issue on education.

■ TD25

Center-Room F2

Issues in DEA

Cluster: Data Envelopment Analysis
Invited Session

Chair: Susan X. Li, School of Business, Adelphi University, Associate Professor, Garden City, NY, 11530, U.S.A., li@adelphi.edu

1 — Non-discretionary Inputs
John Ruggiero, University of Dayton, Professor, Dayton, OH, 45469-2251, U.S.A., ruggiero@notes.udayton.edu.

The current DEA literature on non-discretionary inputs ignores the possibility that efficiency may be correlated with the non-discretionary factors. This paper extends the literature by analyzing the effects that such correlation has. It will

be shown that if the true technical efficiency is negatively correlated with the non-discretionary inputs, the existing DEA efficiency estimates will be biased upward. Using simulated data, the performance of the existing model will be analyzed.

2 — DEA via Excel Spreadsheets and Excel Solver
Joe Zhu, Department of Management, Worcester Polytechnic Institute, Professor, Worcester, MA, 01609, U.S.A., jzhu@wpi.edu.

This presentation demonstrates how DEA models can be solved in Excel Spreadsheets and Solver

■ TD26

Hilton-San Carlos I

Wireless Networking

Sponsor: Telecommunications
Sponsored Session

Chair: Michael Bartolacci, Penn State University, Assistant Professor of Information, Sciences and Technology, Reading, PA, 19610, mbartolacc@aol.com

1 — A Connectivity Decision Support System Framework for Wireless Networks
Michael Bartolacci, Penn State University, Assistant Professor of Information Sciences and Technology, Reading , PA, 19610, mbartolacc@aol.com.

A framework is proposed for linking location/topological information with signal strength and related information to improve reception and data rates. The framework is flexible enough to be adapted to current cellular as well as future ad-hoc networks.

2 — Design of Telecommunication Networks with Unreliable Components
Abdullah Konak, Penn State-Berks Lehigh Valley, Assistant Professor of IST, Reading, PA, 19610, USA, akonak@psu.edu .

This paper presents common reliability and performability measures, such as all-terminal reliability, network resilience, and traffic efficiency, in order to evaluate vulnerability of telecommunication networks in the case of component failures. These measures are used within an efficient heuristic optimization algorithm to design reliable and performable networks.

■ TD27

Center-Room C2

Supply Chain Flexibility

Contributed Session

Chair: Ana Muriel, University of Massachusetts, Assistant Professor, Amherst, MA, 01003, USA, muriel@ecs.umass.edu

1 — The Impact of Flexibility on Supply Chain Agility
Patricia M. Swafford, Georgia Institute of Technology, Atlanta, GA, 30332, USA, patty.swafford@mgt.gatech.edu., Soumen Ghosh, Nagesh N. Murthy

While flexibility is an important element of competitive priorities, no empirical study exists that show the link between the drivers of flexibility and their impact on supply chain agility. Using empirical data, we establish the drivers of flexibility within the key components of the supply chain, and show how they impact overall agility.

2 — Manufacturing Flexibility — An Economic Perspective
Dan Weiss, University of California at Davis, Davis, CA, 95616, USA, dweiss@ucdavis.edu.

This research introduces a single comparison of flexible production systems. The analytical approach of this study is to compare flexibility of production systems. A production system is defined more flexible than another production system if the first has a reasonable performance in more probable future situations. The suggested flexibility comparison is shown to reflect fundamental managerial intuitions and to generalize measures of many types of flexibility.

3 — A Robust Supply Chain Design Under Demand Uncertainty
Yin Mo, Penn State University, University Park, PA, 16802 , USA, yxm5@psu.edu., Terry P. Harrison, Elena Katok

We propose a framework for a robust supply chain design under demand uncertainty. The performance measures and the solution methods are discussed. A stochastic programming based heuristic is proposed and tested. We also discuss the characteristic of the supply chain environment under which uncertainty needs to be treated carefully.

4 — Simulation Study of the Impact of Manufacturing Flexibility on Supply Chain Performance
Yongmei Zhang, University of Massachusetts, Research Assistant, Amherst, MA, 01002, USA, yozhang@acad.umass .edu., Ana Muriel, Anand somasundaram

An optimization-based simulation model was used to study the impact of flexibility on overall system performance in general multi-plant multi-product make-to-order manufacturing systems. Results show that flexibility leads to a considerable increase in production variability, component inventory levels and the upstream order variability. Although a modest increase in flexibility yields most of the sales benefits, production variability is reduced as more flexibility is added to the system .

■ TD28

Center-Ballroom A1

Supply Chain Models

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Vinayak Deshpande, Purdue University, West Lafayette, IN, 47907, USA, deshpandev@mgmt.purdue.edu

1 — Procurement, Clearance Pricing, the Newsvendor Heuristic and the Risk of Avoiding Endogeneity
Gerard Cachon, The Wharton School, Professor, Philadelphia, PA, 19104, USA, cachon@wharton.upenn.edu., Gurhan Kok

We consider the fashion good inventory problem with end of season clearance pricing. The newsvendor heuristic, a standard approach to this problem,assumes a fixed salvage value for mark down inventory. However, the optimal mark down depth depends on the amount of inventory remaining to be sold. We explore the effectiveness of the newsvendor heuristic in this setting. We find that the newsvendor heuristic can perform significantly worse than optimal.

2 — Market Segmentation, Channel Differentiation and Channel Structure under Price and Service Competition
Xuan Zhao, Faculty of Commerce and Business Administration, The University of British Columbia, Vancouver, V6T 1Z2, Canada, xuan.zhao@commerce.ubc.ca., Derek Atkins

This paper explores market segmentation, channel differentiation and channel structure under price and service competition in a heterogeneous market. We study how the heterogeneous market affects the structure of the supply chains delivering the different products. By employing non-cooperative game methodology , we analyze the market equilibrium under both an emerging market and a mature market.

3 — Information Sharing in Decentralized Supply Chains
Ananth Iyer, Purdue University, Professor, W Lafayette, IN, 47907, USA, aiyer@mgmt.purdue.edu., Paul Preckel

We model the impact of information sharing on expected costs when a number of independent retailers share production resources. We show that, contrary to usual intuition, information sharing can increase expected costs in decentralized supply chains. The results suggest the need for careful evaluation of the extent of information sharing and its consequent impact on individual retailers before embarking on collaboration initiatives.

4 — Optimal Capacity-allocation Mechanisms in Supply Chains: An Auctions Approach
Vinayak Deshpande, Purdue University, West Lafayette, IN, 47907, USA, deshpandev@mgmt.purdue.edu., Leroy Schwarz

Consider a supply chain in which a single supplier with fixed capacity sells to several independent retailers. The retailers have private information about their individual markets (e.g. mean market demand), which influences the size of their orders to the supplier. If the sum of all retailer orders exceeds the supplier's capacity, the suplier uses a pre-declared allocation rule. We answer the following question: What is the optimal capacity-allocation rule and pricing mechanism for the suplier?

■ TD29

Center-Ballroom A5

Supply Chains Issues In A Dynamic Environment

Sponsor: Manufacturing and Service Operations Management Society
Sponsored Session

Chair: Mark Ferguson, Georgia Tech, Assistant Professor, Atlanta, GA, 30332, USA, mark.ferguson@mgt.gatech.edu

1 — Production Management under Frequent Product Introductions
Gilvan Souza, University of Maryland, Assistant Professor , College Park, MD, 20742, USA, gsouza@rhsmith.umd.edu.

We investigate optimal product introduction and production for a firm that frequently introduces new products in a competitive, uncertain market. We formulate the integrated problem as a Markov decision process, and show that decoupling the two decisions results in a simple production policy structure, with only mild profit degradations (1.2%).

2 — Durable Goods Channel Under Uncertain Demand
Oded Koenigsberg, Columbia University, Assistant Professor, 10008, US, ok2@mail.duke.edu.

In this paper, we investigate a supply chain of durable goods under demand uncertainty. We show how managing a durable goods supply chain is significantly different from managing a supply chain for non-durable. Although both channels have to deal with the problems of coordination and demand uncertainty, the durable goods manufacturer also has to deal with the problem of time-consistency. Using versions of the two-part tariff contract and returns policies we show that the manufacturer can achieve channel coordination, and can solve both the time consistency and demand uncertainty problems. As a result a manufacturer is better-off selling through a retailer rather than sell directly to the market.

3 — Evaluating Logistics Postponement under Multivariate Normal Demand
Don Warsing, Penn State University, Assistant Professor of Business Logistics, University Park, PA, 16802, USA, dpw11@psu.edu., Ann Marucheck

We present a multi-period planning model in which multivariate-normal demand over a product life cycle may be satisfied using two modes of transportation, one of which is faster but more expensive. We compare single-mode and dual-mode fulfillment strategies and study several approximations to a dynamic programming formulation of the problem.

■ TD30

Center-Ballroom A6

Production/Marketing Models

Contributed Session

Chair: Kaijie Zhu, Hong Kong Univ of Science & Technology, Assistant Professor, Clear Water Bay, Kowloon, HK, Hong Kong, kzhu@ust.hk

1 — Style Goods Pricing with Demand Learning
Alper Sen, Bilkent University, Assistant Professor, Ankara, TR, 06533, Turkey, alpersen@bilkent.edu.tr., Alex Zhang

For many industries (e.g.,apparel retailing) managing demand through price adjustments is often the only tool left to companies once the replenishment decisions are made. A significant amount of demand uncertainty can be resolved using the early sales information. A periodic model and a Bayesian approach are used to summarize sales information and pricing history in an efficient way. We obtained computational results, some of which are empirically validated using data from U.S. apparel industry.

2 — Optimal Pricing and Inventory Control by a Censored Newsvendor
Arnab Bisi, Purdue University, Assistant Professor, West Lafayette, IN, 47907-1310, USA, abisi@mgmt.purdue.edu.

We study the effect of censored demand data on the optimal pricing and inventory policies in a finite-horizon newsvendor model. The demand distribution is price dependent and involves unknown parameters. Using a Bayesian learning scheme we derive structural results of the optimal policies in the system.

3 — Coordination of Pricing and Inventory Control Across Products
Kaijie Zhu, Hong Kong Univ of Science & Technology, Assistant Professor, Clear Water Bay, Kowloon, HK, Hong Kong, kzhu@ust.hk., Ulrich W. Thonemann

We consider the pricing and inventory-control problem for a retailer who orders, stocks, and sells two products. Cross-price effects exist between the two products. We derive the optimal pricing and inventory-control policy and show that this policy differs from the base-stock list-price policy. We show that the retailer can improve profits significantly if the retailer manages the two products jointly. We also present structural results of the optimal pricing and inventory-control policy.

4 — Return Policies with Asymmetric Demand Estimates
Haresh Gurnani, University of Miami, Associate Professor, Coral Gables, FL, 33124, USA, haresh@miami.edu., Arun Sharma

In an environment with uncertain final demand, manufacturers typically offer return policies in order to encourage the retailers to over-stock. In this paper, we study the role of returns when the manufacturer and retailer may not agree on the nature of demand uncertainty in the channel. Depending on the power structure in the channel (for example, manufacturer-leader or retailer-leader), we determine the optimal pricing and return policy.

5 — Coordinating the Resource Investment Decision for a Two-market Price-setter Firm
Seong-Jong Hong, Virginia Tech, Ph.D. Candidate, Blacksburg, VA, 24061, USA, sehong1@vt.edu., Ebru Bish

We consider the resource investment decision of a firm, which operates in two independent markets and is a price-setter in both markets. We analyze the case where the resource investment decision is de-centralized and the case where the resource investment decision between the two markets is coordinated. We characterize the structure of the firm's optimal resource investment strategy and and determine the benefits of centralized decision making.

■ TD31

Center-Room J3

Merging Math Programming and Constraint Programming II: Solutions

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: John Chinneck, Carleton University, Professor, Ottawa, On, K1S 5B6, Canada, chinneck@sce.carleton.ca

1 — Tutorial: Merging constraint programming techniques with mathematical programming
John Hooker, Carnegie Mellon Univ, Professor, Pittsburgh, PA, 15213, USA, jh38@andrew.cmu.edu.

This tutorial shows how constraint programing techniques can enhance those of mathematical programming. The focus is on domain reduction techniques (analogous to cutting planes) and the use of linear relaxations for global constraints. The complementary strengths of MP and CP algorithms are compared in order to justify their integration.

2 — Recent Directions on the Integration of Mathematical Programming and Constraint Programming
Michela Milano, mmilano@deis.unibo.it.

The talk provides an overview of recent directions on the integration of Mathematical Programming (MP) techniques in Constraint Programming (CP) for facing Combinatorial Optimization Problems (COPs). The talk starts by shortly reviewing basic concepts and festures of Constraint Programming. Then, I will explain how MP results like relaxations, reduced cost based variable fixing, and cutting planes can be exploited from a software engineering viewpoint in CP. Finally, I will discuss open problems and research directions.

■ TD32

Center-Room J4

Methods for Convex and Semidefinite Programming

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Sanjay Mehrotra, Northwestern University, Professor, Evanston, IL, 60208-3119, USA, mehrotra@iems.nwu.edu

1 — A Path Following Method for Nonsmooth Convex
Sanjay Mehrotra, Northwestern University, Professor, Evanston, IL, 60208-3119, USA, mehrotra@iems.nwu.edu., Muhittin Ozevin

Recently Gilbert, Gonzaga and Karas constructed examples of ill-behaved central paths for convex programs. In this paper we show that under mild conditions the central path has sufficient smoothness to allow construction of a path-following interior point algorithm for non-differentiable convex programs.

2 — The Simplex Method for Semidefinite and Second-Order Cone Programming
Donald Goldfarb, Columbia University, Professor, New York , NY, 10027, USA, gold@ieor.columbia.edu.

here have been several unsuccessful attempts to extend the simplex method to semidefinite and second-order cone programming. We present here a natural and straightforward extension of the simplex method to these classes of problems and discuss how to implement various "pivot rules". If there is time, we will present some preliminary computational results.

3 — Convergence Conditions and Krylov Subspace Based Corrections for Primal-Dual Interior-Point
Zhifeng Li, Northwestern University, Evanston, IL, 60208-3119, USA, z-li1@northwestern.edu., Sanjay Mehrotra

We present conditions for the convergence of a generic primal-dual interior point algorithm with multiple corrector directions. The corrector directions can be generated by any approach. The search direction is obtained by combining predictor and corrector directions through a small linear program .

■ TD33

Hilton-University

Decision Analysis Software

Contributed Session

Chair: Sari K. Stenfors, Helsinki School of Economics, Helsinki, 00101, Finland, sari.stenfors@hkkk.fi

1 — Suitable Decision Support for Strategic Decisions
Sari K. Stenfors, Helsinki School of Economics, Helsinki, 00101, Finland, sari.stenfors@hkkk.fi., Pekka Korhonen, Mikko Syrjanen

There are numerous decision support methods for strategic decision-making, yet they often do not succeed to answer the needs of the corporate decision-maker. We have studied different methods, and investigated the developer-user dialogue in an energy distribution companyΔs strategic decision-making process. The eval-

uation and validation of the decision support should take into account the entire process.

2 — Reusable Decision Models for Cost Effective Decision Making
Roberto Ley-Borras, Inst. Tecnologico de Orizaba, Orizaba , 94380, Mexico, ley@stanfordalumni.org.

Reusable decision models, a new approach that saves modeling time and money by taking advantage of similarities in "families" of decision situations, include a comprehensive master model and a diagram for building particular models from it. Application examples (deploying of service centers and purchasing of industrial equipment) will be presented.

3 — Risk-Based Shaping Of Collaborative Services
Joe Erl, RBS Group, Edinburgh, EH, United Kingdom, joeerl@yahoo.co.uk.

Scenario planning is a known method of envisioning multiple realities. It can be useful if the plans are based on a consistent approach to risk. We introduce Risk-based Enterprise Management. REM includes a further improvement to the textbook scenarios - service design. Application of REM to Extended Enterprises means that you no longer need to pay a price when integrating services: the more coupled they are, the less flexibility you have to handle unanticipated issues or opportunities.

■ TD34

Hilton-Plaza

Corporate Environment

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Don Kleinmuntz, University of Illinois, Champaign, IL, 61820, USA, dnk@uiuc.edu

1 — Implementation and Modeling Issues in Multiobjective Resource Allocation
Don Kleinmuntz, University of Illinois, Champaign, IL, 61820, USA, dnk@uiuc.edu., Catherine Kleinmuntz

This talk will discuss our experience implementing multiobjective preference models to allocate capital budgets at hundreds of not-for-profit hospitals over the last six years. Practical challenges will be identified, and we will describe several approaches that we have developed to meet those challenges.

2 — The Use of Decision Analysis in Organizations
Kelly See, Duke University, Durham, NC, 27708-0120, USA, kes3@mail.duke.edu., Robert Clemen

Organizations often face uncertainty, trade-offs, and complex choices with broad consequences. Decision analysis (DA) can help address these issues but is not widely used among organizations. Drawing from psychological and organizational theory, we present the results of a preliminary study of factors that determine the use of DA in organizations.

3 — Risk Sharing, Fiduciary Duty, and Corporate Risk Attitudes
James Smith, Duke University, Durham, NC, 27708-0120, USA , jes9@mail.duke.edu.

We consider the problem of deriving risk preferences that reflect the preferences of the company's shareholders. We show that i) corporations should be less risk averse than suggested in the decision analysis literature and ii) market prices generally do not reflect the best interests of shareholders.

4 — Integrating Project Analysis and Portfolio Management
Daniel Smith, Enrich Consulting, Inc., Campbell, CA, 95008, USA, dsmith@enrichconsulting.com., Manuel Cid

Evaluating project decisions in the context of the entire portfolio poses unique challenges but also provides substantial benefits. We will discuss an integrated approach to portfolio management and three main benefits. The first is greater insight around project decisions that require a portfolio view, such as accelerating or delaying timelines and licensing. The second is an explicit consideration of project interdependencies to generate more robust portfolio-level results. The third is a clear picture of risk and opportunity across the portfolio for both financial requirements and resource planning.

■ TD35

Hilton-Almaden II

Experimentation for Profit

Sponsor: Quality, Statistics and Reliability Section
Sponsored Session

Chair: Theodore Allen, Ohio State University, Columbus, OH, 43210, USA, allen.515@osu.edu

1 — The Foundations of Design of Experiments: A Review
Theodore Allen, Ohio State University, Columbus, OH, 43210, USA, allen.515@osu.edu.

This paper surveys all of the recent work in experimental planning on topics including designs for kriging models, mixture experiments, uniform designs, and split plot designs. The attempt is to characterize the value of the work in the context of Savage's view of probability and Hazelrigg's view of system design.

2 — Managing Experimental Integration
Deng Huang, Scientific Forming Technologies Corporation, huang.262@osu.edu., Theodore Allen, Gavin Richards

Virtually all experiments at universities, research centers, or conducted using finite element methods, have an important problem . The evaluations that they give are not evaluations of the systems people care about. Instead, they are the evaluations of surrogate systems. This paper investigates technologies to address these issues and manage data from various sources to create accurate metamodels to predict the performance of the important systems.

3 — A Cautious Approach to Robust Design with Model Uncertainty
Daniel Apley, Texas A&M University, College Station, TX, 77843-3131, USA, apley@tamu.edu.

Robust design methods for minimizing process variability usually rely on empirically estimated process models, and their effectiveness depends on the accuracy of the model. A method is proposed for incorporating model uncertainty information into standard robust design optimization criteria, resulting in a more robust robust design approach.

4 — Experimentation for Profit and Business Decision-making
Mikhail Bernshteyn, Sagata Ltd., Navara Chantarat, Theodore Allen

This paper describes what is new and valuable about experimental planning using optimization for the practitioner. We describe our experiences developing and applying mixture designs, screening techniques, and technology for robust system design with actual companies including Northrop Grumman and Nestle. Also, we discuss what might have happened if more conventional approaches had been used.

■ TD36

Center-Room F1

Operational Models in Semiconductor Manufacturing II

Sponsor: Applied Probability Society
Sponsored Session

Chair: Emmanuel Fernandez, University of Cincinnati, Assoc. Prof., Cincinnati, OH, 45221-0030, emmanuel@ececs.uc.edu

Co-Chair: Michael Fu, University of Maryland, mfu@isr.umd.edu

1 — Approximating Resource Dedication in Re-entrant Queueing Networks
Theresa Roeder, University of California, Berkeley, CA, USA, Hyun-soo Ahn, Lee Schruben

In re-entrant queues, the constraint that customers must use the same server on successive visits to a set of parallel servers is sometimes referred to as resource dedication. We present an approximation to this constraint and examine the quality of this approximation as a function of the traffic intensity, queueing discipline, and the delay between successive visits.

2 — A Geometric Model of Capacity Requirement Analysis for Aggregate Product Demands
Yon-Chun Chou, National Taiwan University, Taipei, 106, Taiwan, ychou@ccms.ntu.edu.tw., J-Z Lin

The manufacturing planning function in semiconductor manufacturing is usually organized as a hierarchy of planning tasks that have different purposes and planning horizons and treat products and process routings at different levels of granularity. This paper describes a methodology for analyzing evolving capacity requirements across granularity levels under uncertain product demands. The variability of product demands is represented as demand scenarios. Capacity requirement fences for all scenarios are then constructed based on process routing and demand scenario information. The capacity requirements are represented as a convex hull. Geometric reasoning models are presented in this paper for statistical analysis of tool.

3 — Preventive Maintenance Optimization for Unreliable Queueing Systems
Xiaodong Yao, University of Maryland, xdyao@isr.umd.edu., Michael Fu, Steven Marcus, Emmanuel Fernandez

This research is motivated by the challenging task of Preventive Maintenance scheduling in semiconductor manufacturing. Our proposed models depart from conventional maintenance models by considering systems "operating" state and "technical" state simultaneously, under the context of queueing systems with unreliable servers. We will investigate structural properties of optimal policies, e.g. control-limit policies, by formulating the problem as a Semi-Markov Decision Process. We plan on investigating simulation-based optimization approaches, e.g. efficient gradient estimation, as well. Some preliminary results and ongoing research will be presented.

■ TD37

Center-Room J1

Perishable and Reparable Inventory

Contributed Session

Chair: Alan Scheller-Wolf, GSIA, Associate Professor, Pittsburgh, PA, 15213, USA, awolf@andrew.cmu.edu

1 — Perishable Inventory Policies with Emergency Replenishments
Deming Zhou, University of California, Los Angeles, CA, 90095, USA, dzhou@anderson.ucla.edu., William Pierskalla

This paper proposes and analyzes a periodic review inventory system for 3-days perishable products under two replenishment modes, regular orders and emergency orders. We prove the existence and uniqueness of a policy that minimizes the expected cost for the problem and derive the structure of the policy.

2 — The Benefits of Sharing in Perishable Inventory Systems
Borga Deniz, GSIA, Student, Pittsburgh, PA, 15213, USA, bdeniz@andrew.cmu.edu., Alan Scheller-Wolf

We consider a retailer facing disparate stochastic demand streams for each age of a perishable good having a 2-period lifetime. The objective is to minimize cost over an infinite horizon, under the assumption that we use a base-stock policy for total inventory. We compare two different service policies: Full Sharing, where excess goods of one age are used to satisfy demand of the other age, and Non Sharing, where demand can only be satisfied by goods of the age requested. We show that under full sharing costs are lower and goods in the system are on average fresher.

3 — Finite Two-echelon Repairable Item Systems
Jan-Kees C.W. van Ommeren, University of Twente, The Netherlands, Enschede, 7500 AE, The Netherlands, ommeren@math.utwente.nl., Henk W.M. Zijm, Anto Daryanto

In this paper, we analyze the repair of technical systems, consisting of a number of identical items. Upon failure of an item, repair takes place in two subsequent stages, i.e. component repair and item assembly. Repair capacity in either stage is limited. In order to increase system availability, also stocks of both components and ready-for-use items are kept. We discuss algorithms to analyze this closed queueing-inventory model and demonstrate their numerical performance.

4 — An Economic Lot-Sizing Problem with Perishable Inventory and Economies of Scale Costs
Leon Chu, University of Florida, Gainesville, FL, USA, zhuyang@ufl.edu., Vernon N. Hsu, Zuo-Jun (Max) Shen

In this paper, we consider an economic lot-sizing problem with general economies of scale cost functions and perishable products . The deterioration rate and inventory carrying cost in each period depend on the age of the inventory. Realizing that the problem is NP-hard, we analyze the effectiveness of easily implementable policies. We show that the cost of the best Consecutive-Cover-Ordering policy is guaranteed to be no more than 1.53 times the optimal cost.

■ TD38

Center-Room N

Vehicle Routing and Dispatching

Contributed Session

Chair: F. Sibel Salman, Purdue University, West Lafayette, IN, 47907, USA, salmanf@mgmt.purdue.edu

1 — On-orbit Satellite Servicing: A Space-based Vehicle Routing Problem
Ozgur E. Gurtuna, Concordia University, Montreal, H3Z 2X3 , Canada, gurtuna@futuraspace.com., Jonathan Trepanier

We investigate the feasibility of modifying and applying algorithms developed for Earth-based vehicle routing problems to a space-based problem: on-orbit satellite servicing. We present the results based on the scenario of servicing 100 satellites and discuss some algorithmic issues in space-based applications of vehicle routing heuristics.

2 — Dynamic Admission and Dispatching Control of Stochastic One-Hub-Two-Spoke Distribution Systems
Helen Hairong Chen, HKUST, PG student, Hong Kong, HK, China, chenhr@ust.hk., Yat-Wah Wan

We study one-hub, two-spoke stochastic distribution systems served by one vehicle. Both admission and dispatching control policies are considered to maximize the total discounted profit. We partially characterize the optimal policies, and provide approximations as well.

3 — A New Criterion for Fitting Distance Functions
John Walker, Brock University, Assistant Professor, St. Catharines, On, L2S 3A1, Canada, jowalker@taro.bus.brocku .ca., Robert Love

In This paper, we discuss the Normalized Absolute Deviations (NAD) goodness-of-fit criterion, which has been developed to estimate the parameters of distance predicting functions. Using data from seventeen geographic regions, the parameters of a distance predicting function are obtained when the NAD criterion is used as the goodness-of-fit criterion. Statistical properties of the residuals, the differences between actual and fitted distances, will also be discussed.

4 — Real-Time Emergency Vehicle Dispatching and Routing for Natural and Man-Made Disasters
Christopher M. Rump, SUNY at Buffalo, Assistant Professor , Buffalo, NY, 14260-2050, U.S.A., crump@eng.buffalo.edu., Galina Rogova, William C. Frank, Jae-Young Choi, Nishant Mishra

We consider emergency vehicle dispatching and routing to hospitals in the wake of a natural disaster such as an earthquake . Due to the uncertain transportation infrastructure, we draw upon concepts in network reliability routing to obtain delivery time estimates. The dispatching decision requires selecting a casualty in queue, which amounts to a stochastic scheduling problem. We develop and test our dispatching and routing algorithms in a geographic-based decision support system with real-time information fusion to illustrate the efficacy of improved situational awareness.

■ TD39

Center-Room K

E-commerce, Supply Chains and Real-Time Fleet Management

Sponsor: Transportation Science Section
Sponsored Session

Chair: Anna Nagurney, University of Massachusetts, Amherst, MA, 01003, nagurney@gbfin.umass.edu

1 — Advisors to Participants in e-Auctions
Teodor Gabriel Crainic, U.Q.A.M., Professor, Montreal, QC , H3C 3P8, Canada, theo@crt.umontreal.ca., Michel Gendreau

Advisors are specialized decision-support systems designed to assist participants in complex negotiation processes involved in the most sophisticated electronic markets, such as simultaneous auctions for multiple items, sequences of sequential auctions, or combinatorial auctions. In this talk, we review the main issues associated with the design and use of advisors. Examples from the field of freight exchanges for full-load motor carriers illustrate the issues and challenges at hand.

2 — Waiting as New Approach for Real-time Vehicle Dispatching
Guntram Noeth, University of Southern California, Wuerzburg, 97084, Germany, guntram_noeth@hotmail.com., Juergen Branke, Maged Dessouky, Martin Middendorf

Real-time vehicle dispatching has gained increasing attention by recent academic research. We introduce a new approach on how transportation service providers can behave to satisfy new customer requests arriving while the vehicles are already on tour . Besides reoptimizing routes and dispatching requests, vehicles can wait at certain locations allowing them to serve dynamically arriving customers at a higher probability. We present some findings of this approach for different routing problems.

3 — Online Transportation Markets Performance Models and Real-Time Fleet Operational Strategies
Miguel Figliozzi, University of Texas at Austin, Austin, TX, 78712, figliozzi@mail.utexas.edu., Hani S. Mahmassani, Patrick Jaillet

Real-time freight transportation marketplaces create a new environment characterized by the repeated interaction of competing carriers. In this presentation, we model and analyze this interaction using a game theoretic framework. NaÔve and sophisticated carriers strategies are developed. Simulation is used to evaluate the impact of carrier strategies, learning, and asymmetries on market equilibrium, profits, and service levels.

4 — A Supply Chain Network Equilibrium Model with Random Demands
June Dong, SUNY at Oswego, Oswego, NY, 13126, dong@oswego .edu., Ding Zhang, Anna Nagurney

We develop a supply chain network model consisting of manufacturers and retailers in which the demands associated with the retail outlets are random. We model the optimizing behavior of the decision-makers and establish the variational inequality formulation of the governing equilibrium conditions along with qualitative properties. Numerical examples are also provided.

■ TD40

Center-Room G

Dynamic Logistics Networks

Contributed Session

Chair: N. Viswanadham, National University of Singapore, Professor, Singapore, SG, 119260, Singapore, mpenv@nus.edu.sg

1 — Measuring System Capacity Flexibility
David J. Chang, University of Pennsylvania, Philadelphia, PA, 19151, U.S.A., djchang@seas.upenn.edu., Edward K. Morlok

The paper develops measures of transportation system flexibility for accommodating changing demands and traffic patterns. Variations of the existing models

MAXCAP and ADDCAP utilizing the concept of reserve capacity are used. Also, the use of stochastic inputs is considered and the effect of routing options is explored.

2 — Design of Adaptive Supply Chain Networks
N. Viswanadham, National University of Singapore, Professor, Singapore, SG, 119260, Singapore, mpenv@nus .edu.sg., Roshan Gaonkar

In this paper, we address the problem of robust supply chain design i.e. selecting the partners such as the suppliers, 3PLs, assemblers etc so that the impact of the occurrence of an exception in terms of cost is minimized. In other words, a supplier with rapid response capabilities to exceptions will be preferred. This way we will be building adaptive capabilities at the planning stage itself.

3 — Continuous Move Routing as a Collaborative Logistics Strategy
James H. Bookbinder, University of Waterloo, Department of Management Sciences, Professor, Waterloo, ON, N2L 3G1, Canada, jbookbinder@uwaterloo.ca., Fatma Gzara

We define continuous move routing as a collaborative logistics strategy used when a community of shippers and carriers coordinate distribution activities using an internet service to improve profitability and performance. We discuss its relevance to the planning of backhauls and how it compares with other logistics strategies such as freight consolidation.

4 — Concurrent Determination of the Block Layout and I/O Point Location Based on Contour Distances
Jae Kim, Georgia Institute of Technology, Post-doctoral fellow, Atlanta, GA, 30332, USA, jgkim@isye.gatech.edu., Marc Goetschalckx

We will present simulated annealing algorithm for the determination of block layouts, where the layout score is based on the (department) contour distance between I/O points. The layout is determined with the sequence-pair algorithm and the I/O point location is determined with a new heuristic. The performance of the algorithm compares favorably with that of a sequential algorithm.

■ TD41

Center-Room M

Modeling Traffic Propagation on Large Networks

Sponsor: Transportation Science Section
Sponsored Session

Chair: Wei-Hua Lin, University of Arizona, Tucson, AZ, 85721-0020

1 — Hybrid Traffic Simulation Model
Jorge A. Laval, University of California at Berkeley, Berkeley, CA, 94720, jlaval@uclink.berkeley.edu., Carlos Daganzo

This paper presents an extension of the cell transmission model that allows for the insertion of moving bottlenecks in a hydrodynamic stream. Moving bottlenecks may be exogenous (their motion in time and space is an input) or endogenous (accelerations are calculated inside the model). Results are shown and applications proposed.

2 — A Hybrid Micro/Mesoscopic Simulation-assignment Model for ITS and Off-line Applications on Large Scale Networks
Athanasios K. Ziliaskopoulos, Northwestern University, Evanston, IL, 60208, USA, a-z@northwestern.edu., Curtis Barrett, Kyriakos Mouskos, Steven Chien

We discuss the deployment of a large-scale assignment based simulation model (called ROUTESIM) on the I-80 Corridor in New Jersey. The simulator propagates traffic microscopically or mesoscopically (based on the cell transmission model). It is used to evaluate Variable Message Signs, TRANSMIT Detectors and other ITS technologies currently under deployment on the corridor . While the use of the model is limited to off-line applications , we will briefly discuss plans for online deployment on the part of the I-80 corridor close to George Washington Bridge.

3 — Characterization of Intersection Delay with Reduced States for Arterial Travel Time Estimation
Wei-Hua Lin, University of Arizona, Tucson, AZ, 85721-0020, Vidyadhar Kulkarni

The proposed method for predicting arterial travel time reduces the continuous delay at intersections into two distinctive states . Delays at multiple intersections are then formulated as a Markov Chain model with their transition matrices determined as a function of arrivals, inflows from side streets, and the arterial signal coordination level.

■ TD42

Fairmont-Belvedere

Market Entry, Competition & Collusion

Contributed Session

Chair: Ted Klastorin, University of Washington, Seattle, WA, 98195, USA, tedk@u.washington.edu

1 — An Integrated Model of Optimal Later Entrant Timing in Dynamic Markets
Jonathan D. Bohlmann, Michigan State University, East Lansing, MI, 48824-1122, USA, bohlmann@msu.edu.

We present an integrated model of later entrant timing that considers improving technology and changes in consumer valuations for various product characteristics. The results indicate conditions under which a later entrant, attempting to overtake an entrenched pioneer, should optimally enter sooner or later given various dynamics in the market.

2 — Cournot Equilibrium with Possibilisitc Market Information
Peijun Guo, Faculty of Economics, Kagawa University, Takamatsu, 760-8523, Japan, guo@ec.kagawa-u.ac.jp.

It seems that Bayes equilibrium is not suitable to analyze the short life-cycle product market. A new Nash equilibrium is proposed where the incomplete market information is characterized by possibility distribution instead of probability distribution and is used to analyze the Cournot-style competition between two firms.

3 — When Buyers Meet In Smoke-filled Rooms
Amy Kallianpur, Michigan State University, East Lansing, MI, 48824, USA, amy.kallianpur.wp99@wharton.upenn.edu.

Economic theory, experimental economists and antitrust scholars have largely ignored the effect of colluding buyers on market outcomes. This research finds that the formation of buying alliances paradoxically tilts the equation in favor of sellers with the evidence still pointing in favor of a regulation-free approach.

■ TD43

Center-Room H

Statistical Estimation

Contributed Session

Chair: Peter W. Glynn, Stanford University, Stanford, CA, USA, glynn@stanford.edu

1 — Clustering Data with Measurement Errors
Mahesh Kumar, MIT, Student, Cambridge, MA, 02139, USA, maheshk@mit.edu., James Orlin, Nitin Patel

We consider the problem of clustering points in a data set when there is measurement error associated with each data point. Using the maximum likelihood principle, we obtain a new objective criterion for clustering that provides a basis for several clustering algorithms; the algorithms are generalizations of the popular k-means and Ward's hierarchical clustering methods. We show the effectiveness of our technique on simulated data, where it outperforms the k-means and Ward's clustering methods.

2 — On the Validity of Steady-State Estimation Methods for Discrete-Event Systems
Peter J. Haas, IBM Almaden Research Center, San Jose, CA, 95120-6099, USA, peterh@almaden.ibm.com., Peter W. Glynn

We give new building block conditions under which a generalized semi-Markov process obeys a functional CLT, so that steady-state estimation methods based on standardized time series are valid. We also show how to employ coupling arguments to establish consistency for a class of 'quadratic-form' estimators of the variance constant in the CLT.

3 — Feature Selection in High-Dimensional Data Mining Problems
Lexin Li, University of Minnesota, Ph.D. candidate, St Paul, MN, 55108, U.S.A., lexinl@stat.umn.edu., Christopher Nachtsheim, Dennis Cook

In high-dimensional regression and data mining problems, feature selection can both significantly improve the prediction accuracy and facilitate the model interpretation. We propose a novel feature selection approach based on sufficient dimension reduction theory. The proposed method does not require parametric model specification, thus applies naturally to any prediction model. It also enjoys computational simplicity, therefore lends itself to large-scale data and real-time applications.

■ TD44

Center-Room B2

Military Applications - Contributed Papers S08

Sponsor: Military Applications Society
Sponsored Session

Chair: James Taylor, Naval Postgraduate School, Monterey, CA, 93943, jtaylor@nps.navy.mil

1 — Stochastic Duels with Time-Dependent Hit Probabilities
Yoon G. Hong, School of ISE, Hansung University, Seoul, 136-792, Korea, yhong@hansung.ac.kr.

The consequences of variable hit probabilities in stochastic duels are examined. Outcomes are compared and evaluated under situations of both round and also time dependent hit probabilities. The advantages of round to round improve-

ment or increasing hit probability with time are demonstrated. Examples with different fire allocation strategies are given.

2 — An Approach To The Routing Of Surveillance Aircraft
Karthik Thyagarajan, State University of New York at Buffalo, Graduate Student, Buffalo, NY, 14260, USA, kt25@eng.buffalo.edu., Dr. Rajan Batta, Dr Mark Karwan, Dr. Robert J Szczerba

We provide a framework for the routing of surveillance aircraft from n origins to n destinations and formulate the problem as a combination of the p-dispersion problem and a quadratic semi-assignment problem. A similarity index incorporates time and altitude differences of the aircraft routes. Computational experience is reported.

3 — Decoupling Random Events in JWARS
Paul Price, AT&T Government Solutions, Inc., paul@unitmath.com., Chuck Burdick, Harry Argo

JWARS is a stochastic simulation based on a single random number generator. This single random stream causes events to be artificially coupled. This paper will discuss de-coupling events by the de-coupling the random number generator. We expect this de-coupling will allow JWARS to answer additional analytical questions concerning object interactions.

■ TD45

Center-Room B3

Information Operations: Some New Analytical Tools

Sponsor: Military Applications Society
Sponsored Session

Chair: Phillip Djang, Army Research Laboratory, WSMR, NM, pdjang@psl.nmsu.edu

1 — Interactive Hypothesis Generator to Support Counter-deception in Information Operations (IO) via Formal Concept Analysis (FCA) using Incomplete Data.
Mike Coombs, PSL, NMSU, mcoombs@psl.nmsu.edu., Alex Pogel, Thomas Cook

A major risk to the success of military operations in the 21st century is the failure to recognize and counter a deception. Formal Concept Analysis (FCA), a tool for inducing lattices of concepts and relations from data, augments the expert by providing logical clarity to human understanding of relational data in a visually compelling format. We propose a family of interactive information fusion tools based on FCA for IO counter-deception.

2 — A Dynamic Reflexive Control Model of Terrorist Decision Process
Vladimir Lefebvre, University of California, Irvine, valefebv@uni.edu., Phillip Djang

A new model of nonlinear reflexive control theory is applied to create a dynamic model of the decision making process of a small number of terrorists. A set of coupled discrete nonlinear equations are used to create a time series of the probability of decision towards a particular action. The ethical status and relative degree of fanaticism are key parameters in this model.

■ TD46

Center-Room C3

Decomposition Methods for IP

Contributed Session

Chair: Zeger Degraeve, London Business School, London, NW1 4SA, United Kingdom, zdegraeve@london.edu

1 — The Co-Printing Problem, a Branch-and-Price Procedure
Marc Peeters, CWI, PNA1, The Netherlands, m .peeters@reizigers.ns.nl., Zeger Degraeve

We present the Dantzig-Wolfe reformulation of the problem and derive cutting planes. We outline a heuristic based on the LP-relaxation and develop a branching scheme, prohibiting complex pricing problem modifications. We present some further algorithmic enhancements, such as the implementation of dominance rules. Finally, we discuss computational results.

2 — MAPO: Multiagent Asynchronous Parallel Optimization
Jes˙s M. Vel·squez-Berm˙dez, DecisionWare, Bogot·, Colombia, jvelasquez@decisionware-ltd.com., Ana M. JimÈnez-Montoya

MAPO is a multiagent platform developed using large scale optimization theories (like Benders and Lagrangean Relaxation) in which the system optimality conditions are in the agents individual behavior and in the communication rules between them. MAPO is a new approach for the development of ACE (Agent-Based Computacional Economics) models.

3 — Strong Lower Bounds for the Capacitated Lot Sizing Problem with Set Up Times
Raf Jans, Erasmus University Rotterdam, ERIM - Rotterdam School of Management, The Netherlands, r.jans@fbk.eur.nl., Zeger Degraeve

We apply Dantzig-Wolfe decomposition to the network reformulation of the capacitated lot sizing problem. The demand constraints are the linking constraints and the problem decomposes into subproblems per period, which contain the capacity and setup constraints. Computational results for Lagrange relaxation and column generation algorithms are presented.

4 — A Comparison of Serial and Parallel Approaches to Solving the Generalized Assignment Problem
Robert Nauss, U. of Missouri-St. Louis, Professor, St. Louis, MO, 63121, USA, robert_nauss@umsl.edu.

The generalized assignment problem (GAP) is known to be NP-hard. In this paper we concentrate on optimizing solution approaches for a large collection of difficult GAP problems ranging in size from 1250 to 16000 binary variables. Using a special purpose branch-and-bound algorithm as the main driver, we devise a parallel solution approach and compare it with a standard serial approach. Computational results are presented and ideas for future work are presented.

5 — Cliques Decompositions of Small World Graphs
Ada Suk-Fung NG, Ecole Polytechnique, Postdoctoral Researcher, Palaiseau, fr, 91128, France, ng@lix .polytechnique.fr., Jean-Loup Guillaume, Matthieu Latapy

Many real world graphs (internet graphs, protein graphs...) are small world graphs (SWG): they are large but have small average distance and high clustering coefficient. We noticed that many SWG are obtained by cliques addition. From this, we propose a realistic SWG model by adding cliques with given size distribution and overlapping ratio. We then examine some well known SWG with our cliques decomposition algorithm and cliques addition procedure and show that they are well fitted in our model.

■ TD47

Center-Ballroom A8

Software Demonstration Session 12

Cluster: Software Demonstrations
Invited Session

1 — Duxbury/Thomson Learning — Insight 2.0
Sam L. Savage, Duxbury/Thomson Learning, savage@stanford .edu.

Sam Savage will demonstrate Insight 2.0, an easy to use yet powerful suite of add-ins for Microsoft Excel performing simulation, decision analysis, forecasting, optimization, queuing and Markov chains. New enhancements include Blitzogramô, interactive histograms, permutation tests, tree flipping, graphical interface for decision analysis, combinatorial optimization and more. Educational versions are available and accompany Savage's Decision Making with Insight (Duxbury 2003(c)).

■ TD48

Fairmont-Valley

Managing Hitech Development and Fostering Hitech Entepreneurs

Invited Session

Chair: George K. Chacko, Multimedia University, Faculty of Mangement, Selangor, Malaysia, George.chacko@mmu.edu.my

1 — How We Manage High Technology at Hewlett-Packard Laboratories
Jamie Dinkelacker, Hewlett-Packard Laboratories, Global Collaboration Environments Group, Palo Alto, CA

Technology Management comprises anticipating, acquiring/inventing , adapting and applying high technology. With an extensive background in directing research for results at Apple and Netscape for 8 years before joining HP in 2000 (with significant earlier experiences managing technology startups), Dr. Jamie Dinkelacker will tell us the score on balancing research spirit, market necessities, and organizational realities at HP with 135 ,000 employees in 120 countries.

2 — How We Foster Emerging Hitech Enterprises Around the World
Kailash Joshi, The IndoUS Entrepreneurs (TiE) Silicon Valley, President

As General Manager of IBM Lexington (now Lexmark) in 1989, Dr. Kailash Joshi was responsible for IBM's re-entry into Indiain 1991. Since 1992 he has been active in the not-for-profit entrepreneurial organization TiE, to mentor young entrepreneurs at 40 locations worldwide. TiE was set up by entrepreneurs from India and Pakistan who have created business with an estimated market value of $200 billion. Currently President of TiE Silicon Valley, Dr. Kailash will share with us the problems, prospects and achievements of creating entrepreneurs of tomorrow worldwide.

Wednesday 8:00 - 9:30am

■ WA02

Fairmont-Cupertino

Tutorial: Stochastic Supply Chain

Cluster: Practice Track
Invited Session

Chair: Thomas O'Grady, Florida Atlantic University

1 — A Queuing Network Model for the 5N+1 Warehouse Stochastic Economic Lot Supply Chain Model
Thomas O'Grady, Florida Atlantic University

A stochastic-oriented complex supply chain of large number of warehouses and retailers is modeled utilizing both dynamic and static resupply time limits for mulitnational retailers. This model is more complex than any current supply chain models in the literature as it extends the dynamic and static resupply time limits to 2 through 70 days and the final model adopts CIS, FOB, Demurrage Admiralty Principles to make it a commercially viable alternative for complex supply chain software.

■ WA06

Fairmont-Atherton

Safety Issues

Contributed Session

Chair: Celso Balthazar, Jr., PETROBRAS, MSc Student, Rio de Janeiro, 20000, Brazil, celsobjr@petrobras.com.br

1 — Labor Force Risk Management
Sérgio de Deus, PETROBRAS, MSc Estudent, Rio de Janeiro, RJ, 20000, BRAZIL, sergioddeus@uol.com.br., Ana Lucia T. Seroa da Motta

Preventing accidents is the primary purpose of safety programs, it allows for maintenance of integrity, guaranteeing people's well being and the continuity of operations. A reduction of total costs is a natural consequence of those measured. Preventing accidents, is not only a social and human imperative measure, but also good business. The work access potential risks generated by labour force, through people's behaviour during normal activities and working environmental conditions

2 — Development of Information System for Statutory Railway Accident Inquiries
R. Rajamani, Civil Aviation, Lucknow, India, shashanktyagi1@indiatimes.com., Rajiv Tyagi, Ashotosh Nigam

Commision of Railway Safety, India, inquire into serious train accidents with a view to establish cause and to make recommendations. In-house software has been developed to manage functions and information related to accident inquires. Software has greatly reduced drudgery in work, has improved accuracy in functions and has generated wealth of information which is of great value in inquiring of accidents and in pursuing of recommendations to its logical conclusion.

3 — Positive Feedback as a Motivator Agent in Preventing Accidents
Celso Balthazar, Jr., PETROBRAS, MSc Student, Rio de Janeiro, 20000, Brazil, celsobjr@petrobras.com.br., Ana Lucia T. Seroa da Motta, Paulo Cavaco, Osvaldo Quelhas

This paper presents a discussion about the importance of positive feedback in safety industrial processes. Considered a reward to workers who comply with procedures and best practices in accident prevention, the positive feedback is a tool not frequently used, even by those directly responsible for safety management. Key words: safety, feedback, reward KRAUSE, T R, Employee-driven systems for safe behaviour: integrating behavioural and statistical methodologies. New York: V N Reinhold,1995

■ WA08

Center-Ballroom A2

Issues in Business I

Contributed Session

Chair: Euijin Kim, Morehead State University, Morehead, KY, 40351, USA, e.kim@moreheadstate.edu

1 — What Is the Persona of Your Web Site?
Scarlett Lam, University of California at Berkeley, Ph.D. Candidate, San Jose, CA, 94720, U.S.A., scarlett@haas.berkeley.edu.

We propose a new construct, Web site persona®, to classify Internet sites and evaluate their dimensions using the factor-analytic approach. We develop and test a multi-item psychometric scale across site categories, brands, and users. Results on the validity, reliability, and generalizability of the scale are reported. The antecedents of Web site personas® are discussed. This proposal has won awards from the Marketing Science Institute and e-Business Research Center dissertation competitions.

2 — A Competitiveness Metrics by AHP for an Internet Shopping Mall
Kyu-Seung Whang, Korea University, professor, Seoul, --, 136-701, Korea, kswhang@korea.ac.kr., Min-Seok Kim

Market competitiveness of an Internet shopping mall is identified by three dimensional criteria: general purchasing factors of consumers, Web site performance, and brand effect. These criteria are further divided into 14 factors. Interviews and surveys were conducted with 15 analysts to estimate the importance weight of each factor by AHP (analytic hierarchy method). Product price showed the highest importance and was followed by trustworthiness and delivery service.

3 — Does the Web Site Effectiveness Affect Trust in e-Businesses?
Euijin Kim, Morehead State University, Morehead, KY, 40351, USA, e.kim@moreheadstate.edu.

One of the most important concerns about e-commerce has been trust and many studies in this area have been proposed. To add a valuable understanding to this line of studies, this study provides theoretical and empirical examination about the effect of web site effectiveness on trust in the context of e-commerce.

4 — Implementing Decision Systems With Web Services
Ananth Srinivasan, University of Auckland, Professor, Auckland, New Zealand, ananth@auckland.ac.nz., Schalk Pienaar, David Sundaram

New generations of information technologies enable us to rethink traditional approaches to the implementation of decision systems. In this work, we examine the utility of web services as an important vehicle to address classic issues in decision systems design and implementation. Specifically, we address modularity, design flexibility, distributed decision making and interoperability as key aspects of design and examine how they may be handled with web services technologies.

5 — Exploring the Economic and Environmental Impacts of the New Digital Economy
Ralph Gay, US Military Academy, Asst Professor (LTC), West Point, NY, 10996, USA, fr2425@exmail.usma.army.mil., Daniel Sui, Don Phillips, Bob Davis,

The environmental impacts of the new supply chains and digital economy distribution networks are examined. An integrated modeling framework is developed to categorize and compute disparate entities, material flows and costs throughout a complex system. An integrated Environmental Input Output Life Cycle Assessment model assesses the full direct and indirect impacts of two disparate means of doing business: the new economy and the traditional economy.

■ WA09

Center-Ballroom A3

Logistics & Service in E-Business

Contributed Session

Chair: Felipe Villegas, Manchester University, UK, fvillegas@man.mbs.ac.uk

1 — E-commerce and Service Bundles in Manufacturing Firms — Case SKF's Iniatives Towards Partnerships
Esko Penttinen, Helsinki School of Economics, Ph.D. Student, Helsinki, EU, 00100, Finland, esko .penttinen@hkkk.fi., Timo Saarinen

We analyze partnerships and new competencies required to offer, instead of just high quality products, a bundle of services in relation to e-commerce initiatives. Based on our case study on a major bearing company SKF, we observed that building trust on supplier's competencies and service quality is a necessary condition for success. The main issue in trust building process is to deliver a unique offering and to demonstrate the customer the net benefits in order to win the battle of customership

2 — E-procurement, E-fulfillment and Optimization
Felipe Villegas, Manchester University, UK, fvillegas@man.mbs.ac.uk., Octavio A. Carranza Torres, Juan Pablo Antun, Peter Barrar

The majority of the e-business models fail in the fulfillment of sales promises that hey have done. While some companies have dominated the "front-end" modules through customer-centric focus, some others have invested enormous quantities of time looking for an optimal operational planning and execution for the production and delivering of goods, the "Back end." Just a few of them have been taken the complete approach of an integrated solution for sales and operations together, that is "back end solution," that simultaneous solves the delivering on time and efficient planning process. This paper offers an explanation current technological situation and how to use and plug some of this tools in order to formulate an optimal planning model for business (Consumer package Goods industry) that offer services trough the internet.

3 — Coordination and Decision-Making in an Electronic Marketplace
Karthik Kannan, Carnegie Mellon University, Doctoral Student, Pittsburgh, PA, 15217, USA, kkarthik@cmu.edu., Vidyanand Choudary, Rema Padman, Ashish Arora, Ramayya Krishnan

In a Centralized scheme (CS), the market-maker of a reverse-market exploits the universal information to choose the set of sellers to participate but incurs a huge decision-making cost. In a decentralized scheme (DS), since, sellers independently decide about their participation, it incurs a significantly lower decision-making costs. We study the trade-off between decision-making cost and information due to factors such as correlation in the quality of sellers, marginal costs for the product.

■ WA10

Center-Ballroom A7

Scheduling I

Contributed Session

Chair: Jiyin Liu, Department of Industrial Engineering & Engineering Management, Hong Kong University of Science & Technology, Assistant Professor, Hong Kong, HK, China, jyliu@ust.hk

1 — The Stochastic Single Machine Scheduling Problem with the Minimum Number of Early and Tardy Jobs
Hossein M. Soroush, Kuwait University, Safat, 13060, Kuwait, hsoroush@kuc01.kuniv.edu.kw.

We study a static stochastic single machine scheduling problem in which job processing times and due-dates are random variables, and fixed weights are imposed on the early as well as tardy jobs . The objective is to find a schedule that minimizes the expected total weighted number of early and tardy jobs.

2 — Heuristic for Scheduling Job Shop with Multiple Due Date Constraints
Shrikanth Mysore, University of Alabama, Doctoral student , Tuscaloosa, AL, 35401, USA, smysore@proctr.cba.ua.edu., Krishna Krishnan

A job shop has to cope with demands, product changes, due date constraints and unforeseen delays. This research attempts to develop a heuristic for scheduling job shops with distinct due dates and uses hybrid genetic algorithm to arrive at a good schedule after the heuristic is applied to the problem.

3 — Lot Streaming of Multiple Jobs in m-1 Two-stage Production to Minimise Makespan
Jiyin Liu, Department of Industrial Engineering & Engineering Management, Hong Kong University of Science & Technology, Assistant Professor, Hong Kong, HK, China, jyliu@ust.hk., Changyin Yin

We study the multi-job lot streaming problem in m-1 two-stage production to minimise makespan. We first develop a balanced-workload solution for each job. With the results, an artificial flowshop problem is formulated. Based on sequence by Johnson's algorithm, a heuristic solution to the original problem is then developed and its performance is analysed.

4 — Responsive Production Planning
Pasi Porkka, Helsinki School of Economics, HELSINKI, FIN-00101, FINLAND, porkka@hkkk.fi., Ari P.J. Vepsalainen

Parallel shortening of set up times and production planning periods increase the potential for customization and flexibility achieved in production planning. Our models show that the control of set-ups still yields relevant capacity savings.

■ WA11

Center-Room C1

Capacity, Flexibility and Risk

Contributed Session

Chair: Panos Kouvelis, Washington University, St. Louis, MO, 63130-4899, USA, kouvelis@olin.wustl.edu

1 — On the Interaction of Production and Financial Hedging decisions in global markets
Qing Ding, Washington University, Ph. D student, St. Louis, MO, 63130, USA, dingq@olin.wustl.edu., Panos Kouvelis

We study the interaction of operational and financial hedging policies of risk averse global firms with demand and exchange rate uncertainty. We consider a simple two stage stochastic programming model of a firm producing in its home country and selling to a foreign market. Our analysis, clearly establishes the value of the hedge policies, such as reducing in total risk (as measured by variance of profits), and increasing in the optimal production plan and the value of mean-variance objective.

2 — Interaction Between Resource Flexibility and Pricing
Rawee Suwandechochai, Virginia Tech, Blacksburg, VA, 24061, rsuwande@vt.edu., Ebru Bish, Stephan Biller

We consider a two-product price-setter firm in a monopolistic situation and study the impact of the firm's pricing strategy on the value of resource flexibility.

3 — Resource Investment Decision Under Uncertainty, Considering Flexible Resources
Ebru Bish, Virginia Tech, Assistant Professor, Blacksburg , VA, 24061-0118, USA, ebru@vt.edu., Qiong Wang

We study the resource investment decision faced by a firm that offers two demand-classes (i.e., products, services), while incorporating the firm's pricing strategy into the investment decision. In addition to dedicated resources, the firm can also invest in a more expensive, flexible resource, which can satisfy both demand-classes. Our analysis provides the structure of the firm's optimal investment strategy.

4 — Production Pooling and Pseudo Order Consideration in Available to Promise (ATP)
Maomao Chen, University of Maryland, Ph.D Candidate, Greenbelt, MD, 20770, USA, mchen@mbs.umd.edu., Zhenying Zhao, Mike Ball

A single time period analytical available-to-promise model for n confirmed customer orders and single pseudo order is presented by considering both material constraints and production capacity pooling benefits. The model employs both profit and customer service level as objective function. We proved that the ATP model yields optimal solution if the marginal changing rate of the production cost function is dominated by that of the customer service function.

■ WA13

Center-Room D

Heuristic Programming Methods II

Contributed Session

Chair: Shane Henderson, Cornell University, Assistant Professor, Ithaca, NY, 14853, USA, henderson@orie.cornell.edu

1 — Compressed Annealing: Integrating Penalty Methods and Heuristics
Jeffrey Ohlmann, University of Michigan, PhD Candidate, Ann Arbor, MI, 48109, United States, johlmann@umich.edu., James Bean, Shane Henderson

Introducing pressure (analogous to penalty multipliers), we present a variant of simulated annealing to address optimization problems by relaxing constraints. A theoretical study supplies insight on the behavior of this primal/dual metaheuristic and computational experiments on an equipment replacement problem validate its effectiveness.

2 — A Learning Automata Based Approach for Simulation-Based Optimization
Abhijit Gosavi, University of Southern Colorado, Pueblo, CO, 81001, USA, gosavi@uscolo.edu.

We present a convergence analysis of a meta-heuristic method called learning automata. The method can be used in simulation-based optimization.

■ WA14

Center-Room E

Capacitated Networks

Contributed Session

Chair: Ana Muriel, University of Massachusetts, Assistant Professor, Amherst, MA, 01003, USA, muriel@ecs.umass.edu

1 — Capacitated Multicommodity Network Flow Problems with Piece-wise Linear Concave Costs
Farhad Munshi, University of Massachusetts, Research Assistant, Amherst, MA, 01003, USA, farhadm@acad.umass .edu., Ana Muriel

We show that the lagrangian relaxation approaches proposed in the literature for the Multicommodity Network Flow Problem with Piece-wise Linear Concave Costs are not effective to solve the capacitated version of the problem. The lower bounds provided by the lagrangian techniques do not improve over the linear programming relaxation, which is found to be rather weak for capacitated problems. We develop a heuristic approach based on properties of the LP relaxation of the capacitated problem.

2 — A Strategic Model of Traffic Assignment on Cyclic Networks
Younes Hamdouch, CRT and Université de Montréal, Montréal , QC, H3T 1J4, CANADA, younes@crt.umontreal.ca., Patrice Marcotte, Sang Nguyen

Traditional traffic assignment models assume that commodity flows are assigned to paths of the underlying network. In contrast with this approach, we advocate the use of strategies for modeling traffic assignment. While this concept has been applied with success on acyclic networks, we show that it can be adapted to cyclic networks involving arcs with rigid capacities. We describe the implementation of a solution algorithm and provide numerical results on test networks.

■ WA15

Center-Room B4

Large Scale Optimization

Contributed Session

Chair: Marina A. Epelman, University of Michigan, Assistant Professor, Ann Arbor, MI, 48109-2117, USA, mepelman@umich.edu

1 — A Fictitious Play Approach to Large-Scale Optimization
Theodore Lambert, University of Michigan, Graduate Student, Ann Arbor, MI, 48109, USA, lambertt@umich.edu., Robert L. Smith, Marina A. Epelman

In this talk I discuss how the game-theoretic tool of fictitious play under identical interests can be used as an optimization heuristic. The fictitious play process essentially decomposes an n-dimensional optimization problem into a series of 1-dimensional optimization problems. I will discuss convergence results and give emperical data demonstrating the power of this new paradigm.

2 — Decomposition-based Algorithms for Large-scale Discrete Optimization
Matthew Galati, Lehigh University, Bethlehem, PA, 18015, USA, magh@lehigh.edu., Ted Ralphs

Decomposition-based algorithms such as Lagrangian relaxation are well-known methods that can be used to develop bounds for discrete optimization problems. We draw connections between these classical approaches and current techniques based on generating strong valid inequalities. We also present a decomposition-based separation algorithm and provide computational results.

■ WA16

Center-Room C4

Integer Programming I

Contributed Session

Chair: Lou Hafer, Simon Fraser University, Burnaby, BC, V5A 1S6, Canada, lou@cs.sfu.ca

1 — A Complete Description of the Scheduling Polytope for Two Activities with Independent Start and Finish Times
Lou Hafer, Simon Fraser University, Burnaby, BC, V5A 1S6, Canada, lou@cs.sfu.ca., Mikhail Bilenky, Alexander Kononov

We analyse the structure of a two-activity, single disjunctive machine scheduling polytope where the duration of the activities is not a known constant. We develop a complete set of facets for the polytope.

2 — A Branch-and-cut Approach for the Weighted Simultaneous Consecutive Ones Problem
Marcus Oswald, Heidelberg, 69120, Germany, Marcus .Oswald@informatik.uni-heidelberg.de., Gerhard Reinelt

A 0/1-matrix has the simultaneous consecutive ones property if its columns and rows can be permutated such that in every row and every column the ones appear consecutively. In this paper we present a branch-and-cut approach for optimizing a given weight function over all these matrices.

3 — A Factor 1/2 Approximation Algorithm for a Class of Stochastic Mixed-Integer Programs
Nan Kong, University of Pittsburgh, Pittsburgh, PA, 15261 , USA, nak11@pitt.edu.

We consider a class of two-stage stochastic mixed-integer programs with nonnegative first-stage objective functions and expected recourse functions. We present a factor 1/2 approximation algorithm. Computational results on real-world and randomly generated problems indicate that actual performance of the approximation algorithm is substantially better.

4 — An Improved Performance Guarantee for the Partial Latin Square Extension Problem
Rommel G. Regis, Cornell University, Ithaca, NY, 14853, USA, rregis@orie.cornell.edu., Carla P. Gomes, David B. Shmoys

Previous work on the Partial Latin Square Extension (PLSE) problem resulted in a 1/2-approximation algorithm based on the relaxation of a 3-dimensional assignment IP formulation. We present a randomized 0.632-approximation algorithm that is based on the relaxation of a packing formulation of the PLSE problem.

■ WA17

Center-Room B1

Configuring Modern Manufacturing Systems

Cluster: Manufacturing Systems
Invited Session

Chair: Manbir Sodhi, University of Rhode Island, Kingston, RI, 02881, USA, sodhi@egr.uri.edu

1 — Measurement and manufacturing configuration
Gerry Frizelle, Cambridge University, UK

It can be demonstrated that Kolmogorov entropy is a natural measure for discrete event input/output systems. Moreover that the resulting complex behaviour of the system shows itself through the formation of queues. These queues are created both through the plant structure (structural complexity)and through the way it operates. This has a number of interesting consequences in terms of looking at configurations. Obviously the more integrated a production line is, the lower will be its structural complexity. However the allocation of products to processes, the actual product mix and the degree of coupling all have an impact of the structural complexity. For example, two plants with an identical product range will have quite different manufacturing configurations if one has 99% of its demand accounted for by a single product while the demand in the second plant is equally distributed between end items. The presentation will develop these ideas and show some of the work that has been done to date.

2 — Production Planning in Flexible Manufacturing Environments
Manbir Sodhi, University of Rhode Island, Kingston, RI, 02881, USA, sodhi@egr.uri.edu.

One of the strategies for meeting demand variability is to install manufacturing capabilities that are economic for producing customized products in varying volume. Flexible manufacturing systems (FMSs), which can be rapidly re-configured to alter manufacturing capabilities, are increasingly being used to respond to such production needs. This versatility of FMSs is achieved, in part, by tool magazines and variable processing speed capability. The challenge in these environments is to get the right materials, including tools, to the right machines at the right time. This talk presents models for determining batch sizes to be assigned to a set of flexible machines as well as the processing speed of each batch so as to minimize the magazine setup and cutting times. Models for single and multiple machines will be presented, along with solution methods and computational results.

3 — Tool Loading on a Flexible Machine with Random Tool Lives
Bernard Lamond, Universite Laval, Professor, Quebec, QC, G1K 7P4, Canada, bernard.lamond@fsa.ulaval.ca., Manbir Sodhi, Martin Noel

This talk reports an investigation of the effect of random tool lives on the total processing time when placing cutting tools in the tool magazine of a flexible machine. Tool magazine loading models from previous studies are used to plan the initial loading . Two types of models for minimizing the makespan are used : (1) deterministic models where the randomness associated with tool lives is disregarded, and stochastic models which assume a random distribution for the tool life. Once the initial loading is determined, random tool lives are generated and the resultant makespan is compared to the makespan expected initially. This study shows that stochastic models estimate the realized makespan with greater precision. It also shows that real time detection using a sensor system for tool wear can significantly reduce production time. An on-line adjustment method that improves productivity by dynamically selecting processing speeds is also described in this talk.

4 — Configuring Flexible Manufacturing Lines
Bhaba Sarker, Louisiana State University, Baton Rouge, LA , 70803, USA, bsarker@lsu.edu.

When a large variety of products are required in small or moderate volumes, flexible flowlines can be effectively utilized for production. In this talk we address the issues of configuring such a flowline, taking into consideration the sequence and processing time requirement for the operations required to complete a job so as to minimize the line length. The line is assumed to be composed of flexible machines, each capable of performing a limited number of operations. The assignment of operations to machines (or magazines), and of machines to locations, taking machine capability and workload balance

■ WA18

Center-Room J2

Nonlinear Programming II

Contributed Session

Chair: Fernando Ordonez, University of Southern California

1 — A Geometric Programming Framework for Univariate Cubic L1 Smoothing Splines
Hao Cheng, North Carolina State University, Raleigh, NC, 27695, U.S.A., hcheng@eos.ncsu.edu., Shu-Cherng Fang, John Lavery

Univariate cubic L1 smoothing splines can provide shape-preserving C1-smooth approximation of multi-scale data. The minimization principle results in a non-differentiable convex optimization problem that can be formulated as a generalized geometric program. In this framework, a geometric dual with a linear objective function over a convex feasible domain is derived, and a linear system for dual to primal conversion is established. Sensitivity analysis for data with uncertainty is presented.

2 — Condition Number Theory for Non-conic Convex Optimization
Fernando Ordonez, University of Southern California, Robert Freund

The Condition Number Theory introduced by Renegar applies to problems in conic form. This is a very general setting since any convex optimization problem

can be transformed into conic form, however these transformations are not necessaraly unique and can modify the natural data structures present in the problem. In this work we develop an extension of Renegar's condition number to problems not in conic form. This extension allows to construct a condition number for problems considering specific data structures that can be present in the problem, for example: upper and lower bounds in LPs, and/or a network structure. We present results that show that also for problems not in conic form the condition number of the problem bounds (i) the size of least-norm feasible solutions of (GP_d), (ii) relative error bounds for (GP_d), (iii) changes in optimal values under perturbation, (iv) the sizes and distances of solutions from the relative boundary of the feasible region, and (v) the complexity of an interior-point algorithm to solve the problem.

3 — An Algorithm to Optimize Portfolio Weights for the First Degree Stochastic Dominance
Choonho Ryu, Department of Business Administration, Hong-ik University, Professor, Seoul, 121-791, Republic of KOREA, ryuch@wow.hongik.ac.kr.

Unlike the mean-variance approach, the stochastic dominance approach is to form a portfolio that first-degree stochastically dominates a predetermined benchmark portfolio, e.g. KOSPI. Analytically defining the first derivative of the objective function, an optimal algorithm was developed to search a set of optimal weights systematically and tested with promising results against Korean and US stock market data sets.

4 — Pseudonormality and Informative Lagrange Multipliers
Asuman Ozdaglar, MIT, Cambridge, MA, 02139, USA, asuman@mit.edu., Dimitri P. Bertsekas

We present a unification of the major constraint qualifications that guarantee the existence of Lagrange multipliers through the notion of constraint pseudonormality. Under convexity assumptions , we extend our analysis to problems that do not necessarily have an optimal solution. We investigate issues related to existence of special type multipliers, called informative multipliers, which provide significant amount of sensitivity information.

5 — The Newton-bracketing Method for Convex Minimization
Yuri Levin, Queen's School of Business, Assistant Professor, Kingston, ON, K7L3N6, Canada, ylevin@business .queensu.ca., Adi Ben-Israel

An iterative method for the minimization of convex functions f, called a Newton-Bracketing (NB) method, is presented. The NB method proceeds by using Newton iterations to improve upper and lower bounds on the minimum value. The NB method is valid for n=1 , and in some cases for n>1 (sufficient conditions given here). The NB method is applied to large-scale Fermat-Weber locations problems.

■ WA19

Fairmont-Regency 2

Power Systems Planning

Contributed Session

Chair: Septoratno Siregar, Institut Teknologi Bandung, Professor, Bandung, WJ, 40132, Indonesia, ss@tm.itb.ac.id

1 — Optimization of Gas Pipeline Network in Indonesian Gas Fields
Septoratno Siregar, Institut Teknologi Bandung, Professor , Bandung, WJ, 40132, Indonesia, ss@tm.itb.ac.id., Satya A. Putra, Daniel Siregar, Edy Soewono, Leksono Mucharam, Anna Wangsadipura, W. T. Udayana

This paper is intended to present a research result on gas pipeline network optimization in Indonesia. The optimizing parameters are pipeline diameter, the objective being to minimize cost. We used real oil fields data as our case studies. We presented some sensitivity analyses by varying flow rates, gas specific gravity and outlet demand pressure.

■ WA21

Fairmont-Glen Ellen

Risk Management

Contributed Session

Chair: Kian Esteghamat, Princeton University, Princeton, NJ, USA, kestegha@princeton.edu

1 — Hedging beyond Duration and Convexity
Jian Chen, Fannie Mae, Washington, DC, 20016, U.S.A., jchen@rhsmith.umd.edu., Michael Fu

Via principal components analysis, we capture over 99.99% of the interest rate yield curve variation in 4 factors. By using the 4 factors in the pricing of arbitrary fixed income securities, we derive PA estimators for the price sensitivities with respect to the factors. Computational results for MBS indicate that using these sensitivity measures in hedging provides far more protection against interest risk exposure than the conventional measures like duration and convexity.

2 — The Impact of "Bad News" on Optimal Investment Strategies
Alex Collomb, Stanford University, Stanford, CA, USA, acollomb@leland.stanford.edu.

We consider a multi-stage portfolio optimization problem with a risky asset class and a risk-free asset where the risky asset is subject to random downside shocks reflecting catastrophic events. The impact that random exogenous shocks have on the optimal investment policy is analyzed. The standard case where the risky asset is assumed to follow a standard geometric Brownian motion is compared to a revised case where random shocks are introduced.

3 — Foreclosure and Timing of Capital Investments
Kian Esteghamat, Princeton University, Princeton, NJ, USA , kestegha@princeton.edu., Wenlong Weng

When should a firm delay a debt-financed investment decision? We analyze the decision to postpone a capital investment for a firm whose operating assets are subject to foreclosure.

4 — Scalable Optimization in B2C Marketing and Risk Management
Amartya Bhattacharjya, Marketswitch Corporation, VP, Product Management, Dulles, VA, 20166, USA, atb@marketswitch.com.

To address large-scale B2C marketing and risk management challenges, Marketswitch has developed a proprietary mathematical constraint-based optimization application that can analyze billions of variables simultaneously to perform optimized decisioning in both batch and real-time modes. Marketswitch software does this by leveraging the power of existing hardware and implementing an intelligent multi-tier architecture. The software is proven to generate performance improvements of 10-100+%.

■ WA24

Hilton-Pacific

Teaching OR/MS Tools

Contributed Session

Chair: Mary E. Kurz, Clemson University, Clemson, SC, 29634-0920, USA, mkurz@clemson.edu

1 — An Intuitive Approach to Hypothesis Testing
Ismael Dambolena, Babson College, Professor, Babson Park, MA, 02457, USA, dambolena@babson.edu., Steven Eriksen, Denise Troxell

There has been a movement in recent years to make the teaching of introductory statistics for business majors more intuitive. We discuss a method of teaching hypothesis testing, using graphs and p-values, that is much more intuitive and less time consuming than the traditional approach followed in most textbooks.

2 — Computer Simulation Technologies in Teaching Queuing Problems.
Mikhail Zaitsev, Institute of Business Studies (IBS-Moscow) at Academy of National Economy, Professor, Deputy Director, Moscow, RF, 119571, Russia, mzaitsev@ibs-m.ru.

The paper presents the experience of teaching Queuing problems with applications in manufacturing and service in Management Decision Methods and Production & Operations Management courses for MBA students in the leading Russian business school. “Arena” simulation software (System Modeling Corporation) is consistently used for illustration of basic concepts of Queuing Theory and Computer Simulation of Waiting Lines as well as for considering more subtle problems from Manufacturing and Service.

3 — What is OR/MS based IE?
Mary E. Kurz, Clemson University, Clemson, SC, 29634-0920 , USA, mkurz@clemson.edu., Michael Leonard, Delbert Kimbler, Anand Gramopadhye, C. McLendon, Sarah Gavin

Faculty at Clemson University’s IE department have been awarded a grant by NSF’s Division of Undergraduate Education supporting development of a new scalable, deployable IE baccalaureate degree . We report on the important first step of determining the tools and modes of OR/MS based IE practice in the future.

4 — GMAT:A Rationale for OR in the Undergraduate Business Curriculum
Edward Baker, University of Miami, Professor, Coral Gables, FL, 33124, US, ebaker@miami.edu.

The GMAT is frequently used as an outcome measure in rating the quality of undergraduate business programs. The quantitative sections of the GMAT assess two areas: data sufficiency and problem solving. Both of these areas are key elements in the operations research process. This paper relates the author's experience in teaching an "old-fashioned" OR elective course to undergraduate business students. Student GMAT performance is also reported.

■ WA25

Center-Room F2

Data Envelopment Analysis I

Contributed Session

Chair: W. W. Cooper, University of Texas at Austin, Austin, TX, 78712, cooperw@mail.utexas.edu

1 — Data Envelopment Analysis Models with Random Inputs and Outputs
Josef Jablonsky, University of Economics, Praha 3, 13 67, Czech Republic, jablon@vse.cz.

The paper formulates DEA models supposing that inputs and outputs are random variables with given continuous probabilistic distributions. Under this assumption the efficiency scores for evaluated production units are random variables. The aim of the paper is to describe the properties of the random efficiency scores by means of simulation experiments.

2 — Identification and Use of Efficient Faces and Facets in DEA
Ole B. Olesen, Dept. of Org. & Mng., University of Southern Denmark, 5230 Odense M, Denmark, ole@sam.sdu.dk., Niels C. Petersen

The paper provides an outline of the use of complete information on the facial structure of a polyhedral empirical production possibility set obtained by DEA for i) the specification of constraints on the virtual multipliers in a cone-ratio model, ii) a characterization of the data generation process, and iii) the estimation of isoquants and relevant elasticities of substitution . It is demonstrated that some of the available (exponential) convex hull algorithms allows for an explicit identification of the facial structure of the possibility set in fairly large DEA data sets.

3 — Using DEA to Identify and Manage Congestion
W. W. Cooper, University of Texas at Austin, Austin, TX, 78712, cooperw@mail.utexas.edu., Patrick Brockett, Honghui Deng, Linda Golden, Timothy Ruefli

A general approach to congestion is provided that includes a use of slack Variables to provide tradeoffs that extends the concepts of marginal rates of transformation and productivity with accompanying advantages in use that are described in this paper.

■ WA27

Center-Room C2

Supply Chain IT Technology

Contributed Session

Chair: Moti Levi, Tulane University, New Orleans, LA, USA, mlevi@tulane.edu

1 — Managing Suppliers in the Presence of Transaction Knowledge Codifiability
Moti Levi, Tualne University, New Orleans, LA, USA, mlevi@tulane.edu.

We present empirical work, based on data collected in a leading Fortune 500 chemical company, examining factors driving supplier management strategy and performance. Transaction knowledge codifiability is highlighted as a key variable in driving both strategy and performance. The data finds support to analytical model presented by Levi at INFORMS 2001.

2 — Pilot Projects and Codifiability
Tom Noe, Tulane University, New Orleans, LA, 70118-5669, usa, tnoe@tulane.edu., Moti Levi

Pilot projects or prototypes are used as a way to learn the transaction, the nature of the supplier, and the buyer's needs. Codifiability is the level at which transaction knowledge can be made explicit. We analyze the nature of contracting for pilot projects under different information and learning scenarios.

■ WA28

Center-Ballroom A1

Pricing Models

Contributed Session

Chair: Liming Liu, Department of Industrial Engineering & Engineering Management, Associate Professor, Hong Kong, China, liulim@ust.hk

1 — Pricing and Leadtime Decisions in a Supply Chain with an Assemble-to-Order Supplier and a Retailer
Xiang Zhu, HKUST, PhD candidate, Hong Kong, China, zhuxiang@ust.hk., Liming Liu

We integrate detailed analysis of inventory and order response time from an operational view with pricing and delivery time decisions from a marketing view for a supply chain with a two-stage supplier, in an assemble-to-order mode, and a single retailer, whose retail price affects the demand rate. The optimal strategy is shown to be the Nash equilibrium of a two-person non-cooperative game.

2 — Optimal Delivery Pricing for Different Demand-Price Elasticity Functions
Akin Emir, University of Florida, Gainesville, FL, 32611, USA, akin@ufl.edu., Joseph P. Geunes

Classical vehicle routing models do not consider how delivery price affects demand for delivery service. We consider the impact of price on delivery-service demand and use route-length approximations to estimate delivery costs. Using a simple model with various price-demand elasticity functions, we determine prices that maximize estimated profit from delivery.

3 — Dynamic Bidding Advisors for Truckload Motor Carriers in Combinatorial Auctions
Tsung-Sheng Chang, Montreal,Quebec, H3S1M8, Canada, ts@crt.umontreal.ca., Michel Gendreau, Teodor Gabriel Crainic

Integrating the load information in e-marketplaces with truckload motor carriers' current operating plans, we create dynamic bidding advisors to help carriers express the huge set of possible bids and, at the same time, identify the feasible combinations of bids to maximize revenues in combinatorial auctions.

4 — Lot Sizing For A Single-Supplier, Multiple-Retailer Supply Chain Under Asymmetric Information
Burcu Baris Keskin, Bogazici University, Istanbul, 80815, Turkey, burcu_baris@hotmail.com., Taner Bilgic

We study a supply chain where a single product is sold to consumers in independent markets.Demand for retailers is known and price sensitive.We assume that the retailers have private information about their cost structure.We investigate the effect of asymmetric information on the supply chain performance in a Stackelberg game under an experimental setting.We show that the perfect contract under full information fails to coordinate the system under asymmetric information.

5 — The Influence of Wholesale Discounts on the Manufacturer's Profitability
ChengFeng Mabel Chou, National University of Singapore, Singapore, 117592, Singapore, bizchoum@nus.edu.sg.

Manufacturers often use wholesale discounts to encourage retailers to order more. We consider the interactions between a manufacturer and a retailer for newsboy products and discuss the influence of wholesale discounts on the manufacturer's profitability when the retailer makes pricing and ordering decisions based on his own interest.

■ WA30

Center-Ballroom A6

Multi-Item Production/Inventory Systems

Contributed Session

Chair: Awi Federgruen, Columbia University, Graduate School of Business, New York, NY, 10027, USA, af7@columbia.edu

1 — Development of an MPS for Optimization of Inventory
Zhonian Wang, Montclair State University, Montclair, NJ , 07093, USA, wangz@mail.montclair.edu., Qiyang Chen, Ruben Xing

In order to optimize the inventory of a manufacturing company, an inventory strategy and model must first be chosen and defined. Several methods, such as lot sizing, work in progress, safety stock, and anticipation inventory, will be compared and prioritized based on certain decision criteria.

2 — Partitioning Heuristics for the Multi-Item Capacitated Lot-Sizing Problem
Joern Meissner, Columbia University, Graduate School of Business, New York, NY, 10027, USA, joe@meiss.com., Awi Federgruen, Michal Tzur

We present two new heuristics for deterministic, multi-item capacitated lot-size problems. These can be implemented to be asymptotically optimal as well as of low polynomial complexity, or to come within any desired relative gap with respect to the optimum. We present an extensive numerical study.

3 — Supply Chain Synchronisation in the Retail Distribution
Rob A.C.M. Broekmeulen, TU Eindhoven, Eindhoven, NB, 5600 MB, The Netherlands, r.a.c.m.broekmeulen@tm.tue.nl.

In this research we examined a concept for the synchronisation of CPG production and distribution. The proposed synchronisation in the retail supply chain is based on the production frequency, the transfer batchsizes and the available shelf space at the retail outlets. We discuss the effects on inventory, transportation and handling.

■ WA31

Center-Room J3

Workshop: Software Tools for Implementing Branch, Cut, and Price Algorithms

Sponsor: Optimization Section-Integer Programming
Sponsored Session

Chair: Ted Ralphs, Lehigh University, Bethlehem, PA, 18015, USA, tkralphs@lehigh.edu

1 — Workshop: Software Tools for Implementing Branch, Cut, and Price Algorithms
Ted Ralphs, Lehigh University, Bethlehem, PA, 18015, USA, tkralphs@lehigh.edu.

Branch, cut and price is a proven, effective technique for solving difficult, large-scale discrete optimization problems. Implementing such algorithms is difficult due to the complexity of simultaneous dynamic generation of variables and constraints. This workshop is aimed towards practitioners and researchers in need of more powerful solution techniques than current commercial software can provide. We will describe how to use the tools available in the COIN-OR repository (www.coin-or.org) to implement a state-of-the-art, parallel BCP algorithm.

■ WA32

Center-Room J4

IT Investments and Valuation

Contributed Session

Chair: Yu-Ming Wang, California State University, Long Beach, Associate Professor, Long Beach, CA, 92620, USA, ymwang@csulb.edu

1 — Linux vs. Windows: A Strategic Valuation Model
Yu-Ming Wang, California State University, Long Beach, Associate Professor, Long Beach, CA, 92620, USA, ymwang@csulb.edu.

Most industry observers agree Linux is not ready to mount a serious challenge to Windows. However, some experts consider Linux a viable alternative that can compete effectively against Windows. This paper presents a valuation model for analyzing the battle between Linux and Windows. In addition to price and technical features, the model considers network effect and the diffusion of unlicensed software. What does it take for Linux to succeed? How would Microsoft respond to the challenge?

2 — Efficiency Model to Analyze Information Technology (IT) Investments of Brazilian Banks
Antonio Carlos Macada, Fundacao Universidade do Rio Grande, Professor, Rio Grande, 96200-200, Brazil, acgmacada@adm.ufrgs.br., Jo„o L. Becker

This work aims at identifying the efficiency of Information Technology (IT) investments on the strategic variables of Brazilian banks. Was employed the Data Envelopment Analysis - CCR technique to evaluate the effectiveness of investment conversion into IT. The set of variables: input - IT investments, expenses with personnel, other clerical expenses and internationalization expenses; output - net income of financial intermediation, revenues from services delivered and from international operations (two stages). The sample data were of the 41 banks' balances (1995 to 1999).

3 — Globalization of Information Technology: India as a Model for Transitional Economies
Sukhdeep Saroya, San Jose State University, San Jose, CA, USA, spsaroya@yahoo.com., Sak Onkvisit, Howard W. Combs

The paper traces the evolution of global sourcing of Information Technology services to countries like India. A SWOT analysis of Indian IT industry provides insight into its competitive advantage. Strategic implications and strategies for Indian IT industry are provided.

4 — A Qualitative and Quantitative approach to analyse IST investments: a Bank empirical approach
Manuel Pereira, Cesur/IST, Prof., 1100 Lisboa, LX, Portugal, mjp@fe.ucp.pt., Luis Tavares

The impacts of IST investments on organizations has a long debate among the scientific OR/MS community. The "productivity paradox" of IST investments (Solow) is nowadays in constant analysis. Some author argue that the methods and data tradicionaly used are not adequate. This presentation will describe a methodology created to include the qualitative side of IST investments in this analysis. The portuguese Bank sector will be the sector used to test this methodology in a five year period.

■ WA33

Hilton-University

Risk Management in Large-Scale System

Contributed Session

Chair: Hilda Blanco, University of Washington, Professor and Chair, Seattle, WA, 98195, USA, hblanco@u.washington.edu

1 — Planning for Resilient Systems
Hilda Blanco, University of Washington, Professor and Chair, Seattle, WA, 98195, USA, hblanco@u.washington.edu.

Terrorism challenges the conventional emergency management paradigm, which is based on knowledge of hazards and estimation of risk. This paper argues that the uncertainty of the threats and of the point of vulnerability, which characterizes terrorism, calls for a new combination of systems-oriented and strategic planning approaches to safeguard our critical infrastructures, which I call resiliency planning. I use a hypothetical model of water system to illustrate the approach.

2 — Terrorism Detection using Distributed Technology and Social Network Analysis
Rahul Bhaskar, Ph.D., California State University, Associate Professor, Fullerton, CA, USA, rbhaskar@fullerton.edu.

Methods of assimilating data and the interconnection of law enforcement data are simplistic compared with today's technology. The ability to interconnect multiple layers of information will undoubtedly increase our ability to detect and deter crimes, especially complex crimes such as terroristic acts. Therefore, it is the goal of this research to design, develop and implement a decision support system to help intelligence analysts in an agency in law enforcement

3 — An Integrated Analytical Hierarchy Process Model for Evaluating Foreign Direct Investment Projects
Philip Huang, Virginia Tech, Professor, Blacksburg, VA, 24061, USA, phhuang@vt.edu., Qing Li

Foreign Direct Investment (FDI) has played a major role in China°¶s phenomenal economic growth. To ensure continual growth, governments need to develop a systematic approach to assess the proposed FDI projects. In this paper, we present a modified Analytical Hierarchy Process that could facilitate the evaluation of a set of FDI projects. To demonstrate this integrated approach , a model is constructed and applied to assess more than 100 FDI projects proposed in China°¶s Tumen River Area.

4 — Hybrid Models in Mining Customer Data
Dan Zhu, Iowa State University, Ames, IA, 50011, USA, dzhu@iastate.edu.

Advance in e-commerce systems has provided financial institutions with tremendous amount of information for CRM. Data mining has surfaced as an excellent tool to help identify good risk customers and avoiding bad ones. In this talk, we investigate various data mining techniques in a bank's customer database to identify the factors that define the optimal techniques to a given credit risk analysis need. We further explore the combination of various models to achieve a better performance.

5 — Application of Simulation to Strategic Planning in an Uncertain World
Scott Kindred, GoldSim Technology Group, Director, Redmond, WA, 98052, USA, skindred@goldsim.com.

Due to uncertainties regarding economic trends, markets, and innovations, it is often difficult to conduct strategic planning in a quantitative manner, and most companies rely on past experience and intuition. Unfortunately, a qualitative approach to decision making is often blind to the inevitability of change and can be influenced by corporate politics and fear. This presentation demonstrates how to overcome these challenges using a simulation approach that explicitly represents uncertainty.

■ WA36

Center-Room F1

Applied Probability I

Contributed Session

Chair: Joshua Levy, University of Minnesota Morris, Assistant Professor, Morris, MN, 56267, USA, levyj@mrs.umn.edu

1 — On the Asymptotic Covariation of the Linear Fractional Stable Difference Process
Joshua Levy, University of Minnesota Morris, Assistant Professor, Morris, MN, 56267, USA, levyj@mrs.umn.edu.

A measure of dependence for any symmetric stationary infinite variance process is covariation. The asymptotic dependence of the process linear fractional stable difference can be analyzed particularly by the rate of convergence of the covariation between components as time increases limitlessly. The rate converges to zero and is a function of the process' stability and self-similarity indices and linearity.

2 — A Generalization of the De Vylder Approximation for the probability of Ruin
Andrei Badescu, University of Western Ontario, Ph.D. student, London, On, N6A 5B7, Canada, andrei_badescu@yahoo.com., David Stanford

The model we present generalizes DeVyder's approach for the probability of ruin in the classical risk model. Through numerical examples we show that our approximation is at least as good de Vylder's, which is always one solution to our methodology . The links between our results and their consequences for the tail of the waiting time in the M/G/1 queue will be explored. We conclude with some ideas for the extension of these results for the case of long tailed claim distributions.

3 — Stability of Data Networks: Stationary and Bursty Models
Hengqing Ye, National Univ of Singapore, Singapore, SG, Singapore, bizyehq@nus.edu.sg., Jihong Ou, Xue-Ming Yuan

We consider a stationary and a bursty connection level communication network model; The former assumes stochastically stationary arrival processes of connections as did in many theoretical studies, while the latter allows more realistic bursty and correlated arrival processes. An interesting result is that the bandwidth allocation policy that maximizes the arctan($\cdot$) utility ensures the stability of the stationary model but {\it not} the bursty model.

■ WA37

Center-Room J1

Stochastic Inventory Models II

Contributed Session

Chair: Suresh P. Sethi, The University of Texas at Dallas, Richardson, TX, 75083, USA, sethi@utdallas.edu

1 — Optimal Policies with Convertible Lead Times
Vedat Taylan Yildiz, University of Massachusetts, Research Assistant, Amherst, MA, 01003, USA, taylan@acad .umass.edu., Guillermo Gallego, Ana Muriel

A retailer facing Poisson demands places orders at a linear cost from a supplier with a fixed lead time l. The retailer has the option of converting (expediting) each order at a certain fixed cost anytime after the order is originally placed. A converted order arrives le < l units of time after it is converted. We show that a threshold base-stock policy is optimal and perform an extensive computational study to evaluate the benefits of expediting and compare the optimal policy vs. myopic ones.

2 — A Periodic Review Inventory Model with Three Delivery Modes and Forecast Updates
Suresh P. Sethi, The University of Texas at Dallas, Richardson, TX, 75083, USA, sethi@utdallas.edu., Ying Huang, Guillermo Gallego, Houmin Yan, Hanqin Zhang

We consider an inventory model with fast, medium and slow modes and demand forecast updates. In each period, the inventory level and demand information are updated, and ordering decisions using each of the three delivery modes are made. Optimal ordering policy is shown to be a modified state-dependent base-stock policy.

3 — Inventory Policy and Exchange Rate Risk Hedging of Multinational Risk-averse Newsvendor
wanshan zhu, University of Michigan, ann arbor, MI, 48109 , U.S, zhuws@umich.edu., Roman KAPUSCINSKI

We examine a Multinational Risk-averse Newsvendor (MRN) facing interrelated exchange risk and demand uncertainty. Both risks are considered jointly. We investigate the optimal inventory policies combined with use of derivatives (futures, forwards, and swaps) to maximize MRN's utility. We show that the optimal policy is a variation of base-stock policy.

4 — A Robust Optimization Approach To Supply Chain Management
Aurelie Thiele, MIT, Cambridge, MA, 02139, USA, aurelie@mit.edu., Dimitris J. Bertsimas

We propose a methodology based on robust linear optimization to address the optimal control problem of supply chains with stochastic demand. We develop an equivalent deterministic, numerically tractable framework with an adjustable level of robustness and derive closed-form expressions for the parameters of the optimal policy when basestock.

5 — To Diversify or Not To Diversify? Hedging Against Yield Uncertainty
Murat Fadiloglu, Bilkent University, Assistant Professor, Ankara, 06533, Turkey, mmurat@bilkent.edu.tr.

A single item inventory model with one retailer and two suppliers is considered. It is assumed that a random function of the lot size is delivered by the suppliers. The cases of binomial yield and stochastically proportional yield are considered and contrasted. The retailer responds to the distinct yield uncertainties of the suppliers by ordering different amounts. The conditions under which diversification between the suppliers is profitable are discussed.

■ WA38

Center-Room N

Rail and Port Applications

Contributed Session

Chair: Yusin Lee, National Cheng Kung University, Tainan, Taiwan, yusin@mail.ncku.edu.tw

1 — Modeling Container Hub Feeder Service on the East Coast of South America
Rogerio Aversa, University of Sao Paulo, Sao Paulo, SP, 05508-900, Brasil, raversa@usp.br., Andre B. Mendes, Ricardo T. Ono

The work intends to present a mixed integer programming model used to locate the Hub Port on the East Coast of South America from a set of ports that responds to the flow demand using container shipping among Brazilian, Argentinean and Uruguayan ports throughout world ports, in order to minimize the total cost operation for CHFS, including tax and fee ports and other related costs from ship owner point of view.

2 — A Network Based Model for the Container Pre-Marshalling Problem
Yusin Lee, National Cheng Kung University, Tainan, Taiwan , yusin@mail.ncku.edu.tw., Nai-Yun Hsu

Pre-marshalling containers stored in a high-stacked yard before the ship becomes available significantly improves the efficiency in the loading process that follows. This paper develops a network flow based mathematical model to minimize the number of container movements in the pre-marshalling process. The model can be solved to optimum.

3 — Dockside Crane Efficiency for Terminal Systems Inc.
Zhiwei Zhou, UBC COE, Graduate Student, Vancouver, BC, V6T1Z2, Canada, azhou@coe.ubc.ca., Mehmet Begen, Maurice Queyranne, Justin Wong

TSI operates the Vanterm and Deltaport container terminals. The goal of this study is to quantify the potential productivity gains that could be realized if the tractor/trailers currently used in the Vanterm operations are replaced with straddles. Two discrete-event simulation models were developed to find the optimal number of transporters. Efficiency potential for straddles have been proved and quantified. TSI will now use this information to evaluate the proposed changes.

■ WA39

Center-Room K

Vehicle Routing II

Contributed Session

Chair: Kamlesh Mathur, Case Western Reserve University, Associate Professor of, Operations, Cleveland, OH, 44106-7235, USA, kxm6@po.cwru.edu

1 — Combined Routing and Product Take-Back Strategies in Reverse Logistics
Kamlesh Mathur, Case Western Reserve University, Associate Professor of Operations, Cleveland, OH, 44106-7235, USA, kxm6@po.cwru.edu., Ronald Ballou, Ahmad Alshamrani

Recovering parts of previously shipped products to customers results in a reverse flow of items from customers upstream to producers. We study utilizing the vehicles that deliver products to customers to pick up the recovered items under a multi-period planning horizon and uncertain future customer demand. For a given vehicle route, optimal and heuristic pickup policies are presented. A heuristic algorithm for jointly determining the vehicle route and associated pick-up policy is also proposed.

2 — A Stabilized Cutting Plane Algorithm for the Vehicle Routing Problem with Time Windows
Brian Kallehauge, Centre for Traffic and Transport, Technical University of Denmark, Kgs. Lyngby, DK, 2800, Denmark, bk@ctt.dtu.dk., Jesper Larsen, Oli B.G. Madsen, Kaj Madsen

We present an exact algorithm for the VRPTW based on Lagrangian relaxation (LR). The LR splits the VRPTW into a non-smooth Lagrangian dual (LD) problem and a constrained shortest path subproblem. The LD problem is solved using a cutting-plane (CP) algorithm but we add bounds on the Lagrangian multipliers to handle the well-known instability issues of cutting-planes. We have embedded the stabilized CP algorithm in the branch-and-cut system ABACUS and present experimental results.

3 — Calculating Shortest Path with Realistic Restrictions on Road Networks
Rene Jorgensen, CTT, Ph.D.-student, Kgs. Lyngby, DK, 2800 , Denmark, rmj@ctt.dtu.dk.

An improved way of calculating shortest path on road networks using the algorithm ML-Thresh-X2 is presented. Results are impressive with regards to CPU time, and a new network structure promises improved results when considering road restrictions. Instead of working with nodes, all information about the network is stored in the arcs. The algorithm performs very promising with regards to future practical use, with computational time up to 60 times less than a Dijkstra heap implementation.

4 — Vehicle Routing Problem with Time Windows and Stochastic Travel Times
Jacky C..F. Wong, The Chinese University of Hong Kong, Student, Shatin, NT, Hong Kong, cfwong@se.cuhk.edu.hk., Janny Leung, C.H. Cheng

We consider a special version of the vehicle routing problem with time windows where the travel times between any two nodes are discrete stochastic variables, formulated as a 2-stage stochastic integer program. An exact branch-and-cut algorithm and some heuristics are proposed to solve the problem.

5 — Solving The Infinite Planning Horizon Vehicle Routing Problem
Tal Raviv, Technion. Haifa, Israel, Haifa, 32000, Israel,

talraviv@tx.technion.ac.il., Michal Penn

We study the multi-depot vehicle routing problem with constant demand for transportation and infinite planning horizon. We present an algorithm to obtain an optimal routing for the case when only variable costs are taken into consideration and an additive approximation algorithm for the more general case when fixed and variable costs are both taken into account. A bound on the amount of safety stock needed to implement our routing rule is introduced.

■ WA40

Center-Room G

Logistics Decision Support Systems

Contributed Session

Chair: Grisselle Centeno, University of South Florida, Assistant Professor, Tampa, FL, 33620, USA, gcenteno@eng.usf.edu

1 — Case Study of Collaborative Logistics Process Modeling using UMM

Sang-yong Park, Electronics and Telecommunications Research Institute, Member of Engineering Staff, Daejeon, CN, 305-350, Republic of Korea, gspeed@etri.re.kr., Jung-woon Yoo, Insoo Kim

The advent of e-business standard made it easy for logistics industry to collaborate with their customer. However research on the business process for collaborative logistics has been insufficient so far. Therefore, this paper focuses on the business process modeling to standardize the collaborative logistics process using UMM as a modeling methodology. As a result this research can optimize the collaborative logistics process and follows the international standard like ebXML.

2 — Logistics System modeling for a Fertilizer Company

Grisselle Centeno, University of South Florida, Assistant Professor, Tampa, FL, 33620, USA, gcenteno@eng.usf.edu., Alejandro Carbo

The logistics system of a Fertilizer Company is modeled using ARENAÆ. It takes into consideration physical installations and resources such as: transportation bands, ships, raw material, bulk warehouses, tank-farms, roads and trucks. The objective is to evaluate the existing material handling system and to compare it to a series of proposals, such that non-destructive assessment can be made and economical and feasible conclusions can be achieved.

3 — Supply Chain Multi-objective Simulation Optimization

Mahmut Ali Gokce, Atrium Windows and Doors, Planning & Scheduling Cons., Raleigh, NC, 27606, USA, magokce@unity .ncsu.edu., Michael G. Kay, Deepak Gupta, Russell E. King, Jeffery A Joines

Poor decisions of product and raw material ordering can lead to huge inventories that are costly or to insufficient inventory ,which can lead to the inability to meet customer demand.We address optimizing these sourcing decisions within a supply chain to determine robust solutions.The deficiencies in the traditionally used supply chain performance measures are discussed and a new multi-objective GA methodology utilizing an existing supply chain simulator is developed to overcome these limitations

■ WA42

Fairmont-Belvedere

Learning and Production Introduction

Contributed Session

Chair: Ram Bala, UCLA, Doctoral Student, Los Angeles, CA, 90095-1481, United, States of America, ram.bala@anderson.ucla.edu

1 — Optimal Temporal Product Introduction Strategies Under Valuation Changes and Learning

Suman Mallik, University Of Illinois at Urbana-Champaign, Champaign, IL, 61820, USA, mallik@uiuc.edu., Dilip Chhajed

Firms often introduce differentiated products for the premium and the basic consumer segments. In doing so a firm needs to answer one or more of the following questions. Should a company introduce a high-end premium product before a basic product or the vice-versa? Should it introduce two products simultaneously? When is it optimal to have only a single product? Using a two-period stylized economic model we seek to answer each these questions.

2 — Pricing and Market Segmentation for Upgradeable Software Products

Ram Bala, UCLA, Doctoral Student, Los Angeles, CA, 90095-1481, United States of America, ram.bala@anderson .ucla.edu., Scott Carr

A monopolist software producer who introduces upgrades at a rapid pace has to decide on how to price upgrades given that customers can look ahead and balk from buying an earlier version. The producer offers special upgrade pricing to old customers. The level of product improvement is used as a tool to segment the market. We identify conditions for which special upgrade pricing is optimal and also conditions when different versions can be treated as independent products.

3 — Supply Chain Planning for New Product Development

Roshan Gaonkar, The Logistics Institute - Asia Pacific, Research Engineer, Singapore, SG, 119260, Singapore, tlirsg@nus.edu.sg., N. Viswanadham

The design and planning of supply chain networks supporting multiple product generations overlapping with each other is of critical importance in the high-tech industry. In this presentation, we develop a mixed integer-programming model for integrated planning across the supply chain and show how such a model may be used for making decisions related to introduction and rollovers of finished products and components from one generation to another.

■ WA43

Center-Room H

Neural Networks

Contributed Session

Chair: John Kros, East Carolina University, Assistant Professor of Decision, Sciences, Greenville, NC, 27858, U.S.A., krosj@mail.ecu.edu

1 — Impact of Missing Data & Transfer Function Type in the Data Mining Process

John Kros, East Carolina University, Assistant Professor of Decision Sciences, Greenville, NC, 27858, U.S.A., krosj@mail.ecu.edu., Marvin Brown, Chien-Hua(Mike) Lin

We test the impact of missing data on the Neural Network Transfer Function type in the Data Mining process. Most commercial data mining software packages incorporate Neural Networks. Various types of Transfer Functions are investigated and compared in this work (e.g., Linear, s-Sigmoid, and Hyperbolic Tangent).

2 — Model-free actor-critic neural learning with Cohen-Grossberg node dynamics in non-Markovian domains

Eiji Mizutani, Tsing Hua University, Graduate Student, Hsinchu, TW, 300, Taiwan R.O.C., eiji@wayne.cs.nthu.edu .tw., Stuart Dreyfus

We describe how multi-stage non-Markovian decision problems can be solved in a totally model-free fashion using actor-critic reinforcement learning by assuming that a discrete version of Cohen-Grossberg node dynamics describes the node-activation computations of a neural network. This is, in spirit, a neuro-dynamic programming approach.

■ WA46

Center-Room C3

Integer Programming Applications

Contributed Session

Chair: Erwin Kalvelagen, GAMS Development Corp, Washington, DC, USA, erwin@gams.com

1 — A Method to Minimize Cellular Telecommunication Network Expansion Cost

JOON-YEOUL OH, NEW MEXICO STATE UNIVERSITY, LAS CRUCES, NM, U.S.A., jooh@nmsu.edu.

The installation of new cells is one method to give better service to users in wireless telecommunication network. The installation of new hubs may reduce total connection costs. This paper presents a method to minimize the total installation and connection costs. This minimization determines whether new hubs are needed or not. If new hubs are needed, it selects the best from candidate locations. This problem is known as an np-hard problem.

2 — On Solving The Progressive Party Problem as a MIP

Erwin Kalvelagen, GAMS Development Corp, Washington, DC, USA, erwin@gams.com.

The `Progressive Party Problem' has long been considered a problem intractable for MIP solvers. Fortunately, there has been progress in the MIP arena: we can solve now larger and more difficult problems than ever before. In this paper we will show that we can solve the problem formulated as a large MIP, that can be solved on a PC using standard software. A simple myopic heuristic is also implemented and can solve the problem in a fraction of the time.

3 — An Heuristic Procedure for Minimizing the Number of Lasts in Shoe Manufacturing

Denis Borenstein, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, 90010-460, Brazil, denisb@adm .ufrgs.br., Jo„o L. Becker, Marcia J.H. Rehfeldt

An heuristic procedure is developed for minimizing the number of shoe lasts in an assembly line. The heuristic is capable of obtaining near-optimal solutions, with a considerable reduction in computational effort. The heuristic was compared with human schedulers, decreasing the number of lasts in average 23.4%.

4 — Classification and Regression via Integer Optimization

Romy Shioda, Massachusetts Institute of Technology, Cambridge, MA, 02139, USA, romy@mit.edu., Dimitris J. Bertsimas

We intoduce CRIO (Classification and Regression via Integer Optimization) which separates data points in different polyhedral regions to solve classification and regression problems. In classification each region is assigned a class, while in regression each region has its own distinct regression coefficients. Computational experimentation with real data sets shows that CRIO is comparable to and often outperforms the current leading methods in classification and regression.

5 — Equipment Scheduling in High Volume Factories
xinhui zhang, Opearations Research Program, Austin, TX, 78712, USA, xinhui.zhang@mail.utexas.edu., Jonathan F. Bard

A multiple criteria optimization model is presented to solve an equipment scheduling problem at facilities that process large volumes of raw material per day. The focus is on mail distribution centers where the timely dispatch of product must be balanced against annual staffing costs. Computational results are presented.

Wednesday 10:00 - 11:30am

■ WB06

Fairmont-Atherton

Organizational Theory II

Contributed Session

Chair: Scott Rockart, Duke University, Assistant Professor, Durham, NC, 27708, USA, srockart@duke.edu

1 — Organizational Form, Environmental Volatility, and Market Entry in the Telecommunications Market
Glen Dowell, University of Notre Dame, Assistant Professor, Notre Dame, IN, 46556, U.S.A., gdowell@nd.edu., Brad Killaly

We draw upon ecological description of "r" and "k" strategist firms to explore the expansion behavior of U.S. international telecommunications service firms since 1985. We examine the extent to which firms' foreign market entry decisions are influenced by the uncertainty of market demand, the cost of the market expansion and the interaction between the two. We test our hypotheses by examining all of the foreign market entries of U.S. telecommunications service firms from 1984 until 2000.

2 — Status Hierarchies and Competition in Professional Services Industries
Scott Rockart, Duke University, Assistant Professor, Durham, NC, 27708, USA, srockart@duke.edu.

A variety of explanations have been given for the existence of status hierarchies in professional services industries. This paper examines leading explanations in light of industry data and uses a formal model to investigate the implications of one explanation.

■ WB10

Center-Ballroom A7

Semiconductor Scheduling

Contributed Session

Chair: Yuehwern Yih, Purdue University, West Lafayette, IN, 47907, USA, yih@purdue.edu

1 — Selection of Real Time Dispatching Strategy for Semiconductor Wafer Fabrication Systems
Yuehwern Yih, Purdue University, West Lafayette, IN, 47907, USA, yih@purdue.edu., Hyeung-Sik Min

Semiconductor wafer fabrication is one of the most complex and capital intense manufacturing processes. There are two type of dispatching strategies in this system: a vehicle-initiated dispatching policy and a machine-initiated dispatching policy. Both policies significantly affect the system performance. This paper presents a framework to develop a real time controller for selecting dispatching strategy to achieve desired multiple performance measures under various system scenarios.

2 — Dispatching rules (Batching in advance and feeding constantly) and Due-date Trick in Semiconductor
Myoungsoo Ham, Texas Instruments, Lake Dallas, Tx, 75065, USA, msham@ti.com.

I present two dispatching rules and one due-date management method. First dispatching rule is about the batching which tries to make a full batch in advance. Second rule is to feed the constraint tool constantly. This rule calculates the lot arrival for next 48 hours and searches any hungry time for the tool and fill out the time. Last presentation is about the due-date management method. How about exchanging the due-date of two different lots: one is early and the other is late?

3 — Scheduling Burn-in Ovens under Multi Resource Constraints using Short-term Production Targets
Payman Jula, University of california at berkeley, Researcher, Berkeley, CA, 94720-1777, USA, payman@ieor .berkeley.edu., Robert C. Leachman

Two mathematical programming based algorithms and two heuristics are proposed for short-term scheduling of burn-in ovens in back-end semiconductor manufacturing. The methods strive to achieve short-term production targets subject to constraints for availability and compatibility of multiple resources. Performance of the methods is analyzed and conclusions are drawn.

4 — Use of Scheduling Heuristics in the Context of Supply Chains
Katariina Kemppainen, Helsinki School of Economics, Helsinki, FI, 00101, Finland, kakemppa@hkkk.fi., Ari P.J. Vepsalainen

The requirements for using priority rules over inter-organizational links include common task structures, availability of shared data, and reliance on commensurate performance criteria. From this vantage point the current research seems to exploit problem anomalies rather than building efficient coordination principles.

■ WB14

Center-Room E

Linear Programming Algorithms

Contributed Session

Chair: Rua-Huan Tsaih, Dept. of MIS, National Chengchi Univ., Professor, Taipei, Ta, 116, Taiwan, R.O.C., tsaih@mis.nccu.edu.tw

1 — A Face-Point Based Algorithm for Linear Programming Problems
Rua-Huan Tsaih, Dept. of MIS, National Chengchi Univ., Professor, Taipei, Ta, 116, Taiwan, R.O.C., tsaih@mis .nccu.edu.tw.

We present a face-point based algorithm that releases a sequence of face feasible solutions. A face feasible solution is a feasible solution on a face that is an intersection of the feasible region with a supporting hyperplane. The proposed algorithm develops a series of ever-improving approximating linear programming problems, whose set of optimal solutions is the same as the one of the original problem, but feasible regions are reduced iteratively.

■ WB15

Center-Room B4

Traveling Salesman and Related Problems

Contributed Session

Chair: Fred Glover, University of Colorado, Boulder, CO, 80309-0419, USA, fred.glover@colorado.edu

1 — Analysis on the Implementation of the Stem-and-Cycle Ejection Chain Method for the Asymmetric TSP
Dorabela Gamboa, Escola Superior de Tecnologia e Gest„o de Felgueiras, Felgueiras, PT, 4610-156, Portugal, dgamboa@oninet.pt., Cesar Rego, Fred Glover

We describe the implementation of an effective Stem-and-Cycle ejection chain method for the Asymmetric TSP. We report computational findings that show the impact of several algorithmic components which are critical for performance.

2 — A Methodology for Solving the Rural Postman Problem
George Wang, GW, Fremont, CA, USA, georgemw21@hotmail.com .

This paper presents a methodology for solving the rural postman problem (RPP). The methodology formulates the RPP as an "ultra-network". Then, solving the RPP is equivalent to computing a shortest path in the ultra-network. Thus, any method for computing a shortest path in a cyclic network can be used for obtaining an optimal solution for the RPP.

3 — The "Satellite" Data Structure for the Traveling Salesman Problem
Colin Osterman, University of Mississippi, Graduate Student, University, MS, 38677, USA, cjosterm@olemiss.edu, Cesar Rego

The problem of data representation is crucial to the efficiency of heuristic search algorithms for the traveling salesman problem (TSP). We propose a new data structure for representing a TSP tour, with associated solution strategies, and present computational results on standard benchmark problems from the DIMACS TSP Challenge.

■ WB16

Center-Room C4

Integer Programming II

Contributed Session

Chair: Guvenc Sahin, University of Florida, PhD Student, Gainesville, FL, 32608, USA, guvencs@ufl.edu

1 — Accelerating Integer Programming Algorithms Based on Condition Information
Jorge Vera, Catholic University of Chile, Professor, SANTAIGO, CHILE, jvera@ing.puc.cl., IVAN DERPICH

It is well known that some variable selection rules can have an effect on the running time of Branch and Bound algorithms for integer programming. In this work we present some rules which are based on the geometry of the linear relaxation of the problem and some condition measures of the corresponding polyhedron. We also use some measures based on the "integer width" of the polyhedron. We present some conceptual analysis as well as preliminary computational results.

2 — Solution Approaches for the Two-Level P-Median Problem
Guvenc Sahin, University of Florida, PhD Student, Gainesville, FL, 32608, USA, guvencs@ufl.edu., Haldun Sural

We examine the two-level p-median location problem, which is difficult to solve in a reasonable time. For the exact solution, we develop alternative mathematical models comparable with each other. For the approximate solutions, we present three classes of heuristics: LP-based, p-median based, and p-center based. Each class comprises of several variants. The models and the heuristics are tested. Promising methods are applied to a (real-life) problem of the Turkish Red Crescent.

3 — Approaches to Generating Facets of Master Cyclic Group Polyhedra
Lisa Evans, University of Minnesota, Postdoctoral Associate, Minneapolis, MN, 55455, US, evans@ima.umn.edu., Ellis Johnson

Facets of master cyclic group polyhedra may be used to generate cutting planes for general IP's. We present a computationally intensive algorithm that generates all facets for small polyhedra , and two faster algorithms that generate a subset of facets for any sized master polyhedron. We propose that the subsets of facets generated by these faster algorithms compose a large portion of the surface of the master polyhedra.

4 — A GRASP with Path Relinking for the Quadratic Assignment Problem
Carlos A.S. Oliveira, University of Florida, PhD Student, Gainesville, FL, 32601, USA, oliveira@ufl.edu., Mauricio G.C. Resende, Panos M. Pardalos

The Quadratic Assignment Problem (QAP) is a NP-Hard problem with many applications in engineering, including scheduling, VLSI design and manufacturing. We propose a GRASP (Greedy Randomized Adaptive Search Procedure) with Path Relinking to improve the current methauristic solutions to this problem. We discuss how Path Relinking can be implemented in an effective way. Extensive experiments performed on instances from the QAP library are presented and analysed.

5 — Novel Approaches to Maximum Clique and Related Problems
Sergei Butenko, University of Florida, Ph.D. Candidate, Gainesville, FL, 32611, USA, butenko@ufl.edu., Panos Pardalos

Given a simple undirected graph, the maximum clique problem is to find its largest complete subgraph. This NP-hard problem has many practical applications, including information retrieval, signal transmission analysis, drug design, and classification theory among others. In this talk we will report several recently developed heuristics for the maximum clique and related combinatorial optimization problems.

■ WB25

Center-Room F2

DEA Applications

Contributed Session

Chair: Donna Retzlaff-Roberts, The University of Memphis, Associate Professor, Memphis, TN, 38152, USA, retzlaff@memphis.edu

1 — Improving Efficiency in the Service Sector: A Case Study
Trishit Bandyopadhyay, Goa Institute of Management, Ribandar, 403006, India, tbandyo@yahoo.co.in.

To improve service-sector efficiency one needs first to measure it, then target-setting through benchmarking, and moving towards the target. DEA has been applied to STDC, India, and it reveals the presence of relative inefficiencies in the various hotels of STDC,- calling for a more vigorous demand management action in the absence of retrenchment.

2 — Designing Quality and Performance Improvement in Large Service Organizations: A DEA Case Study
Alexandra Medina-Borja, Virginia Tech/ ARC, Senior Research Associate, Falls church, VA, 22046, USA, nmedina@vt.edu., Kostas Triantis, Kalyan Pasupathy

Service organizations are challenged while designing quality management systems with performance dimensions of intangible nature. Once collected, they need to interpret multi-dimensional results and come up with quality improvement strategies. We present the development of a performance management system at a large social service organization with hundreds of field offices. The methodology of Data Envelopment Analysis is used for benchmarking and identification of specific goals or targets.

3 — An International Comparison of Health Care Using DEA
Donna Retzlaff-Roberts, The University of Memphis, Associate Professor, Memphis, TN, 38152, USA, retzlaff@memphis.edu., Cyril Chang, Rose Rubin

Our paper applies Data Envelopment Analysis to OECD Health Data to analyze technical efficiency in producing health outcomes. The data reveal that some countries achieve relative efficiency advantages, including those with good health outcomes and those with modest health outcomes. We conclude that the USA may learn from countries more economical in their allocation of healthcare resources

4 — Determining US Commercial Airport Efficiencies using Data Envelopment Analysis
Massoud Bazargan, Embry - Riddle Aeronautical Univ., Associate Prof., Daytona Beach, FL, 32114, USA, bazargam@erau.edu., Bijan Vasigh

In this paper, we compiled detailed information on 45 US commercial airports (the top fifteen large, medium, and small hub airports). We use both financial and operational data. In this paper, initially we adopt DEA to analyze the efficiency and performance measures of airports within each group by comparing and cross-referencing them with each other. We then extend our analysis to identify those airports that are not efficient and thus dominated by others airports that are more efficient.

■ WB27

Center-Room C2

Supply Chain Information Systems

Contributed Session

Chair: Dae Ryong Kim, Delaware State University, Dover, DE, 19901, U.S.A., dkim@dsc.edu

1 — The Development of a Causal Model on the Factors Affecting EDI Systems' Effectiveness
Dae Ryong Kim, Delaware State University, Dover, DE, 19901, U.S.A., dkim@dsc.edu., Byung Gon Kim, Soon Chang Park

There has been a stream of research on identifying benefits of Electronic Data Interchange (EDI) systems during the last decades . However, exploring possible relationships among the factors that affect the effectiveness of EDI systems has been largely ignored and not been adequately examined. Few studies empirically investigated such relationships among the factors affecting EDI systems' effectiveness although a limited number of studies theoretically proposed the possible causal relationships among the factors affecting EDI systems' effectiveness.

2 — Cooperative Information System Architecture For Small & Medium Enterprises (SME's)
Milind K. Sharma, J N V University,Jodhpur, Jodhpur, 342011, India, milindksharma@rediffmail.com., Rajat Bhagwat

Though today's SME's have enough potential to produce the quality products and supply at competitive prices in the international market but in the absence of proper information infrastructure they don't get sufficient economic returns and mediators take undue advantages for which the SME's are deserving candidates. In this paper an attempt is made to propose cooperation based Information System Architecture in the Information Age.

3 — Which EDI Transaction Sets are Required in the Supply Chain?
Andru M. Peters, San Jose State University, San Jose, CA, 95132, USA, peters_a@cob.sjsu.edu.

Discussed will be the various electronic commerce trading documents that can be traded between buyer & seller in the Supply Chain Marketing channels. The trading document implementation sequence will be identified which will support the JIT, FRM, QR, SCM & cross dock business

■ WB28

Center-Ballroom A1

Assembly System Design and Operation

Contributed Session

Chair: Wallace J. Hopp, Northwestern University, Professor, Evanston, IL, 60208-3119, USA, hopp@nwu.edu

1 — Semiconductor Supply Disruption Analysis: Build-to-Order Versus Build-to-Forecast PC Producers
Ioannis S. Papadakis, Drexel University, LeBow College of Business, Philadelphia, PA, 19104, USA, isp@drexel.edu.

Operations risk management study for PC manufacturers, using model of competition between BTO and BTF assuming falling PC component prices (Moore's Law). BTF needs to smooth out disruptions but significantly for relative disruption impact to BTO to be sizably negative. Also, closed formulas developed for BTO supply postponement option.

2 — Serial Agile Production Systems with Automation
Biying Shou, Northwestern University, Ph.D student, Evanston, IL, 60208, U.S.A, b-shou@northwestern.edu., Seyed Iravani, Wallace J. Hopp

To gain insights into design and control of manufacturing cells with automation, we study simple models of serial production systems where one flexible worker attends a set of automated stations. We (a) characterize the operational benefits of automation, (b) determine the most desirable placement of automation within a line, and (c) investigate how best to allocate labor dynamically in a line with manual and automatic equipment.

3 — A Nested Branch & Price Model for Prescribing the Optimal Design of a Circuit Card Assembly Factory
Deepak Warrier, Texas A&M University, Graduate Student, College Station, TX, 77843, USA, deepakwarrier@hotmail .com., Wilbert Wilhelm

To design a circuit card assembly factory (CCAF) one must prescribe a set of assembly lines with sufficient capacity and capability to assemble a required set of circuit-card (CC) types. This paper develops a model for the CCAF problem and a Nested Branch and Price (B&P) approach to solve it. The objective of the base case is to minimize the overall cost. A further development deals with balancing assigned workloads. Computational results contribute to the evolution of nested B&P methodology.

■ WB30

Center-Ballroom A6

Organizational Issues in SCM

Contributed Session

Chair: Ari P.J. Vepsalainen, Helsinki School of Economics, Helsinki, FI, 00101, Finland, vepsalai@hkkk.fi

1 — A Case-Based Assessment Framework for Supply Chain Integration
Jay Sankaran, U. of Auckland, Associate Professor, Auckland, NZ, New Zealand, j.sankaran@auckland.ac.nz., John Campbell

We present a framework for assessing supply chain integration that we have induced, through rigorous analysis of qualitative data, from case studies of leading-edge organizations. The framework is intended for organizations to progressively identify and realize opportunities for enhancing the integration of their supply chains.

2 — What to Expect from Future Supply Chains
Ari P.J. Vepsalainen, Helsinki School of Economics, Helsinki, FI, 00101, Finland, vepsalai@hkkk.fi., Katariina Kemppainen

A focused survey of SCM practices in industrial companies traces the development of supply chains and supporting IT solutions over two decades. While major changes anticipated in the literature ñ customer focus, process management, outsourcing, and partnerships ñ appear still in the formative stages, interesting new network structures are already in place.

■ WB36

Center-Room F1

Queueing II

Contributed Session

Chair: Apostolos Burnetas, Case Western Reserve University, Associate Professor, Cleveland, OH, 44106, USA, AtB4@po.cwru.edu

1 — Back-Up Service Facilities in Queueing Systems
Jeff Griffiths, Cardiff University, Professor, Cardiff, Gl, CF24 4YH, Wales, UK, griffiths@cardiff.ac.uk.

The provision of back-up service facilities is commonplace in many queueing systems, especially in transport management. The operator of the queueing system is faced with a number of decisions. Is it absolutely necessary to provide a back-up service? Is it profitable to do so? Will providing back-up service improve customer satisfaction? What should be the capacity of the back-up service? To answer such questions the process is analysed by means of a batch-service queueing model.

2 — Admission Control via Pricing in Multiclass Service Systems
Antonis Printezis, Case Western Reserve University, PhD Candidate, Cleveland, OH, 44106, USA, AntP@po.cwru.edu., Apostolos Burnetas

Consider a service system whose owner can control the incoming load of customers by admission pricing. We examine the effect of splitting the system into two subsystems with separate queues and differentiating pricing for each queue. We show that separation is not efficient for a single class of customers, and discuss the implications when there are multiple classes that differ in their cost of waiting.

■ WB37

Center-Room J1

Stochastic Inventory Models II

Contributed Session

Chair: A. G. de Kok, Technical University of Eindhoven, Professor, Eindhoven, 5600, MB, Netherlands, A.G.d.Kok@tm.tue.nl

1 — Peak Season Inventory Planning
Mahmut Ali Gokce, North Carolina State University, Department of Industrial Engineering, Research Assistant, Raleigh, NC, 27606, USA, magokce@eos.ncsu.edu., Russell E. King

We develop a math/comp. model for inventory planning of items with sharp peaks in demand.Right amount of inventory must be built due to lead-time,max. order and max. inventory level constraints.The problem is modeled as a dynamic programming problem utilizing the value iteration method.Multiple regression analysis are performed to predict the season performance based on critical inputs.Results show lead-time is the most important factor.Characteristics of optimal ordering policies are presented .

2 — Efficient Learning by the Distribution Free Newsvendor
Earl R.B. Gordon, Stanford University, Stanford, CA, 94305, USA, earlg@stanford.edu., Martin L. Puterman

This paper explores methods of determining inventory levels in newsvendor inventory models with unknown demand distributions (only an upper bound on the demand is known) and a finite horizon . A new approach that uses the ideas of reinforcement learning is developed; it has the advantage that it updates all action values at each iteration. Results are given for various distributions and parameter values.

3 — Linear Programming Based Planning Concept for a Serial, Two-Echelon Inventory System
M. K. Dogru, Technical University of Eindhoven, PhD Student, Eindhoven, 5600 MB, Netherlands, m.k.dogru@tm .tue.nl., A. G. de Kok, G. J. van Houtum

In this study, we develop an LP formulation for the inventory control of a serial, two-echelon inventory system which incorporates stochastic demand information. It is shown that when appropriate safety stocks are assigned to each stock point, the LP developed can duplicate the ordering behavior of base stock policy, which is known to be optimal.

4 — Mobile Ordering in Installation Services
Tuomas Kokkonen, Helsinki School of Economics, Helsinki, FI, 00101, Finland, tuomas.kokkonen@posti.fi.

Traditional ordering processes in installation services can be re-engineered with modern mobile ordering systems. In this study, a model is built to compare alternative ways of ordering tools and parts and to analyze their effectiveness.

5 — Selective Priorities in Customer Service
Aimo Inkiläinen, Helsinki School of Economics, Professor, Helsinki, FI, 00101, Finland, inkilain@hkkk.fi., Katariina Kemppainen, Ari P.J. Vepsalainen

We demonstrate, with a case, the common problem of finding a trade-off between inventories and delivery speed without sacrificing customer satisfaction. Even with minor investments in technology-based visibility within supply chains the impact on efficiency is amplified through incentives and selective order prioritization.

■ WB40

Center-Room G

Global Logistics Planning

Contributed Session

Chair: Martin L. Puterman, University of British Columbia, Vancouver, BC, V6T1Z2, Canada, marty@coe.ubc.ca

1 — Steel Product Out-bound Logistics
Soo Chang, POSTECH, Associate Professor, Pohang, KB, 790-784, Republic of Korea, syc@postech.ac.kr., Jongho Park, Dongwook Kang, Jeongwon Lee

Logistic planning for out-bound material flow in the steel industry has several unique characteristics. We study those characteristics and develop several paractical approaches for finding efficient logistic plan.

2 — Logistics Planning and Optimization for a Canadian Beverage

Manufacturer
Mehmet A. Begen, Centre for Operations Excellence-UBC, mabegen@coe.ubc.ca, Ernest Wu.

3 — An Analysis of Transfer Services
Jouni Laine, Helsinki School of Economics, Researcher, Helsinki, He, 00101, Finland, laine@hkkk.fi., Ari P.J. Vepsalainen, Anu Bask

Does the current transport infrastructure provide sufficient services for global customers and e-commerce operators? While addressing the question in the content of a portfolio of different transport services, we suggest a new framework that matches incremental transport needs with appropriate transport organizations and channels.

■ WB42

Fairmont-Belvedere

Marketing I

Contributed Session

Chair: Sak Onkvisit, San Jose State University, San Jose, CA, 95192-0069, USA, onkvisit_s@cob.sjsu.edu

1 — Measurement Scales in the International Context
Sak Onkvisit, San Jose State University, San Jose, CA, 95192-0069, USA, onkvisit_s@cob.sjsu.edu., John J. Shaw

Marketing scholars need to establish the universality of the constructs of interest and their related measurement tools in the international context. When conducting cross-national studies, they must choose between identical measurement and equivalent measurement. Scale sensitivity and balanced/unbalanced scales merit attention. Also conceptual equivalence, instrument equivalance, and linguistic equivalence must be scrutinized.

■ WB46

Center-Room C3

Cutting Stock and Related Applications

Contributed Session

Chair: Brenda Rayco, Universite Libre de Brussels, B-1050 Brussels, Belgium, brayco@smg.ulb.ac.be

1 — Towards Efficient Plate Mill Operations
Brenda Rayco, Universite Libre de Brussels, B-1050 Brussels, Belgium, brayco@smg.ulb.ac.be., Wafa Rezig

We consider an optimization problem related to the manufacture of steel plates. We propose a constructive heuristic that involves the identification of cliques for the generation of feasible cutting patterns. We further employ a greedy procedure with randomization for the assignment of plates to slabs.

2 — Computer Results for the Guillotine Cutting Stock Problem
VÌctor M. Parada, Santiago, Chile, vparada@diinf.usach.cl, Lorena D. Pradenas

In this work, the behavior of several algorithms to solve the two-dimensional guillotine cutting problem, is studied. Performance of each algorithm is analyzed both in terms of waste and running time. In order to do that, a set of instances are classified and subsequently evaluated.

3 — A New Class of Covering-packing Problems in Business and Industry
Eugene J. Zak, Majiq Systems & Software, Redmond, WA, 98052, USA, zak@majiq.com.

The cutting stock problem (CSP) is a particular case of the set-covering problem. Similarly we introduce another class of combinatorial optimization problems called skiving stock problem (SSP) as a particular case of the set-packing problem. The SSP shares many properties and solving techniques with the CSP. When these two problem spaces are contrasted they illuminate one another in that way they form a "dual" relationship where techniques once thought to be applicable in one domain can be applied in the other. Furthermore, the SPPS, like the CSP, may have numerous applications in business and industry.

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Manufacturing
MA18 Harvey Wagner Prize Comp. Session 01
MA19 Electric Power Market Design
MA20 Auction Theory
MA21 Contributed Paper Session 34-S04 - OR Models in Finance
MA22 OR/MS in Forestry V
MA23 Airline Operations II
MA24 Enhancing the Communication Skills of Undergraduates
MA26 Contributed Paper Session 80-S01 - Personnel Scheduling
MA27 Reverse Production System Design and Analysis
MA28 Collaboration and Cooperation in the Supply Chain
MA29 Inventory Models
MA30 Empirical Operations Management
MA31 Advances in Computational Optimization
MA32 Managing and Operating Large-scale Data Centers
MA33 Stochastic Network Interdiction
MA34 DA Arcade
MA35 Recent Advances in Six-Sigma Quality Tools
MA36 Topics in Queueing Networks
MA37 Queueing Systems: Analysis and Control III
MA38 Joint Session with TSS: Rail and Intermodal Applications
MA39 Real-Time Route Guidance and Dynamic Traffic Assignment
MA40 Panel Discussion - Agent-based Models: New Challenges for Military Simulations
MA41 Location Analysis V
MA42 Contributed Paper Session 54-S05 - Advertising and Promotion
MA43 Dynamic Pricing/Revenue Management
MA44 Complexity and Model Validation S01
MA45 Contributed Paper Session 87-S05 - Telecom Capacity and Pricing
MA46 Benchmarking & Performance Testing of Optimization Software
MA47 Software Demonstration: Session 5

Monday 10:00 - 11:30am

MB01 Tutorial: Combinatorial Optimization in Bioinformatics and Computational Biology
MB02 Case: Engineering Optimization Model Applications
MB03 Tutorial: Risk Management in Electricity Markets
MB04 Panel: Collaboration of Academia, Industry and Government in Data Mining Research
MB05 Best Dissertation Award
MB06 Contributed Paper Session 52-S04 - Organizational Theory I
MB07 Information Based Extended Product Development II
MB08 Optimization Models in e-Marketplaces
MB09 Adaptive Enterprise Business Model and Technology
MB10 Project Management I
MB11 Contributed Paper Session 78-S02 - Flow Shop Scheduling
MB12 Applications of OR in the Prevention and Treatment of Cancer
MB13 Optimization Algorithms and Applications
MB14 LP Complexity
MB15 Network Optimization 3
MB16 Discrete Optimization
MB17 Facility Planning and Design I
MB18 Harvey Wagner Prize Comp. Session 02
MB19 Electric Power and Gas Market Modeling I
MB20 Auctions Research in Marketing
MB21 Contributed Paper Session 34-S05 - Financial Markets
MB22 Contributed Paper Session 15-S01 - OR in Advanced Technologies
MB23 Air Traffic Applications
MB24 The Changing Accrediation Environment and its Impact on OR/MS
MB25 Specifying and Selecting Variables in Data Envelopment Analysis
MB26 Contributed Paper Session 80-S02 - Pricing and Designing Technology-based Service Contracts
MB27 Contributed Paper Session 86-S05 - Supply Chain Coordination
MB28 Game Theoretic Models in Operations Management
MB29 Tools and Strategies to Improve Demand Chain Management
MB30 Issues in Capacitated Assemble-to-Order Systems
MB31 Advances in Algebraic Modeling
MB32 Customizable and Configurable Product Design and Selection
MB33 Stochastic Programming: Theory and Applications
MB34 Decision Analysis in Military Environment
MB35 Panel Discussion: Journal Editors' Perspective on Future Trends in Quality, Statistics, and Reliability Research
MB36 Numerical Methods in Queueing Analysis
MB37 Contributed Paper Session 72-S01 - Maintenance and Testing
MB38 Simulation Software/Models
MB39 Advances in Dynamic Traffic Assignment Modeling Part I
MB40 The Interface of Simulation and Statistics
MB41 Contributed Paper Session 51-S01 - Facility Loc & Routing
MB42 Panel Discussion on Marketing Models: ROI, Accountability and Implementation
MB43 Pricing and Revenue Management
MB44 Panel: Modeling and Simulation of Urban Operations S02
MB45 Military Applications - Session 15
MB46 Linear/Quadratic Programming Software
MB47 Software Demonstration, Session 6

Monday 1:30 - 3:00pm

MC01 Tutorial: Logical Analysis of Data
MC02 Tutorial: Scenario-based Technology Planning
MC03 Practice: Contributed 1
MC04 Leading Software in Data Mining and Knowledge Discovery
MC05 Entrepreneurship I, Regional & Institutional Policy Milieu and the Development of Innovative Startup Firms
MC06 Contributed Paper Session 52-S05 - Teams
MC07 Uncertainty and Complexity in Product Development
MC08 Supply and Demand Management
MC09 Contributed Paper Session 26-S07 - Issues in E-Business II
MC10 Project Management II
MC11 Contributed Paper Session 78-S03 - Parallel Machine Scheduling
MC12 Multiple Criteria Decision Making and Health Care
MC13 Interior Point Algorithms for Linear and Nonlinear Problems
MC14 Contributed Paper Session 50-S01 - Linear Programming I
MC15 Network Optimization 2
MC16 Very Large-Scale Neighborhood Search Algorithms
MC17 Facility Planning and Design II
MC18 Harvey Wagner Prize Comp. Session 03
MC19 Electric Power Market Modeling II
MC20 Auction Session 6
MC21 Financial Engineering, Session 01
MC22 Contributed Paper Session 30-S02 - Power Systems Planning I
MC23 Threats to Life and Limb
MC24 INFORM-ED CASE COMPETITION 2002 - Finalists 1&2
MC26 Contributed Paper Session 80-S03 - Planning and Purchasing Service Capacity
MC27 Contributed Paper Session 86-S06 - Competition in Supply Chains I
MC28 Beyond Coordinating Contracts: Market Entry Games and Incomplete Contracts
MC29 New Results for Perishable Inventory Systems
MC30 Multi-Echelon Inventory Systems
MC31 Open Source Optimization Software
MC32 OR and the Internet
MC33 Sampling and Robustness in Stochastic Optimization
MC34 Security Environment
MC35 Quality Monitoring with Multivariate and Waveform Data
MC36 Stochastic Control of Queues
MC37 Contributed Paper Session 72-S02 - Modeling Failure Distributions

MC38 Student Paper Contest I
MC39 Advances in Dynamic Traffic Assignment Modeling Part II
MC40 A Cross Industry Study of the Impact of Business Practices on the Transportation and Logistics Industries
MC41 Contributed Paper Session 51-S02 - Facility Location
MC42 Customer Management Issues
MC43 Revenue Management, Routing, and Pricing
MC44 Probabilistic Models of Air-to-Air Engagements and Campaigns S03
MC45 Military Applications - Contributed Papers - Optimizing Ground Operations, S13
MC46 Nonlinear Programming Software
MC47 Software Demonstration, Session 7

Monday 4:30 -6:00pm

MD01 Tutorial: Value Function Approximation in Dynamic Programming: History and Recent Developments
MD02 Case: Technology Commercialization
MD03 Contributed Paper Track 81-S01 - Simulation Methodology
MD04 Data Mining Applications in Customer Relationship Management
MD05 Distinguished Speaker
MD06 Contributed Paper Session 52-S06 - IT Implementation
MD07 Model-Based Approaches for Product Family Development
MD08 Information and Optimization in Supply Chain Management
MD09 Aspen MIMI Demand Management, Supply Chain Planning, Scheduling and Capable-to-Promise Implementations
MD10 The Theory and Practice of Rescheduling
MD11 Contributed Paper Session 78-S04 - Scheduling Automated Systems
MD12 Cost Effectiveness Analysis in Health Care
MD13 Interior-Point Methods for Nonlinear Programming
MD14 Contributed Paper Session 63-S02 - Optimization I
MD15 Applications of Network Optimization
MD16 Computational Mixed Integer Programming
MD17 Facility Planning and Design III
MD18 Non-Traditional Applications of OR
MD19 Application of Optimization in the Competitive Power Industry
MD20 Auction Session 7
MD21 Financial Engineering, Session 02
MD22 Contributed Paper Session 30-S03 - Optimization Problems in the Power Industry
MD23 Panel: Current Issues in Aviation
MD24 INFORM-ED CASE COMPETITION 2002: Finalists 3&4
MD25 Computations in Data Envelopment Analysis
MD26 Telecommunications Session 1
MD27 Contributed Paper Session 86-S07 - Competition in Supply Chains II
MD28 Innovative Capacity Management for the New Millenium
MD29 Inventory Planning in Large-Scale Supply Chain Systems
MD30 Flexibility and Pricing in Supply Arrangements - S36
MD31 George B. Dantzig Dissertation Finalist Presentations
MD32 ICS I Attacking and Defending Networks
MD33 Applications of Multistage Stochastic Programming
MD34 Decision Analysis Society Awards
MD35 Statistical Methods in Engineering Design
MD36 Tutorial: Scheduling Multiclass Queueing Networks via Fluid Models
MD37 Contributed Paper Session 86-S15 - Queueing in Manufacturing
MD38 Contributed Paper Session 88-S03 - Public Transportation Systems
MD39 Dynamic Traffic Assignment Applications
MD40 Strategic Network Design in Transportation and Logistics
MD41 Contributed Paper Session 51-S03 - Competitive Facility Location
MD42 Marketing Research
MD43 Online Auctions
MD44 Joint Warfare System (JWARS) - Algorithms, Uses, and Analysis S04
MD45 Military Applications - Contributed Papers - Resource Allocation in Military S14
MD46 Global Optimization Software
MD47 Software Demonstration, Session 8

Tuesday 8:00 - 9:30am

TA01 Tutorial: Control of the Supply Chain-Some Lessons from Traffic Flow Theory
TA02 Case: Entrepreneurship Education for Engineers: The Stanford Experience
TA03 Tutorial: Modeling Capacity in Production and Supply Chain Planning Models
TA04 Data Mining Applications in Telecom and Computing Industries
TA05 Contributed Paper Session 80-S04 - Worker Flexibility
TA06 Contributed Paper Session 52-S07 - Socio-technical Systems
TA07 Determinants of Product Development Rate and Impact
TA08 Performance Analysis and Optimization in e-Business
TA09 Impact of New IS Capabilities on the Structure of B2B Relationships
TA10 Scheduling and Transportation Logistics
TA11 Contributed Paper Session 78-S05 - Scheduling Disruption Management
TA12 Improving Productivity in Health Care
TA13 Fractional Programming and Generalized Convexity I
TA14 Contributed Paper Session 63-S03 - Minimax Problems
TA15 Very Large Scale Neighborhood Search
TA16 Applications of Integer Programming
TA17 Scheduling Wafer Fabrication II: New Approaches to Operational Modeling and Simulation for Semiconductor Manufacturing
TA18 Demand and Supply Chain Management - Putting Theory into Practice
TA19 Optimization and Equilibrium Models in Energy Applications
TA20 Empirical Issues in Auction Design
TA21 Financial Engineering, Session 03
TA22 Contributed Paper Session 14-S01 - Auctions
TA23 What Will Tomorrow Bring?
TA24 Integrating Research and Teaching
TA25 DEA Session 5
TA26 Resource Allocation in Network Planning
TA27 Contributed Paper Session 86-S08 - Negotiation & Collaboration in Supply Chains
TA28 Contracts, Coordination in Supply Chains
TA29 Retail Supply Chain Management II
TA30 Risk Management in Supply Chains
TA31 Advances in Metaheuristics and Combinatorial Optimization
TA32 Tutorial: Global/Nonlinear Optimization in Modeling Environments
TA33 Contributed Paper Session 63-S01 - Stochastic Programming
TA34 Intrapersonal (behavioral) Environment I: Subjective Probabilities in Decision Analysis
TA35 Automatic Process Control Methods for Quality Improvement
TA36 Dynamic Stochastic Spatial Models in Medicine
TA37 Contributed Paper Session 49-S04 - Inventory Risk Pooling
TA38 Railroad Scheduling and Blocking
TA39 Recent Advances in Congestion Pricing Methods
TA40 Contributed Paper Session 51-S08 - Integrated Logistics Systems
TA41 Urban Transportation Planning Models I
TA42 Contributed Paper Session 59-S01 - Product and Concept Development
TA43 Contributed Paper Session 76-S01 - Revenue Management I
TA44 Military Operations Research at West Point
TA45 Military Applications - Contributed Papers S09
TA46 Software for Semidefinite and Conic Optimization
TA47 Software Demonstration, Session 9

Tuesday 10:00 - 11:30am

TB01 Tutorial: Facility Location - Models, Algorithms and Applications
TB02 Tutorial: Developing Industrial-Strength Spreadsheet Optimization Models
TB03 Practice: Contributed 2
TB04 Data Mining Applications in Manufacturing and Credit Industries
TB05 Strategy I
TB06 Contributed Paper Session 52-S01 - Licensing and Standards
TB07 Set Based Product Development: Application and Strategies
TB08 Managing Demand in Supply Chains
TB09 Analysis of System or Mechanism in Electronic Markets
TB10 Optimization-based Distributed Scheduling
TB11 Contributed Paper Session 86-S12 - Issues in Automobile Manufacturing
TB12 Population-based Cancer Models
TB13 Fractional Programming and Generalized Convexity II
TB14 Contributed Paper Session 58-S01 - Graph Theory
TB15 Telecommunication Networks
TB16 Mixed Integer Programming I
TB17 Analysis of Bucket Brigades and Worksharing Systems
TB18 Harvey Wagner Prize Competition, Awards Ceremony
TB19 Methods for Optimizing Reservoir Operation and Power Production
TB20 Auction Experiments
TB21 Financial Engineering, Session 04
TB22 Contributed Paper Session 14-S02 - Auctions and Bidding
TB23 MSOM Fellows' Lectures
TB24 Spreadsheet Research: Opportunities and Interest Group
TB25 New Methods and Applications in DEA
TB26 Telecommunications Session 3
TB27 Contributed Paper Session 86-S09 - Bullwhip Effect
TB28 Tutorial: A Demand-focused Decentralization Scheme for Serial Supply Chains
TB29 Operations Economics
TB30 Coordination Issues In Supply Chain Management
TB31 Parallel Metaheuristics
TB32 New Initiatives in Global Optimization
TB33 Contributed Paper Session 23-S02 - Decision & Risk Applications
TB34 Intrapersonal (behavioral) Environment II: Epistemic and Aleatory Uncertainty in Rational Decision-Making and Risk Analysis
TB35 Statistical and Systems Reliability Modeling
TB36 Brownian Motion Models of Stochastic Networks
TB37 Contributed Paper Session 49-S01 - Multi-item Inventory Systems
TB38 Student Paper Contest II
TB39 Pricing and Acceptance in Freight Transportation
TB40 Contributed Paper Session 51-S05 - Integrated Production/Transportation Models
TB41 Urban Transportation Planning Models II
TB42 Contributed Paper Session 59-S02 - Product Portfolio Management
TB43 Contributed Paper Session 83-S01 - Quality Control
TB44 Progress in Modeling, Simulation, and Analysis at TRAC-WSMR S06
TB45 Systems Analytic Approaches from a Military Perspective S07
TB46 Integer Programming Software
TB47 Software Demonstration, Session 10
TB48 The Vital Need to Brand our Profession - Session 01

Tuesday 1:30 - 3:00pm

TC01 Tutorial: Very Large Scale Neighborhood Search
TC02 Case:Optimization in Logistics and Supply Chains
TC03 Case:A Generalize Framework to Build Optimization-Based Model Applications
TC04 Mining of Manufacturing Enterprise Data
TC05 Strategy II
TC06 Contributed Paper Session 52-S02 - Management of IT
TC07 Contributed Paper Session 44-S01 Entrepreneurial Decision-Making
TC08 Contributed Paper Session 26-S02 - E-Business Service Pricing and Contracting
TC09 Contributed Paper Session 26-S01 - E-Business Collaboration and Infor Sharing
TC10 Stochastic Scheduling
TC11 Contributed Paper Session 86-S14 - Scheduling in the Semiconductor Industry
TC12 Operations Research and Community Health Services
TC13 Fractional Programming and Generalized Convexity III
TC14 Contributed Paper Session 58-S02 - Networks
TC15 Network Design
TC16 Combinatoric Network Optimization
TC17 Planning and Control of Pull or Hybrid Systems
TC18 50th Anniversary of the Founding of ORSA: Past President Session I
TC19 Contributed Paper Session 30-S01 - Environmental Hazard Modeling
TC20 Empirical Investigations into Auction Mechanisms
TC21 Financial Engineering, Session 05
TC22 Contributed Paper Session 28-S02 - Global Economic and Trade Issues
TC23 Contributed Paper Session 88-S08 - Crew Scheduling
TC24 Spreadsheet Research
TC25 Dynamics and Productivity
TC26 Telecommunications Network Design
TC27 Contributed Paper Session 86-S10 - VMI and Information Sharing
TC28 Auctions and Supply Contracts
TC29 Information and Supply Chain Management
TC30 The Economics of E-Markets for Supply Chain Management S37
TC31 Merging Math Programming and Constraint Programming I: Modeling
TC32 Applied Probability Models
TC33 Contributed Paper Session 23-S01 - Modeling Utility
TC34 Technological Environment
TC35 Model-Based Diagnosis of Engineering Systems
TC36 Operational Models in Semiconductor Manufacturing I
TC37 Contributed Paper Session 49-S02 - Stochastic Inventory Models I
TC38 Contributed Paper Session 88-S01 - Vehicle Routing I
TC39 Optimization of Freight Transportation Systems
TC40 Contributed Paper Session 51-S04 - Warehousing and Matl Handling
TC41 Using OR/MS Techniques for Public Transit
TC43 Contributed Paper Session 83-S02 - Probability Distributions
TC44 Analytical Modeling of Force-on-Force Combat Attrition S07
TC45 Innovations in Military Simulation Modeling Session S11
TC46 Stochastic Programming Software
TC47 Software Demonstration, Session 11
TC48 Panel: INFORMS and The OR Entrepreneur

Tuesday 4:30 - 6:00pm

TD01 Tutorial: Bio-informatics and Management Science - The Common Tools and Techniques
TD02 Case:Optimization in Logistics: State of the Art in Practice and Research
TD03 Panel: Embedding OR/MS Techniques in Enterprise Software Applications
TD04 Modeling and Algorithm in Data Mining
TD05 Engineering Management
TD06 Contributed Paper Session 71-S01 - TQM
TD07 Contributed Paper Session 44-S02 - Knowledge Sharing in Innovation
TD08 Contributed Paper Session 26-S03 - E-Commerce

Consumer Pricing
TD09 Contributed Paper Session 26-S06 - Search Issues in E-Commerce
TD10 Supply Chain Optimization
TD11 Contributed Paper Session 86-S16 - Supply Chain and CRM
TD12 Health Applications in Scheduling, Screening, and Long-Term Care
TD13 Fractional Programming and Generalized Convexity IV
TD14 Contributed Paper Session 58-S03 - Network Routing
TD15 Network Flow Algorithms
TD16 Mixed Integer Programming II
TD17 Behavioral Modeling and Control of Modern Production and Business Processes
TD18 50th Anniversary of the Founding of ORSA: Past President Session II
TD19 Contributed Paper Session 30-S04 - Land, Water and Climate Issues
TD20 Business-to-Consumers Online Auctions
TD21 Contributed Paper Session 28-S03 - Financial Engineering I
TD22 Contributed Paper Session 28-S01 - Economics I
TD23 Contributed Paper Session 88-S04 - Airport Operations
TD24 Where is OR/MS in Undergraduate Business Curriculum?
TD25 Issues in DEA
TD26 Wireless Networking
TD27 Contributed Paper Session 86-S04 - Supply Chain Flexibility
TD28 Supply Chain Models
TD29 Supply Chains Issues In A Dynamic Environment
TD30 Contributed Paper Session 86-S19 - Production/ Marketing Models
TD31 Merging Math Programming and Constraint Programming II: Solutions
TD32 Methods for Convex and Semidefinite Programming
TD33 Contributed Paper Session 23-S03 - Decision Analysis Software
TD34 Corporate Environment
TD35 Experimentation for Profit
TD36 Operational Models in Semiconductor Manufacturing II
TD37 Contributed Paper Session 49-S03 - Perishable and Reparable Inventory
TD38 Contributed Paper Session 88-S02 - Vehicle Routing and Dispatching
TD39 E-commerce, Supply Chains and Real-Time Fleet Management
TD40 Contributed Paper Session 51-S06 - Dynamic Logistics Networks
TD41 Modeling Traffic Propagation on Large Networks
TD42 Contributed Paper Session 59-S04 - Market Entry, Competition & Collusion
TD43 Contributed Paper Session 83-03 - Statistical Estimation
TD44 Military Applications - Contributed Papers S08
TD45 Information Operations: Some New Analytical Tools
TD46 Contributed Paper Session 45-S02 - Decomposition Methods for IP
TD47 Software Demonstration, Session 12
TD48 Managing Hitech Development and Fostering Hitech Entepreneurs

Wednesday 8:00 - 9:30am

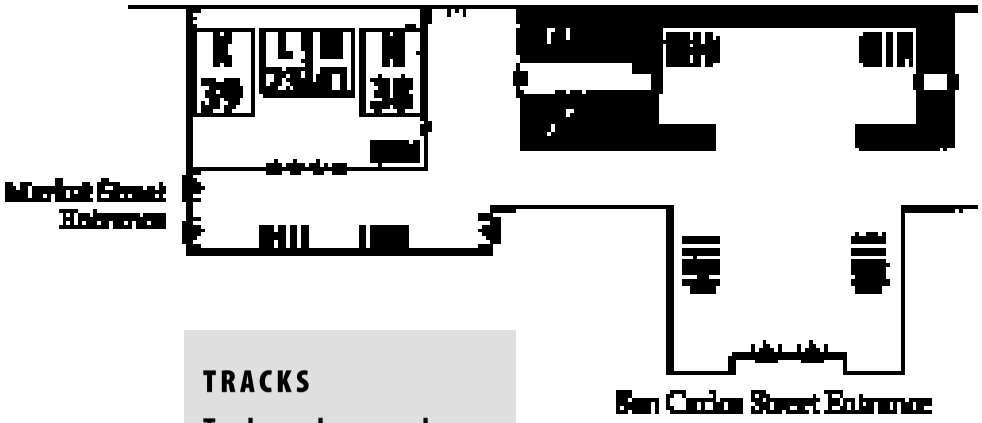
WA02 Tutorial: Stochastic Supply Chain
WA06 Contributed Paper Session 52-S08 - Safety Issues
WA08 Contributed Paper Session 26-S04 - Issues in Business I
WA09 Contributed Paper Session 26-S05 - Logistics & Service in E-Business
WA10 Contributed Paper Session 78-S06 - Scheduling I
WA11 Contributed Paper Session 86-S20 - Capacity, Flexibility and Risk
WA13 Contributed Paper Session 41-S03 - Heuristic Programming Methods II
WA14 Contributed Paper Session 58-S04 - Capacitated Networks
WA15 Contributed Paper Session 63-S04 - Large Scale Optimization
WA16 Contributed Paper Session 45-S03 - Integer Programming I
WA17 Configuring Modern Manufacturing Systems
WA18 Contributed Paper Session 60-S02 - Nonlinear Programming II
WA19 Contributed Paper Session 30-S05 - Power Systems Planning
WA21 Contributed Paper Session 34-S07 - Risk Management
WA24 Contributed Paper Session 29-S03 - Teaching OR/MS Tools
WA25 Contributed Paper Session 22-S01 - Data Env. Analysis I
WA27 Contributed Paper Session 86-S03 - Supply Chain IT Technology
WA28 Contributed Paper Session 86-S17 - Pricing Models
WA30 Contributed Paper Session 86-S22 - Multi-Item Production/Inventory Systems
WA31 Workshop: Software Tools for Implementing Branch, Cut, and Price Algorithms
WA32 Contributed Paper Session 43-S03 - IT Investments and Valuation
WA33 Contributed Paper Session 23-S04 - Risk Management in Large-Scale Systems
WA36 Contributed Paper Session 12-S02 - Applied Probability I
WA37 Contributed Paper Session 49-S05 - Stochastic Inventory Models II
WA38 Contributed Paper Session 88-S09 Rail and Port Applications
WA39 Contributed Paper Session 88-S07 - Vehicle Routing II
WA40 Contributed Paper Session 51-S07 - Logistics Decision Support Systems
WA42 Contributed Paper Session 59-S05 - Learning and Production Introduction
WA43 Contributed Paper Session 31-S01 - Neural Networks
WA46 Contributed Paper Session 45-S04 - Integer Programming Applications

Wednesday 10:00 - 11:30am

WB06 Contributed Paper Session 52-S09 - Organizational Theory II
WB10 Contributed Paper Session 78-S07 - Semiconductor Scheduling
WB14 Contributed Paper Session 50-S02 - Linear Programming Algorithms
WB15 Contributed Paper Session 63-S05 - Traveling Salesman and Related Problems
WB16 Contributed Paper Session 45-S05 - Integer Programming II
WB25 Contributed Paper Session 22-S02 - DEA Applications
WB27 Contributed Paper Session 86-S02 - Supply Chain Information Systems
WB28 Contributed Paper Session 86-S18 - Assemply System Design and Operation
WB30 Contributed Paper Session 86-S21 - Organizational Issues in SCM
WB36 Contributed Paper Session 12-S03 - Queueing II
WB37 Contributed Paper Session 49-S06 - Stochastic Inventory Models II
WB40 Contributed Paper Session 51-S09 - Global Logistics Planning
WB42 Contributed Paper Session 54-S06 - Marketing I
WB46 Contributed Paper Session 45-S01 - Cutting Stock and Related Applications

San Jose McEnery Convention Center

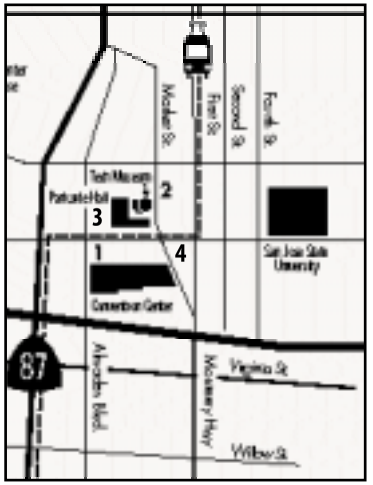
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TRACKS

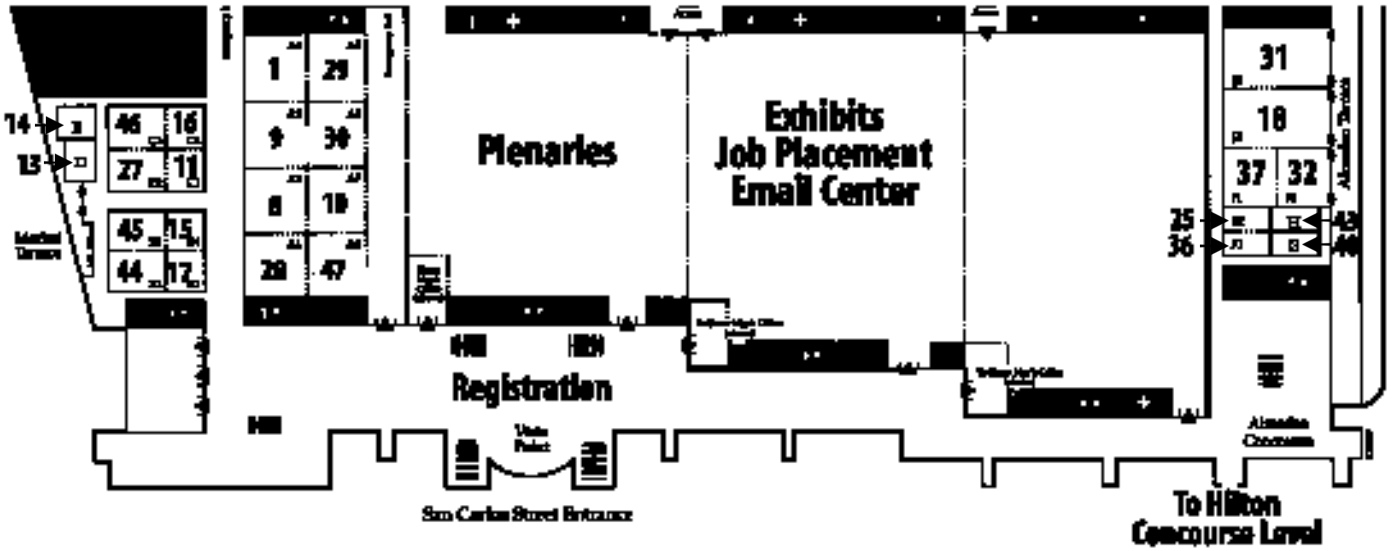
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DOWNTOWN SAN JOSE



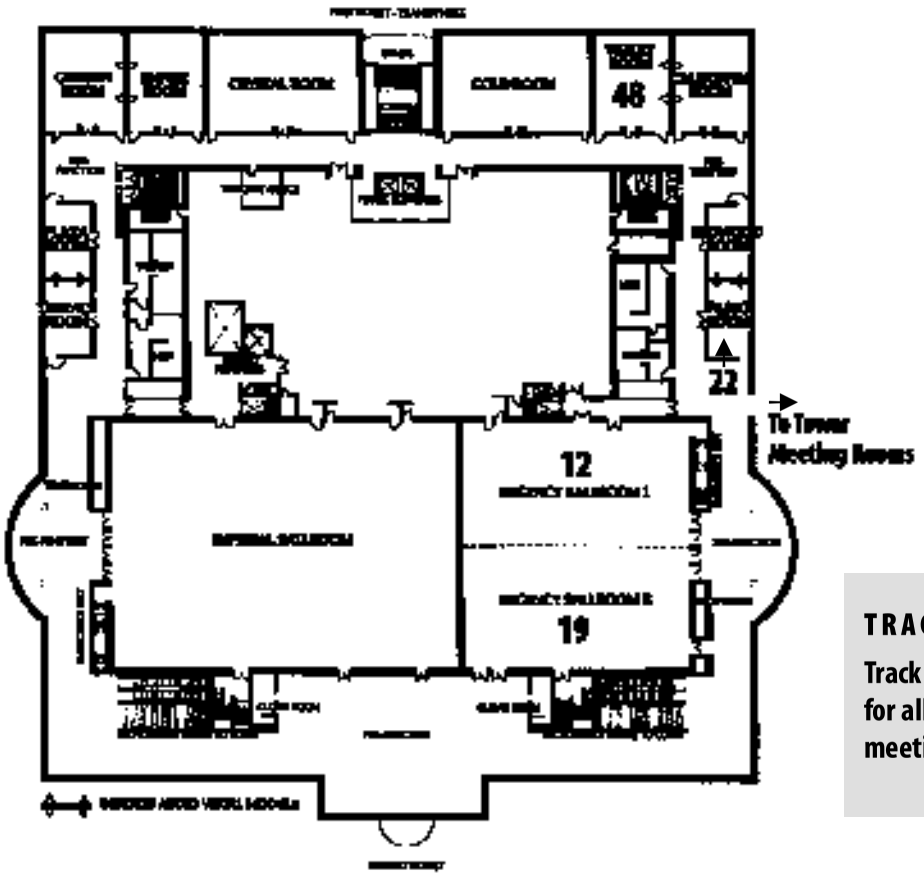
1–Hilton
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3–Crowne Plaza
4–Hyatt St. Claire

LEVEL 2—CONCOURSE LEVEL

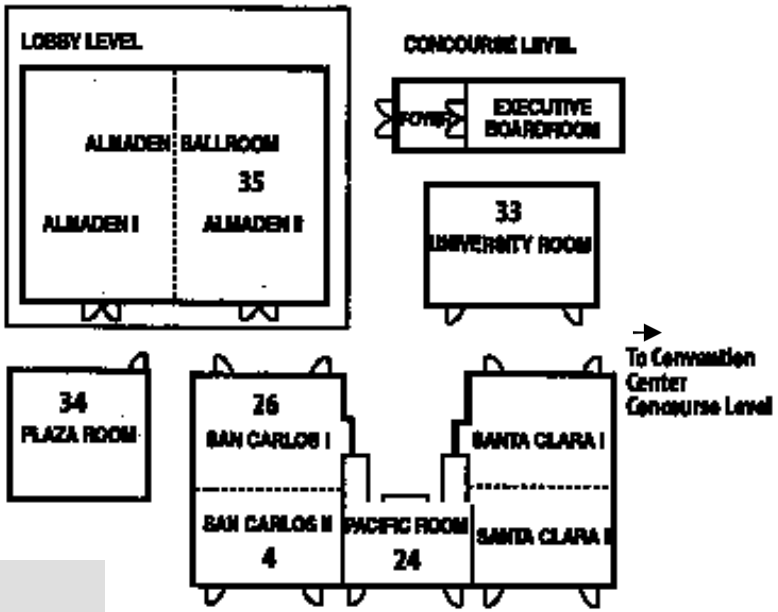


Fairmont and Hilton Hotels

FAIRMONT HOTEL—BALLROOM LEVEL



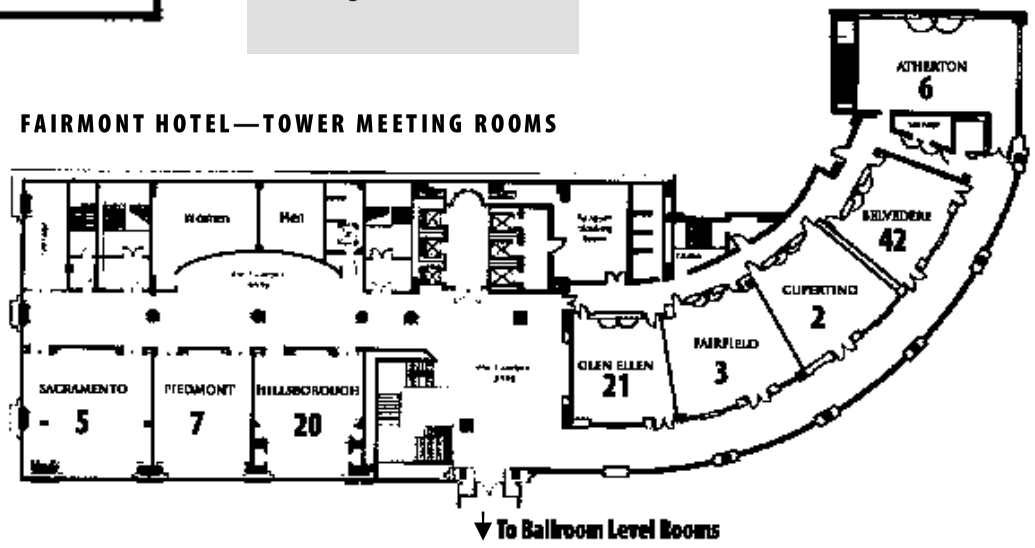
HILTON HOTEL



TRACKS

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FAIRMONT HOTEL—TOWER MEETING ROOMS



INFORMS San Jose 2002 – Addendum

IMPORTANT!

Please refer to this addendum for late changes to the printed program

Sunday, November 17, 2002

SA

SA02.4. New Presentation, Predicting Inter-Purchase Timing in the Automotive Market, *Cheng, Jie , J.D. Power & Associates, Jie.Cheng@jdpa.com, Jay, Michael , J.D. Power & Associates , Michael.Jay@jdpa.com, Lo, Brigitte , J.D. Power & Associates, Brigitte.Lo@jdpa.com, Zetu, Dan, J.D. Power & Associates, dan.zetu@jdpa.com*

CRM is predicated on knowing and then anticipating your customer's needs. In the Automotive Marketplace some customer needs can be anticipated, for example reliability techniques could be used to anticipate when major automotive components will need to be replaced, which could prompt a customer invitation for service. At what point are there too many repairs, or the vehicle's mileage is too high, so as to prompt an individual to return to the new vehicle market. Understanding this In-Market time is crucial for Automotive Marketers to develop effective marketing campaigns that can be targeted only against those consumers that will soon be reentering the marketplace and thereby be sensitive to promotions and incentives. We will predict this return to the marketplace by indirectly modeling the inter-purchase timing for new vehicle purchases.

SA10.

- **Presentation Withdrawn, A New Algorithm for On-line Bin Packing,** *Hans Kellerer*
- **Presentation Withdrawn, An Approach to Integrate Concepts of Evolutionary Acquisition and Project management,** *Unver Cinar*
- **Presentation Withdrawn, Cost Risk Analysis - Back Allocation to the Cost Elements,** *Marc Rose*

SA16. Presentation Withdrawn, A New Approach for Multicriteria Optimization, *Fernanda M. Raupp, Wilfredo Sosa*

SA17. Presentation Withdrawn, Demand Forecast Sharing in Supply Chains with Consideration of Forecasting Costs*, Xiohang Yue*

SA24.5. Revised Paper, Universal Access: What Have We Learned from the E-Rate?, *Heather Hudson*

The Telecom Act of 1996 mandated discounts for high-speed connectivity for schools and libraries. Five years later, what have we learned? This paper examines innovative features of the E-rate; reasons for disparity in take-up of subsidies; whether schools could extend access to communities, etc. It also includes a case study on E-rate in Alaska (has nation's highest take-up rate). It concludes with analysis of lessons relevant for other countries concerned with extending Internet access.

SA40. Presentation Withdrawn, Operational Modeling and Simulation at Intel, *Mani Janakiram*

SA42.4. New Presentation, Incorporating Future Price Expectations into Consumers' Purchase Decisions, *Qin Zhang,P.O. Box 1133, One Brookings Dr., St. Louis MO 63130, USA, zhangq@Olin.wustl.edu Chakravarthi Narasimhan,Washington University, P.O. Box 1133, One Brookings Dr., St. Louis MO 63130, USA, Narasimhan@olin.wustl.edu P.B. Seetharaman,Washington University, P.O. Box 1133, One Brookings Dr., St. Louis MO 63130, USA, Seethu@olin.wustl.edu*

We incorporate future price expectations in a joint model of three household decisions. Households are assumed to form expectations by following Bayesian learning schemes. Our estimation results on two categories indicate a significant effect of the expectations on category purchase decisions and the effects are heterogeneous across different household groups.

SA42.5. New Presentation: Qualitative Semiorders and the Empirical Adequacy of Linear Representations *Johansson, Rolf, University of California, Irvine, rhjohnso@uci.edu*

We ask whether linearly or weakly ordered numerical representations can be descriptively adequate models of choice behavior, when at the qualitative level preference and indifference form a semi order. We show that the mere existence of discrimination thresholds - which yield intransitivities of indifference - is NOT sufficient to render linear/weak order representations descriptively inadequate. However, problems arise because of the fact that such thresholds are variable, not constant.

SB

SB13.4. New Presentation: **Solving the 0/1 Multi-Dimensional Multiple-Choice Knapsack Problem by a Tabu Search** Curry*, Guy, Texas A&M University, g-curry@tamu.edu; Li, Vincent, Cornell University, vincentcli@netscape.net*

We present a tabu search heuristic based on two different schemes of oscillation around feasibility boundary. Choice rules utilizing surrogate constraint information and feasibility change are used in different stages of the search respectively. Rules are given for the 0/1 multi-dimensional multiple-choice knapsack problem. The critical event based tabu memory helps to achieve diversification while the use of tight oscillation near the feasibility boundary reinforces intensification.

SB18.2. Paper Moved from SB40.4 Title Updated. Some New Results on Scheduling Two Competing Agents*, Alessandro Agnetis*

SB21. Presentation Withdrawn, Information Technology and Cost and Profit Efficiencies of Financial Intermediaries, *Hong-Jen Lin*

SB32.

- **Presentation Withdrawn, The Insider Threat to Information Systems,** *Victor Spahic*
- **Presentation Withdrawn, Designing the Optimal Information Security Architecture,** *Huseyin Cavusoglu,*
- **Presentation Withdrawn, Automatic Control of Inter-organizational Business Processes using XML,** *Misuk Lee*

SB42.1. New Presentation: Inferring Preferences from Viewing Time: Empirical Evidence and Implications for Catalog Design, *Gallagher, Katherine, Associate Professor, Memorial University of Newfoundland, kgallagh@mun.ca Parsons, Jeffrey, Professor, Memorial University of Newfoundland, jeffreyp@mun.ca, 709.737.4741 Ralph, Paul, Student, Memorial University of Newfoundland, pralph@roadrunner.nf.net*

Techniques for accessing the content of online catalogs rely on hierarchical organization of products into standardized categories. However, this structure does not work well for certain types of shopping or information search. We present an empirical study that demonstrates a positive viewing time/preference relationship, introduce a notion of product similarity based on attributes, describe an algorithm to identify and quantify similarity matches, and briefly outline ongoing research.

SB45.4. New Presentation: Technology Impact with Remote Service Delivery, *Hao Qian, PhD Candidate, University of Toronto, 105 St George Street, Toronto ON M5S 3E6, Canada, haoq@rotman.utoronto.ca, Oded Berman, University of Toronto, Rotman School of Mgt., 105 St. George Street, Toronto ON M5S 3E6, Canada, berman@rotman.utoronto.ca, Dimitry Krass, Associated Professor, University of Toronto, 105 St George Street, Toronto ON M5S3E6, Canada, Dimitry Krass krass@rotman.utoronto.ca*

We study the substitution of on-site service by remote service. Two firms compete on price and service time, to ensure the service time require investment cost. Customers' decision depends on the location and preference over the two firms. The competitive equilibrium is demonstrated to exist. We use some numerical examples to investigate the effect of different remote cost factors on the equilibrium.

Sunday, November 17, 2002

SC

SC04. Presentation Withdrawn, Demand Forecasting for Multi-Generation Product Combining Discrete Choice and Dynamics of Diffusion, *Wonton Kim, Ph.D. Candidate, Seoul National University*

SC08. Presentation Withdrawn, Pricing Content for Multiple Digital Channels, *Kerem Tomak*

SC23. Presentation Withdrawn, The Airline Fleet Planning Problem for Low Traffic Sectors, *Balram Avittathur*

SC45.5. New Presentation, Topology Design in Virtual Private Networks, *Oya Karasan,Assistant Professor, Bilkent University, Dept of Industrial Engineering,, Bilkent University,*
Security concerns in the Internet are usually alleviated by creating secure virtual private networks (VPNs) that are cost-effective networks built on public backbones. Given customer nodes and an associated traffic matrix, this design problem involves determining which node pairs are to be connected via tunnels through a service provider network such that the total multihopped traffic is minimized. A tabu search-based heuristic and lower bounding techniques to bracket the optimum are proposed.

SD

SD45.5. New Presentation, Projective Schedules for Packet Switches, *Ross, Kevin, Stanford University, kross@stanford.edu, Bambos, Nicholas, Professor, Stanford University, bambos@stanford.edu*
We introduce a class of projective scheduling policies which are robust and scalable, and choose the service mode in reponse to backlogs. They substantially extend the known maximum weight matching algorithms in switch packet scheduling.

SD14. Presentation Withdrawn, A sequential Steady Sliding Algorithm for Multirigid-body Contact Problems, *James A. Tzitzouris*

SD42. Presentation Withdrawn, Market Segmentation, Competitive Market Structure and Switching Reasons, *Geonha Kim, Takahiro Ohno*

INFORMS San Jose 2002 – Addendum

IMPORTANT!

Please refer to this addendum for late changes to the printed program

Monday, November 18, 2002

MA

MA02. Session Withdrawn, Roundtable Companies and Universities Join Forces: How We Avoid Disappointment, *Laurie Dutton*

MA10. Presentation Withdrawn, Graph Topology Rules for Agent-based Large-scale Project Scheduling, *Anna Segurson, Moshe Dror, Kurt Fenstermacher*

MA10.3. New Presentation, Properties of Multi-mode Resource Constrained Project Scheduling Problems with Resource Vacations and Task Splitting, *Jirachai Buddhakulsomsiri, David S. Kim, Oregon State University*
This paper presents results from extensive computational testing of the multi-mode resource-constrained project scheduling problem when tasks can be split during scheduling if resources are temporarily not available.

MA19.4. New Presentation, A Unit Commitment-based Price Model in Competitive Market, *Chika Sugiyama, Chung-Li Tseng*
Consider a market that operates centralized unit commitment for power auction. Assuming that demand uncertainty follows some diffusion process, we derive the price process for electricity by applying Ito's lemma. Some properties of the obtained price process such as price jumps are discussed.

MA22. Presentation Withdrawn, Evaluating Landscape-scale Fuel Treatments for Biomass-based Energy Generation, *Jeremy Fried, USDA Forest Service, Jamie Barbour, Roger Fight,*

MA23.3. New Lead Author, Optimization Tool to Ensure Crew Feasibility During Schedule Development Process, *Lourdmareddy Gumireddy*

MA24. Presentation Withdrawn, Integrating Workplace Communication into Undergraduate Courses, *Judith S. Norback*

MA25. Presentation Withdrawn, Using MSAccess and VB for applying DEA to large data sets: automating performance evaluation, *Kalyan Pasupathy*

MA25. Session Moved from WA25, Contributed Paper Session 22-S01 - Data Env. Analysis I, *Chair: W. W. Cooper*

MA25.4. New Presentation: **Using MSAccess and VB for applying DEA to Large Data Sets: Automating Performance Evaluation,** *Alexandra Medina-Borja, Virginia Tech, nmedina@vt. Kalyan Pasupathy, Virginia Tech, kalyan@vt. Kostas Triantis, Professor, Virginia Tech, triantis@vt.edu*
One of the limitations of applying DEA in real life are that the technique works better with larger number of DMUs. Those DMUs need to operate in similar environments, and be comparable regarding the size of their operations. Finding groups that meet these constraints is not common. In order to implement DEA in a service organization with over 1000 units a two-step system was developed. The first step clusters DMUs in groups of similar environment and the second step applies DEA to those groups

MA26. – Presentation Withdrawn, A New Cut for Solving the PBS Problem, *Michel Gamache*

MA38. NEW Chair, Joint Session with TSS: Rail and Intermodal Applications, *Erick Wikum, Schneider National, Inc., wikume@schneider.com*

MB

MB11. Presentation Withdrawn, Hybrid Flow Shop Scheduling with Bottleneck Production Stages, *Vera L. Castiho*

MB22. Presentation Withdrawn, Methods for Generating Forest Parcelizaiton Maps, *Susan King*

MB22.3. New Presentation: **Tolerancing Algebra: A New Method for Analyzing Tolerance Information in Product Development**, *T. C Chang, Professor, Purdue University, tchang@purdue.edu; Y. Steve Hong, Assistant Professor, University of Toledo, yhong@eng.utoledo.edu*
As a fundamental building block for the 3D tolerance transfer analysis, the tolerancing algebra on deviation space has been proposed and elaborated. Based on the investigation on the spatial characteristic and the propagation mechanism of geometric tolerances and manufacturing process dispersions, a set of primitives and operations has been defined, which forms the algebraic structure of the tolerancing algebra. Some important algebraic properties have been derived.

MB22.4. New Presentation, Comparison of finite-size edge effect and correlation effect in ungapped sequence alignment, *Yonil Park*
I present the simulation results of comparison of finite-size edge effect and correlation effect in the ungapped sequence alignment. We describe the computation methods used and see the results obtained. By running extensive computational experiments, we conclude that the correlation effect is also important although its size is about 1/3 to 1/2 of the edge effect.

MB27. Presentation Withdrawn, Coordinating Supply Chains with Constraints, *Fernando Bernstein, Ashok Srinivasan,*

MB29.4. Presentation Revised, Coordinating Inventory Control and Pricing with Fixed Ordering Cost: The Infinite Horizon Case, *Xin Chen*
We analyze an infinite horizon, single product, periodic review model in which pricing and production/inventory decisions are made simultaneously. Demands in different periods are identically distributed independent random variables whose distributions depend on the product price. Ordering cost includes both a fixed cost and a variable cost proportional to the amount ordered. We show that a stationary (s,S,p) policy is optimal for both the discounted and average profit models.

MB37. Presentation Withdrawn, A System Level Maintenance Decision Support Tool, *Zimin (Max)Yang*

MB37.4. New Presentation, Design of a Maintenance and Operations Recommender, *Villafana, Luis, Graduate Student, University of California, Berkeley, luisv@sims.berkeley.edu, Federspiel, Clifford, Research Specialist, Center for the Built Environment, UC Berkeley, cliff_f@uclink.berkeley.edu*
We describe the design of a maintenance and operations recommender (MORE), which uses information from omputerized Maintenance Management Systems and Energy Management and Control Systems to recommend what maintenance personnel should do in response to a maintenance service request or other event requiring a maintenance or control system action.

Monday, November 18, 2002

MC

MC09.5. New Presentation Global Partnership Role of E-Commerce *Mahmud, ATM, Faculty, University of Maryland University College, amah1981@netzero.net, 301--217-9492: Quasem, Mohammad, Associate Professor, Howard University, mquasem@howard.edu*
Job mobility across all twenty-four time zones of the globe, through the usage of E-Commerce, can boost productivity. Although the relevance may appear obvious for industries in which output is an inverse function of interruptions in the production process, the role of E-Commerce towards productivity improvement, in general, needs an in depth evaluation. This study will critically analyze the important role of E-Commerce in the global perspective.

MC11.

- **Presentation Withdrawn, , Parallel Flowshops with Unrelated Processors,** *Marcelo S. Nagano*
- **Presentation Withdrawn, Sequencing Jobs in Flow Shops with Parallel Arbitrary Machines, Joao V. Moccelin**

MC11.4. Presentation Moved from WB28.2, A Nested Branch & Price Model for Prescribing the Optimal Design of a Circuit Card Assembly, *Depak Warrier, Wilbert Wilhelm*

MC14. Presentation Withdrawn, A Variant of Dikin's Affine-Schaling Algorithm for Linear Programming, *Pin-Qi Pan*

MC16. Presentation Withdrawn, Advances in Ejection Chain Methods for the Traveling Salesman Problem, *Cesar Rego, Fred Glover, Abraham Punnen*

MC22. Presentation Withdrawn, Strategic Pricing in Thermal Systems: A Bilevel Programming Approach, *Marcia Fampa*

MC25.2. Presentation Withdrawn, Designing Quality and Performance Improvement in Large Service Organizations: A DEA Case Study, *Alexandra Medina-Borja*

MC25. Session Moved from WB25, Contributed Paper Session 22-S02 - DEA Applications, *Chair: Donna Retzlaff-Roberts*

MC25.5. New Presentation: **A DEA Model to Evaluate Service Productivity of Branches in an Airline Company**, *Minho Lee, Business School, Korea University, kieslo@korea.ac.kr; Kwangtae Park, Business School, Korea University, ktpark@korea.ac.kr Hosun Rhim, Business School, Korea University, hrhim@korea.ac.kr*
We present a model to evaluate service productivity of branches in an airline company in Korea. Branches are grouped into two kinds: sales branches and airport branches. We evaluate performance of branches using common and group-specific measures. DEA model is modified for this purpose and tested with real data.

MC26.5. Presentation Updated - Solving a Generalized Parallel Replacement Problem, *Joseph Hartman*
The parallel replacement problem under economies of scale may be modeled as a fixed charge network problem and solved using flow pack inequalities. We examine a generalized version of the problem in which assets may not contribute equally to demand, complicating the integer programming solution.

MC27. New Session Chair, Contributed Paper Session 86-S06 - Competition in Supply Chains I, *Chair: Francisco Veloso*

MC34.1. Presentation Title Revised, Probabilistic Modeling of Terrorist Threats*, Elisabeth M. Pate'-Cornell*

MC38. Presentation Moved from TB38, Student Paper Competition I, *Chair: Chip Kraft*

- **MC38.1. Solving Real-Life Locomotive Scheduling Problems,** *Jian Liu, University of Florida, University Of Florida, liujian@ufl.edu*
  The locomotive scheduling problem is to assign locomotives with sufficient power to trains on a pre-planned train schedule. In this paper, we report the results of a study of the locomotive scheduling problem faced by CSX Transportation. We developed a solution technique that uses ideas from problem decomposition, linear programming, integer programming, and neighborhood search. Comparing our solution with that of in-house software developed by CSX showed that we obtained a savings of over 400 locomotives, which translates into a savings of over one hundred million dollars annually.
- **MC38.2. Ant Colony Systems Applied to Switch Engine Assignment and Routing in a Railroad Yard,** *Jodelson Sabino, Federal University of Espirito Santo, jsabino@escelsa.com.br;*
  This paper explores the application of a multiple ant colony systems meta-heuristic method called COMPETants in railroad yard operations optimization. Some modifications are proposed to make the original algorithm more suitable for use in the railroad yard context. The problem proposed here can be classified as a Full Truckload Capacitated Pickup and Delivery Problem with Time Windows and Capacity Constraints (PTPTWC) and we aim to attend a set of transportation requests with minimal cost**.**
- **MC38.3. Shunting Passenger Train Units in a Railway Station,** *Richard Freling, Erasmus University, Dennis Huisman, Erasmus University Rotterdam, The Netherlands, huisman@few.eur.nl; Leo G. Kroon, The Netherlands, lkroon@fbk.eur.nl; Ramon M. Lentink, The Netherlands, rlentink@fbk.eur.nl*
  In this paper we introduce the problem of shunting passenger train units in a railway station. Shunting occurs whenever train units are temporarily not necessary to operate a given timetable. We discuss several aspects of this problem and focus on two subproblems. We propose mathematical models for these subproblems together with a solution method based on column generation. Furthermore, a new efficient and speedy solution technique for pricing problems in column generation algorithms is introduced. Finally, we present computational results based on real life instances from Netherlands Railways.

MC42. Presentation Withdrawn, Analyzing the Word of Mouth Effect in Customer Lifetime Value and it's Implications to Customers, *Jonathan Lee*

MC42.2. New Presentation, Defining and Measuring Reservation Price: Review, Synthesis and Extrapolation, *Rabikar Chatterjee, University of Pittsburgh, rabikar@katz.pitt.edu, Tuo Wang, University of Pittsburgh, R. Venkatesh, University of Pittsburgh*
There is a lack of consensus on the precise meaning of the reservation price construct and the measurement methodologies to estimate its value. We review and synthesize the relevant literature and offer directions for its measurement. Our conclusion is that the reservation price is best captured by a range of valuations tied to the probability of purchase.

MC42.1. Presentation Revised: Stochastic Variety Seeking as Mixed *Strategies,* *Min Ding,Pennsylvania State University, Smeal College of Bus. Admin., University Park PA 16802, USA, mqd9@psu.edu,*
This paper provides a theoretic explanation for stochastic variety seeking behavior. A framework has been developed and relevant theoretic insights derived. It has been demonstrated that individuals' stochastic variety seeking behavior could be interpreted as mixed strategies that individuals use when facing uncertain utilities (for a given option).

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MD

MD06.1. Lead Author Revised, Strategic Management: Guaranteeing Implementation, *James R. Marshall, Rodney Brim*

MD11. Presentation Withdrawn, A Heuristic Algorithm for Part Input into an FMS, *Yumin He, Richard Dudek, Milton Smith*

MD14.2. New Presentation: **MIP Approach to the Kentucky Voter Redistricting Problem** *Camm, Jeffrey, Professor, University of Cincinnati, jeff.camm@uc.edu, (513) 556-7140; Norman, Susan, Assistant Professor, Northern Arizona University, Susan.Norman@nau.edu*
The goal of the voter-redistricting problem is to partition a state into districts so that the districts have equal populations, are contiguous and compact. We focus on the voter-redistricting problem as defined in the state of Kentucky after the 1990 census. We present two MIP models and examine performance of these models on 10 problems. The tradeoff between the minimum number of cuts and contiguity is examined. Limitations of the models are described.

MD23. New Session, Panel Discussion: Aviation Security: Enough is Enough?, *Arnold Barnett, MIT, Alfred Blumstein, Carnegie-Mellon University, Jonathan Caulkins, Carnegie-Mellon University, Linda Green, Columbia University, Edward Kaplan, Yale University, Richard C. Larson, MIT, Amedeo Odoni, MIT*
Some people assert that current aviation security measures are devastatingly expensive, and serve more to annoy passengers than to protect them. Others, however, see criticisms of these measures as highly exaggerated, and fear that proposed cutbacks raise the risk of another 9/11-like cataclysm. The panel will reveal the correct answer.

MD37.2. Presentation Revised, Optimal Configuration of Production and Procurement Control Policies in Decentralized, Multi-Stage, Multi-Product, Pull Manufacturing Systems, *Cigdem Z. Gurgu, Tayfur Altiok*
Distributed/decentralized manufacturing has been widely used in many supply-chain systems, where semi-finished units are transferred from one facility to another in batches to be processed and passed to another facility. We present an analytical method for performance evaluation of such a market-driven system. This method is later integrated with RSM to optimize production and procurement policies.

MD37.4. **New Presentation, Delay Analysis in Production Systems with Autocorrelated Times to Failure**, *Baris Balcioglu,Rutgers University, bbalciog@rci.rutgers.edu, Tayfur Altiok,Rutgers University, altiok@rci.rutgers.edu, David Jagerman,Rutgers University, jagerman@worldnet.att.net*
We investigate production systems in which the workstations encounter autocorrelated failures. We approximate the autocorrelated failure stream by a renewal stream that preserves its peakedness and rate. Then the process completion time analysis that combines the service time and the repair times is finalized. The completion time variable serves as the service time of the approximating queueing system from which the approximate mean delay of the original production system can be found.

MD39. Lead Author Change, Development and Application of a Simulation-based Dynamic Traffic Assignment Model, *Michael Mahut*

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TA

TA05.4. New Presentation: Contingent Manpower Contracting: Insights from a High Clockspeed Industry, *Bhatnagar, Rohit, Dr., Nanyang Business School, arbhatnagar@ntu.edu.sg*
We present a case study from a high clockspeed industry highlighting the importance of contracting contingent manpower. An LP based model is proposed to address important decision issues such as optimal induction of contingent workers, scheduling of permanent and contingent workers in face of demand ramp up, and the impact of demand variability and worker skill flexibility.

TA07. Presentation Withdrawn, R&D Competency and Industrial Organization, *Korhan Gurkan*

TA12.1. Presentation Revised: Using the Optimal Partition in Assignment Problems, *Allen Holder,Trinity University, Department of Mathematics, 715 Stadium Drive, San Antonio TX 78212, USA, aholder@trinity.edu*
Assignment problems are network optimization models, and these models are often used for nurse and operating room scheduling. We show that the optimal partition `observes' all optimal solutions. Moreover, we show that there is a connection between the parametric analysis of the underlying optimization problem and Hall's Matching Theorem.

TA22.1. New Presentation: **Comparative Analysis of New and Traditional Multi Unit Auctions**, *Mike Freimer, Pennsylvania State University, mbf10@psu.edu; Tim Huh, Cornell University, huh@orie.cornell.edu; Robin Roundy, Cornell University, roundy@orie.cornell.edu; Amar Sapra, School of ORIE, sapra@orie.cornell.edu*
In this paper, we introduce a new sealed-bid multi-unit auction mechanism called, Quasi-Uniform Price Auction and present some theoretical results about it. We present several examples in which we analytically compare performance of different auction mechanisms for acquisitions and mergers and discuss relative advantages of different auction mechanisms.

TA27.5. New Presentation, Analysis of a Decentralized Supply Chain under Partial Cooperation, *Zeynep Alisan*
We are dealing with a distribution system that has one supplier and two independent retailers. We offer a reallocation policy for the retailer orders that both retailers will benefit after the production lead-time. Since each retailer decides its order-up-to level considering other retailer's order-up-to level, this problem has a game theoretical structure. We investigate how beneficial it is to apply this policy instead of behaving independently and how far we are from centralized solution.

TB

TB22.1. New Presentation: **A New Bidding Framework for Combinatorial E-Auctions**, *Jawad Abrache, CRT and Université de Montréal, jawad@crt.umontreal.ca; Benoit Bourbeau, CIRANO, bourbeab@cirano.qc.ca; Teodor Gabriel Crainic, Professor, U.Q.A.M., theo@crt.umontreal.ca; Michel Gendreaum, Professor, Universite de Montreal, michelg@crt.umontreal.ca*
Bidding vocabularies help participants in an electronic auction define their bids and express various requirements on their execution. We propose a new bidding vocabulary for combinatorial auctions based on a two-level representation of a combined bid, and we examine its impact on the mathematical programming formulation of the corresponding allocation problem.

TB22. Presentation Withdrawn, Bidding Decision Analysis Based on Rival Bidders' Incomplete Data, *Gang Feng*

TB23.2. Presentation Updated, What Can We Learn About Research Style from Physics, Medicine and Finance? *Marshall Fisher,The Wharton School, University of Pennsylvania, Dept of Operations and Info Mgt, Suite 1300, 3620 Locust Walk, Philadelphia PA 19104-6366, USA, fisher@opim.wharton.upenn.edu*
Academic physics, medicine and finance have spawned 'big', intellectually deep ideas that have significantly impacted the world, e.g. relativity and the Manhattan project, the germ theory of disease and vaccines, and a theory of capital markets that revolutionalized Wall Street. Operations has had big ideas –Ford's assembly line, the Toyota production system, TQM and statistical process control – but they have not come from academia. Why? And what can we learn from other fields to change this?

TB26. Session Cancelled, Telecommunications Session 3, *Kerem Tomak.*

TB34.2. Presentation Title Revision, Situational Aspects of Attitudes Toward Ambiguity: Why and When are People Likely to be Ambiguity Averse? *Garber, Russ, Stanford University, rgarber@stanford.edu; Pate'-Cornell, Elisabeth M., Stanford University mep@leland.stanford.edu*

TB38.1. Presentation Revised, Tutorial: An Overview of Railroad Operations Research Challenges, Chip Kraft, chipKraft@aol.com, *Michael F. Gorman, University of Dayton, Warren Powell, Princeton University, Dept of Operations Res and Fin Engg, Princeton NJ 08540, USA, powell@princeton.edu*
This tutorial will provide a high-level overview of the state-of-the-practice versus state-of-the-art in railroad-related operations research. Students and other researchers who think they might have an interest in rail OR topics, are encouraged to attend. Sample applications include train dispatching, rail yard operations, service planning and network design, car scheduling, service monitoring and service recovery, revenue management, empty car distribution, locomotive distribution and crew management.

TB38.3. Presentation Revised: Ant Colony Systems Applied to Switch Engine Assignment and Routing in a Railroad Yard, *Jodelson Sabino,Federal University of Espirito Santo, Vitoria ES, Brazil, jsabino@escelsa.com.br*
This paper explores the application of a multiple ant colony systems meta-heuristic method called COMPETants in railroad yard operations optimization. Some modifications are proposed to make the original algorithm more suitable for use in the railroad yard context. The problem proposed here can be classified as a Full Truckload Capacitated Pickup and Delivery Problem with Time Windows and Capacity Constraints (PTPTWC) and we aim to attend a set of transportation requests with minimal cost.

TB42.4. New Presentation: **Digital Convergence: Implications for Product Portfolio and Design Mantena**, *Ravi N. , Stern School of Business, New York University, rmantena@stern.nyu.edu,*
Digital convergence enables the creation of multifunctional products that combine features from offerings of different industries. While presenting an opportunity for value creation and profit growth, this also poses a significant threat due to the increased substitutability between products. We derive the resulting implications for firms' product portfolio and design choices.

TB43.4. New Presentation, Organizational Improvement Using Design of Experiments Techniques, *Zenzen, Fran, Division QA Manager, General Dynamics Decision Systems, fran.zenzen@gd-decisionsystems.com, Borror, Connie, Arizona State University,*

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conni@asu.edu, Davis, Conley, General Dynamics Decision Systems, conley.davis@gd-decisionsystems.com, Keats, J. Bert, Arizona State University, bert.keats@asu.edu
Quality Function Deployment (QFD) is used to identify customer demands and the extent to which Quality Assurance was meeting these demands. Design of Experiments was then used to optimize department performance. This study is believed to be the first published use of DOE with behavioral variables in an organization.

TB44.3. Presentation Lead Author Revised, EPiCS: A Command and Control (C2) Exercise SYstem for Crisis Managers, *Walter Bulter*

TC

TC06.1. Presentation Revised: The Role of Autonomy: Paths to Effective IT Use and Impact , *Carlos E. Urcuyo,University of Toledo, Toledo OH 43606-3390, USA, carlos.urcuyo@utoledo.edu, Xiaodong Deng,Oakland University, School of Business Administration, Rochester MI 48309-4493, USA, deng@oakland.edu, William Doll,University of Toledo, Toledo OH 43606-3390, USA, WDoll@utnet.utoledo.edu*
Autonomy has been recognized as a key factor that determines an individual's job performance by enhancing motivation, encouraging employee growth and development, and facilitating innovation. In today's knowledge-driven economy, realizing the potential of information technology may require that knowledge workers have some autonomy in deciding how they use the computer in their work. User autonomy enables knowledge workers to use the computer more effectively in problem solving/decision support, to adapt or improvise in their work, and, therefore, to enhance their productivity. The information systems literature has not adequately explored user autonomy in knowledge intensive work. The paths or mechanisms by which user autonomy enhances both system-use and technology's perceived impact on innovation and productivity have not been identified. This study presents a model of user autonomy's impacts. The model hypothesizes that user autonomy has a direct impact on productivity and indirect impacts via enhancing the user's IT problem solving capabilities, intrinsic motivation, and innovative efforts. The model is tested using a sample of 152 design engineers. The theoretical and practical significances of the findings are discussed.

TC07. Presentation Withdrawn, Creativity in Strategic Planning: Process vs. Product, *Ronald N. Taylor*

TC10. Presentation Withdrawn, Stochastic Scheduling with Preemptive-repeat Machine Breakdowns, *Xiaoqiang Cai*

TC17.5. New Presentation, Allocating Work in Process in a Multiple Product CONWIP System with Lost Sales, *Sarah Ryan,Associate Professor, Iowa State University, Ind. & Mfg. Systems Eng., , smryan@iastate.edu, Jumpol Vorasayan,Iowa State University, Dept. of Ind. & Mfg. Sys, jumpolv@iastate.edu*
We model a multiproduct CONWIP system as a multiple chain closed queuing network. A nonlinear program evaluates its performance and finds an allocation WIP to product types to minimize the maximum lost sales across types. Results are compared with a more restrictive analytical model as well as simulation.

TC22. Presentation Withdrawn, Application of Random-utility-based Multizonal Input-output Models: Production, Trade, Travel and..., *Kara M. Kockelman, Ling Jin*

TC25.3. Presentation Revised: Scale Effect in Malmquist Productivity Indexes – Applications to Finnish Agriculture
Timo Sipiläinen,Researcher, University of Helsinki, Department of Economics & Management, Finland, timo.sipilainen@helsinki.fi
Scale or volume effect is one of the sources of productivity change. The role of this effect seems to have been partially neglected in the productivity analysis. Several methods and decompositions have been suggested for analyzing the sources of productivity change. In this paper input oriented Malmquist productivity index is adopted and it is decomposed according to Färe, Grosskopf, Norris and Zhang (1994), Ray and Desli (1997) and Lovell (2001). FGNZ approach starts from the changes in the benchmark (constant returns to scale) technology when the starting point of RD is the best practice (variable returns to scale) technology. In the latter approach it is possible to take into account the scale effect in the form of scale change factor instead of scale efficiency change (FGNZ), in addition to technical change and technical efficiency change. In multi-input multi-output case input mix and output mix effects have to be determined when analyzing the scale and volume effect (L). In the empirical data indexes are calculated applying DEA (data envelopment analysis) based output distance functions. The decompositions are calculated and compared in a sample of Finnish dairy farms for 1989-1997. The period is of interest because of the drastic change in agricultural policy when Finland joined the European Union in 1995.

TC40. New Session Chair, Contributed Paper Session 51-S04 – Warehousing and Matl Handling, *Rene de Koster*

TC42. New Session, Revenue Management II, Chair: Cope, Eric
Stanford University, ericcope@stanford.edu,

TC42.1. New Presentation Revenue Maximization in a Stochastic Environment *Cope, Eric, Stanford University, ericcope@stanford.edu*
A vendor has an unlimited quantity of single-item goods for sale in successive time periods. Demand for the goods is constant over time but unknown, and the vendor wishes to maximize total discounted revenue by sequentially adjusting the price. Heuristic nonparametric Bayesian methods are introduced which use Dirichlet processes as priors on the distribution of customers' reservation prices. These methods are shown to be robust and compare favorably with certain "upper bound" strategies

TC42.2. New Presentation, Adding Variance to the Demand in Dynamic Programming, *Walczak, Darius, Scientist, PROS Revenue Management, dwalczak@prosrm.com*
Practitioners sometimes show reluctance to apply DP models in Revenue Management citing difficulty in modeling high-variance, real-life customer demand. We propose one method to address it by suitably adding variance to the demand and slightly generalizing the DP formulation while keeping desired structural properties intact. We include a numerical example with an application to a popular model with Poisson demand.

TC42.3. New Presentation, The Revenue Performance of Randomized LP Under Stochastic Capacities, *Enders, Johannes, Scientist, PROS Revenue Management, jenders@prosrm.com, Oosten, Maarten, Senior Scientist, PROS Revenue Management, moosten@prosrm.com*
Stochastic capacities are a little explored topic in revenue management. They occur for example in half open rail networks. Existing randomized linear programming approaches to compute network displacement costs assume stochastic demands and deterministic capacities. We explore the revenue performance of an approach with stochastic demands and stochastic capacities.

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TD

TD07.4. New Presentation: **New Knowledge Creation in Interdisciplinary Communities of Innovation**, *Cockayne, William, Stanford University, bill@cockayne.com*
This paper explores knowledge creation in interdisciplinary communities of innovation. It presents multiple ethnographic studies of idea creation and team formation through early interactions. The knowledge is measured through artifacts at a pre-diffusion stage of innovation. The communities exist across multiple organizations and locations throughout the world; are focused on implementing the new ideas for economic innovation; and work in different areas of science, technology and integration.

TD08. Presentation Withdrawn, Online Price Competition Strategies, *Cenk Kocas*

TD09. Presentation Withdrawn, Supplier Investment in Reduced Buyer Search Cost in Electronic Commerce, *Larry Arnold*

TD10.1. Presentation Revised: The Impact of Information Sharing on Forecasting Accuracy in a Multi-stage Supply Chain with Stationary Demand, *Yao Zhao,Northwestern University, 2145 Sheridan Road, MEAS C210, Evanston IL 60208-3119, USA, yzh841@casbah.acns.nwu.edu David Simchi-Levi,Professor, MIT, Dept. of Civil and Env. Engineering, 77 Massachusetts Ave., Rm. 1-171, Cambridge MA 02139, USA, dslevi@mit.edu*
We consider a distribution system with a single manufacturer, a single distribution center and multiple retailers in infinite time horizon. We characterize the impact of sharing individual retailers' demand information on the manufacturer's forecasting accuracy.

TD21.4. New PresentationEmpirical Comparison of Adaptive Long Term Asset Allocation Strategies, *Frank Siereveld, Portfolion Corporation, frank@siereveld.com*
This paper analyzes various adaptive asset allocation strategies, using real and simulated historical data, and incorporating a discrete stochastic dynamic programming technique. We compared buy and hold, fixed mix, and adaptive trading strategies. We conclude that adaptive multi-period strategies are superior to static single period strategies in terms of risk-adjusted performance, and that piecewise-linear utility functions can improve downside protection.

TD21.5. New Presentation: **Valuing Options with Transaction Cost: A Simplified Approach,** *Kazuhiro Ninomiya, Stanford University kaaz@stanford.edu*
We present a simple discrete-time, discrete-space framework for valuing options when there is transaction cost in the underlying assets. We propose a comprehensive option pricing method we call 'Optimal Hedge Pricing' that combines the concepts of utility maximization and arbitrage-free option pricing via a replication argument. For an efficient and straightforward numerical procedure, we offer a stochastic linear programming formulation that fares well with the framework.

TD26. Presentation Withdrawn, Design of Telecommunication Networks with Unreliable Components, *Abdullah Konak*

TD26. Presentation Withdrawn, A Connectivity Decision Support System Framework for Wireless Networks, *Michael Bartolacci*

TD27. Presentation Withdrawn, The impact of Flexibility on Supply Chain Agility, *Patricia Swafford, Soumen Ghosh, Nagesh N. Murthy*

TD31.2 Lead Author Change, Recent Directions on the Integration of Mathematical Programming and Constraint Programming, *Inout Aron, Carnegie Mellon University*

TD37.5. New Presentation: **Lotsize- reorder policy for perishables** *Gurler, Ulku, Bilkent University, ulku@bilkent.edu.tr*
Lotsize reorder policies are considered for perishables with fixed lifetimes and positive replenishment leadtimes. Using a renewal theoretic approach, effective shelflife distribution and operating characteristics are obtained when there are more than one outstanding orders. Numerical results are provided.

TD38.5. New Presentation, A Set Partitioning Approach to determine the Minimum Number of Vehicles Required, *Vis, Iris F.A., assistant professor, Vrije Universiteit Amsterdam, ivis@feweb.vu.nl*
We formulate the problem of determining vehicle requirements under time-window constraints as a set-partitioning problem. Firstly, an efficient search method is developed to find all possible combinations of loads to betransported by one vehicle, such that the loads are transported in time. Using these directed paths an incidence matrix can be constructed. With this incidence matrix the minimum number of vehicles can be determined.

TD43.4. New Presentation, The Efficiency of Observing Residual Lifetimes When Estimating *Weibull Parameters, Miller, Greg, Associate Professor of Statistics, Stephen F. Austin State University, miller@math.sfasu.edu*
We show that observations on residual life times can be cost efficient when compared to collecting data on time between events in a renewal process. We give a completely analytical treatment to this problem in the case that the time between events follows the popular Weibull distribution. We discuss scenarios where partially observing the renewal process is a superior sampling plan for the sake of parameter estimation. Applications to repairable systems modelling are provided.

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WA10.5. New Presentation: Optimality Conditions for Fuzzy Scheduling Rules, *Ertunga Ozelkan, Visiting Assistant Professor, The University of Texas at Dallas, ertunga.ozelkan@utdallas.edu*
The scheduling rules such as the shortest processing time (SPT) and earliest due date (EDD) may not always yield optimal solutions in a fuzzy environment. This paper provides an overview of the required optimality conditions for fuzzy scheduling rules with examples from the single machine fuzzy completion time and lateness, and two-machine flow shop problems.

WA11.5. New Presentation, Dynamic Capacity Partitioning During New Product Introduction, *Huang, Pu, GSIA, pu@andrew.cmu.edu; Scheller-Wolf, Alan, Associate Professor, GSIA, awolf@andrew.cmu.edu; Tayur, Sridhar, Professor, Carnegie Mellon University, stayur@andrew.cmu.edu*
We embed a Hidden Markov Model within a discrete time capacitated production-inventory system to estimate the demand for a new product while partitioning capacity between it and an extant product. For a wide range of problem formats we characterize the optimal capacity allocation policy by proving that costs are jointly convex in initial inventory level and capacity. We develop an effective procedure to solve the capacity allocation and demand estimation problems simultaneously. Computational studies show that the advantages of this integrated decision making can be significant.

WA14.3. New Presentation: A multi-commodity flow network design problem with economies of scale, *Oded Berman, University of Toronto, berman@rotman.utoronto.ca; Halit Uster, Texas A&M University, uster@tamu.edu*
We consider a particular logistics network structure that emphasizes the benefits due to scale economies. We provide an IP model for the corresponding network design problem and a heuristic solution procedure. We also present some numerical results.

WA14.4. New Presentation: Multicommodity Flow Problem with Time Windows and Circular Schedules, *Lee Mitchell, Programmer Analyst, UPS, app3lam@ups.com, 812-941-8784; Patricia Neri, , O. R. Analyst, UPS, pnerib@aol.com*
The Sleeper Scheduling System builds schedules for a major transportation carrier company where these schedules have to satisfy many realistic constraints. The problem is modeled as a Multicommodity Flow Problem with Time Windows and Circular Schedules. Constraint Programming and Column Generation approaches were used to solve this problem. How these two methods were used and the results obtained with them are compared.

WA15.3. Presentation Revised, Partition and Cut: New Class of Cutting Planes for 0-1 Programming, *Osman Oguz*
The basic principle of cutting plane techniques is to chop away the portions of the solution space of the linear programming relaxation of an integer program which contain no integer solutions. We propose a new class of cuts, and an algorithm based on these cuts allowing the discarded portions to contain both feasible and infeasible integer points. Some computational experimentation with the method is also reported.

WA19.2. New **Presentation**: **Alternative Designs for Transmission Contracts: Market Power and Uncertainty in a Two Stage Model.** *Maria Martoccia, London Business School, mmartoccia@london.edu*
The paper analyses different formulations of transmission contracts in the presence of uncertainty and market power. Despite an extensive literature, the effects of uncertainty over the multi-period settlements that characterise the trading of electricity have still been unresolved. This analysis uses a two-stage stochastic optimization formulation. Alternative market designs are simulated to evaluate how they affect the behaviour of generators.

WA25. Session Moved to MA25, Contributed Paper Session 22-S01 - Data Env. Analysis I, *Chair: W. W. Cooper*

WA26. New Session: Planning Growth and Diversification, Chair: Lee, Dong-Hyun, *Associate Professor, The Catholic University of Korea, dhlee67@catholic.ac.kr*

WA26.1. New Presentation: **An Anatomy of Relatedness in Diversification: From Relatedness Seeker to Relatedness Creator**, Dong-*Hyun Lee, Associate Professor, The Catholic University of Korea, dhlee67@catholic.ac.kr, 82-32-340-3232.*
Existing studies have paid much attention to the static aspect of diversification strategies such as the seeking of relatedness, but neglected the dynamic aspect of diversification strategies such as the creating of relatedness. To contribute to developing a dynamic model of diversification strategy, this paper proposes a new perspective of diversification with which to evaluate the relatedness between the existing and new businesses.

WA26.2. New Presentation: **Operations Expansion Planning at a Leading Canadian Investment Counselling** *Kelly FirmChung, MSc. Candidate, Centre for Operations Excellence, kchung@coe.ubc.ca, Martin L. Puterman, University of British Columbia, marty@coe.ubc.ca*
A financial management firm currently operates four offices in Canada. The firm is seeking to increase its market share of private investors in a number of other Canadian cities over the next 10 years. A critical decision must be made as to the most cost effective method of expanding their operations to service the new markets. The objective of this study is to develop a scenario analysis tool to identify a strategic hiring and growth plan to optimize long-term profitability.

WA28.5. Co-Author added, The Influence of Wholesale Discounts on the Manufacturers Profitability *David Simchi-Levi, Ekaterina Lesnaia*

WA29. New Session; Supply **Contracts Chair: Savaskan, Canan**, *Assistant Professor, Kellogg School of Management, r-savaskan@kellogg.nwu.edu*

WA29.1. New Presentation: **Coordination of Customer Satisfaction and Capacity Allocation with Cost Analysis,** *Nianpin Cheng, Lehigh University, nic5@lehigh.edu, Mingzhou Jin, Assistant Professor, Mississippi State University, mjin@ie.msstate.edu, Jeffry Moore, Agere Systems, jeffrymoore@agere.com, Robert Storer, Professor, Lehigh University, rhs2@Lehigh.edu*
An IP model is presented to coordinate the manufacturing and marketing departments in setting customer satisfaction levels while utilizing current capacity efficiently, and to estimate the present costs of customer satisfaction policies and the long-term loss for current capacity utilization. An incentive scheme addresses information asymmetry and interest confliction.

WA29.2. New Presentation: **Contract Constrained Resource Allocation** Phillip *Bradford, Professor, Department of Computer Science, pgb@cs.ua.edu, (205) 348-6343,* ***Michael*** *Katehakis, Professor, Rutgers, mnk@andromeda.rutgers.edu, 9733535295*
The problem studied is that of how to allocate a limited supply of a resource to more than one retailer where the allocation must abide by contract constraints. This analysis yields solutions to inventory allocation in a centralized distribution system with multiple retailers. That is, one manufacturer in the presence of supply contracts when the demand for the resource at each station is random.

WA29.3. New Presentation: On Supply Contracts with Default Risk, *Volodymyr Babich, Case Western Reserve University, vob2@po.cwru.edu, Apostolos Burnetas, Associate Professor, Case Western Reserve University, AtB4@po.cwru.edu, (216) 338-4778, Peter Ritchken, Professor, Case Western Reserve University, phr@po.cwru.edu*

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We consider contracts between a retailer and suppliers subject to default. For a single supplier we analyze the effect of default risk on the equilibrium quantity and show that it is independent of the payment arrangements. For several identical competing suppliers the equilibrium follows from an equivalent problem with a single supplier. We also present results for non-identical suppliers. Here the retailer trades off diversifying credit risks against not selecting the lowest cost supplier.

WA32.5 New Presentation: *An Experimental Validation of the Factors Constituting Structural Complexity in Multiple Model Metho*, *Akhilesh Bajaj, Assistant Professor, Carnegie Mellon University, akhilesh@andrew.cmu.edu*
We review earlier work on evaluating the complexity of modeling methods in systems analysis and design. We highlight unanswered questions and present a set of metrics to measure complexity. We present a novel methodology to empirically validate these metrics. From a methodology standpoint, this research breaks new ground in that it is the first work to empirically validate not any particular modeling method, but rather to validate metrics that can be applied to evaluate any modeling method.

WA33.5. Lead Author Revised: Application of Simulation to Strategic Planning in an Uncertain World, *Rick Kossik, GoldSim Technology Group, 18300 NE Union Hill Rd., Suite 200, Redmond WA 98052, USA, rkossik@goldsim.com*

WA36.4. New Presentation: Heavy-Traffic Approximations for the Maximum of Perturbed Random Walk, *Victor F. Araman, New York University, varaman@stern.nyu.edu; Peter F. Glynn, Stanford University, glynn@stanford.edu*
A perturbed random walk is obtained by taking an ordinary random walk and adding to it a stationary sequence of perturbations; such processes arise in production, telecommunications, and risk settings. We shall describe the distribution of the maximum of a perturbed random walk, for both light-tailed and heavy-tailed perturbations, in which the ordinary walk's drift is close to zero and negative.

WA41. New Session: Current Issues in Logistics Chair: Loomba, Arvinder, *Professor, San Jose State University, loomba_a@cob.sjsu.edu, 408-924-3578*

WA41.1. New Presentation: Transformation of Supply Channels in Heavy Logistics, *Erkki Hamalainen, Researcher, Helsinki School of Economics/Logistics, hamalain@hkkk.fi, +358-9-4313 8326*
Product characteristics such as bulkiness and complexity demand different capabilities from supply channel operators in heavy logistics. Among them are product choice, delivery speed and processing capability. Our research shows that steel distribution includes three development periods with different combination capabilities. Analogy to paper industry and sawn goods exists.

WA41.2. New Presentation: **Effectiveness of 3PL relationships in Silicon Valley Firms**, *Arvinder Loomba, Professor, San Jose State University, loomba_a@cob.sjsu.edu;* ***Sumeet*** *Solanki, Graduate Student, San Jose State University, sumeetsolanki@yahoo.com*
Increasingly Silicon Valley firms are using Third Party Logistics (3PLs) firms for their supply chain needs. In a changing market scenario, firms are demanding more and more—like IT and E-commerce services—from their 3PLs. In other cases with logistics efficiency / effectiveness deteriorating, firms are questioning their decision to employ 3PLs. This paper reviews current practices in 3PL relationships in Silicon Valley with implications for the future.

WA41.3. New Presentation: **Short Term Storage of Goods in Cross-docking Operations**, *Kees Jan Roodbergen, Rotterdam School of Management, k.roodbergen@fbk.eur.nl*
We focus on the process of short-term storage in cross-docking operations. The goal is to determine storage locations for incoming pallets such that the travel distances of the forklift trucks with loads are minimized. We model this problem as a network and solve it as a minimum cost flow problem.

WA43.3. New Presentation: **A hybrid approach to physician-detailing planning using non-linear programming and neural networks** Gnana *Anandalingam, University of Maryland, ganand@rhsmith.umd.edu, Levi Sorrell, Director of Business Intelligence & Analytics, Johnson & Johnson, lsorrell@janus.jnj.com, John Yi, Manager of Sales Analytics, Johnson & Johnson, yij@seas.upenn.edu*

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WB06.3. New Presentation: **Organization Redesign for Production Effectiveness**
Freed, Tali , Assistant Professor, California Polytechnic State University, tfreed@calpoly.edu, 805-756-2544; Stebbins, Michael, Professor, California Polytechnic State University, mstebbin@calpoly.edu, 805-756-1416
We present a case study in organization design at a major electronics manufacturer. The company has been successful in obtaining profitable R&D contracts, but less successful in obtaining production contracts. The case outlines the process used by the company to redesign its organization structure in order to improve production effectiveness.

WB11. New Session: Lot Sizing. Chair: Berk, Emre, *Assistant Professor, Bilkent University, eberk@bilkent.edu.tr*

WB11.1. New Presentation Lot-Sizing under Constant Demand, Infinite Horizon with Learning & Forgetting: Study of Convergence, *Chand, Suresh, Professor of Operations Management, Krannert School of Management, suresh@mgmt.purdue.edu; Teyarachakul, Ms. Sunantha, Ph.D. Student in Operations Management, Purdue University, teyarach@mgmt.purdue.edu, Ward, James, Professor in Operations Management, Krannert School of Management, jw7402@mgmt.purdue.edu*
Globerson & Levin ("Technical Paper: Incorporating Forgetting into Learning Curves." IJOPM, 87), in a model with constant demand and fixed lot size, conclude that the cycle production time converges to a unique value, based on numerical examples. We continue their study by providing a mathematical proof of existence of the convergence of cycle production time. We found that the production time does not necessarily converge to a unique value; but could alternate between two values.
/ Lot-Sizing under Constant Demand, Infinite Horizon with Learning & Forgetting

WB11.2. New Presentation: Dynamic Lotsizing Problem: Revisited with Warm/Cold Processes; *Berk, Emre, Assistant Professor, Bilkent University, eberk@bilkent.edu.tr*
The Manne-Wagner-Whitin problem is revisited in the presence of production quantity dependent setup costs, such that setup cost in a period is zero if production done in the previous period is larger than a prespecified value. The structure of the optimal production schedule and planning horizons are presented. An o(N) search routine is proposed for a special case

WB11.3. New Presentation Modeling and Solving Batch Sizing and Scheduling Problems, *Monique Guignard, Professor, Wharton School, Univ. of Pennsylvania, guignard@wharton.upenn.edu; Wang, Siqun, Ph.D student, Wharton School, Univ. of Pennsylvania, siqun@wharton.upenn.edu*
We build discrete- and continuous-time MILP and LP formulations related to minimizing makespan in capacitated batch sizing and scheduling problems in process industries. Using each model in turn, we obtain tight lower bounds and construct good feasible solutions step by step in a modular fashion for the Bloemer-Guenther and Westenberger-Kallrath benchmark data.

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WB14. Presentation Withdrawn, A Face-Point Based Algorithm for Linear Programming Problems, *Rua-Huan Tsaih*

WB18. New Session: Nonlinear Programming III Chair: Alizadeh, Farid, *Professor, Rutgers University, alizadeh@rutcor.rutgers.edu*

WB18.1. New Presentation: Discrete Bilevel Programming: Application to a Gas Shipper's Problem, *Dempe, Stephan, Prof.Dr. Freiberg University of Mining and Technology, dempe@math.tu-freiberg.de Kalashnikov, Vyacheslav , Professor, Technological Institute Monterrey, kalash@itesm.mx*
In this paper, we present a mathematical framework for the problem of minimizing the cash-out penalties of a natural gas shipper. The problem is modeled as a mixed-integer bilevel programming problem. To solve it efficiently, we re-formulate it as a standard mathematical programming problem making use of an exact penalty function approach and describe a branch-and-bound algorithm for its solution.

WB18.2. New Presentation: On the regularity condition for vector programming problems *Amahroq, Tijani, Cadi Ayyad University, amahroq@fstg-marrakech. Ac.ma; Gadhi, Nazih, Cadi Ayyad University, gadhi@math.net*
This paper deals with a regularity assumption for the existence of Lagrange Multiplier for the problem of minimizing an application f on the solution set of an inclusion 0 in F(x) where f and the support function of set valued map admit first order approximations. Some results concerning the regularity above are also established.

WB18.3. New **Presentation: An Algorithm for Perturbed Second-Order Cone Program** *Alizadeh, Farid, Professor, Rutgers University, alizadeh@rutcor.rutgers.edu Xia, Yu, Business School, yuxia@pegasus.rutgers.edu*,
The second-order cone program is reformulated into systems of equations. The iterates of semismooth Newton's method converge quadratically. It is good for "warm start". Numerical examples are provided to support the theoretical results. The algorithm is further extended to SDP.

WB21. New Session: Options Valuation, Chair: Dalakouras, Georgios, *Visiting Assistant Professor, Worcester Polytechnic Institute, gbdalako@umich.edu*

WB21.2. New Presentation: **Service Sector Pricing Decisions - A Real Options Approach,** *Miller, Luke, Auburn University, millelt@eng.auburn.edu, 334-844-1419**:** Park, Chan, Auburn University, park@eng.auburn.edu, 334-844-1428*
Revenue management in the service sector requires a market-based, proactive treatment of pricing decisions. A real options framework is proposed as a technique to value the strategic pricing flexibility. A unifying taxanomy of service pricing practices is discussed in a real options context, and standard option valuation tools are applied to strategic service sector pricing scenarios.

WB21.1. New Presentation: **Robust Optimization: Norms, Convexity, and Applications** *Bertsimas, Dimitris J. , Professor of Operations Research, Sloan School, MIT, dbertsim@MIT. EDU, 617-253-4223**:** Pachamanova, Dessislava, Assistant Professor of Operations Research, Math/Science Department, Babson College, dpachamanova@babson.edu, Sim, Melvyn, Massachusetts Institute of Technology, melvyn@mit.edu, 617-253-6185*
We derive the robust counterparts of linear optimization problems when coefficients are uncertain and are assumed to vary in bounded sets determined by different definitions of the distance between possible realizations and nominal coefficient values. Computational experiments indicate that modeling uncertain data in this way results in improved performance of some portfolio optimization techniques, such as shortfall minimization.

WB21.3. New Presentation: **A new Convexity-based Fast and Robust Algorithm for Pricing and Hedging Asian Options** *Dalakouras, Georgios, Visiting Assistant Professor, Worcester Polytechnic Institute, gbdalako@umich.edu*
Pricing of contracts that depend on underlying assets, known as financial derivatives, is a main area of financial engineering. One specifies a process followed by a "stock", and values contracts that depend on this price. The Asian option is an exotic contract with value depending on the average price of the stock. We describe some of the difficulties that arise in these options and propose new methods for pricing. We exploit convexity to get an extremely fast and accurate, and at the same time conceptually simple, algorithm.

WB25. Session Moved to MC25, Contributed Paper Session 22-S02 - DEA Applications, *Chair: Donna Retzlaff-Roberts*

WB28.4. New Presentation: Buffering Operations and Productivity Improvement, *Quasem, Mohammad, Associate Professor, Howard University, mquasem@howard.edu*
Productivity is defined as a measure of the effectiveness use of resources. This paper discusses the overall purpose and benefits of the installation of buffers with continuous material flow production line models. In order to improve the productivity, the system needs uninterrupted processing product from one work station to the next, varying the required work pace to achieve the minimal amount of baglog possible. In this study the system availibility for the model evaluated.

WB29. New Session: **Supply Contracts Chair: Savaskan, Canan, Assistant** *Professor, Kellogg School of Management, r-savaskan@kellogg.nwu.edu*

WB29.1. New Presentation An Analytical Study Of The Q(s, S) Policy Applied On The Joint Replenishment Problem, *Larsen, Christian, Professor, Aarhus School of business, chl@asb.dk; **Nielsen**, Christina, Ph.D. Student, Aarhus School of Business, christina.nielsen@anderson.ucla.edu*
We work out an analytical solution procedure to evaluate the performance of a joint replenishment inventory control policy, called the Q(s,S) policy, which was first suggested and characterized by Viswanathan (1997). The performance of the Q(s,S) policy is compared with the performance of other known joint ordering policies as in Pantumsinchai (1992) and Viswanathan (1997). It is shown that the Q(s,S) policy performs best among the considered policies.

WB29.2. New Presentation Optimal lifecycle sourcing strategies for products, *Shen, Yuelin, DBA candidate, Boston University, School of Management, ylshen@bu.edu, Willems, Sean, Assistant Professor, Boston University, willems@bu.edu*
This paper investigates how to effectively apply multiple sourcing strategies across a product lifecycle. Hybrid sourcing refers to a sourcing strategy that switches between part types during the product lifecycle. We determine optimal single and hybrid sourcing strategies in single and multiperiod settings, providing insight into benefits of each policy.

WB30.3. New Presentation: Complementarities in the Retail Supply *Chain Huang, Xiaowen, Phd Candidate, University of Minnesota, Operations and Management Science, xhuang1@csom.umn.edu; Sinha, K. K. , Professor, University of Minnesota, ksinha@csom.umn.edu*
Never has so much technology and brainpower been applied to improving supply chain performance, yet the performance of many supply chains has never been worse. We will examine the complementarities between retail supply chain technologies and operational practices, and its implications for retail store performance. Food retailing will be the empirical context of our study.

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WB28.2. Presentation Moved to MC11.4, A Nested Branch & Price Model for Prescribing the Optimal Design of a Circuit Card Assembly, *Depak Warrier, Wilbert Wilhelm*

WB30.4. New Presentation, Perspectives to Supply Chain Management, *Anu Bask,Helsinki School of Economics, P.O.Box 1210, Helsinki FI 00101, Finland, abask@hkkk.fi*
Recent Developments in the areas of strategies, channels, processes and relationships show pressures that call for attention to the various dimensions and varying intensities in supply chain management (SCM). We will discuss of intensities in integration e.g. SCM framework offered from the academia and the role of third-party logistics.

WB33. New Session: Decision Analysis I, *Chair: Mike Voth*

WB33.1. New Presentation, Giving For Greatest Benefit, *Thomas W. Keelin, Decision Education Foundation, tomk@decisioneducation.org*
This paper shows how one philanthropic organization, the Keller Family Foundation, allocates resources among specific, but very different, giving opportunities – a college education for a deserving person, a house for a deserving family, decision skills for teenagers for a lifetime (see www.decisioneducation.org.). Resource allocation methods proven in business (see author's article, HBR, Mar-Apr '98) are leveraged with value function assessment methods tailored to philanthropic giving.

WB33.2. New Presentation: The Design of Staged Commitments, *Mike Voth, Stanford University, mikev@stanfordalumni.org*
To make staged commitments of resources in an optimal way, one must trade off the flexibility afforded by smaller commitments against potentially significant costs of review. In decision analysis practice, this trade-off is typically addressed only informally as part of problem formulation. We develop a general and tractable approach for explicitly formulating and solving staged commitment problems using a Markov Decision Process framework.

WB42.2. New Presentation; Adaptive Sampling to produce a Consensus on the Best Ideas, *Donoho, Miriam, San Jose State University, donoho_m@cob.sjsu.edu*
I will speak about an interesting new survey-like process that has arisen from the Internet Era. The problem is to efficiently find the best few ideas out of hundreds or thousands about a product or service. To do this, a Silicon Valley company enrolls individuals in a web-based survey in which participants volunteer ideas and other participants rank the idea against others that have been proposed. By an adaptive sampling process -- ideas which have proven more popular in recent experience are shown more often for rankings -- more data is collected about highly ranked ideas than about others. I will discuss the connections between this problem and classical ranking and selection, and some analysis which suggests good ways to efficiently sample to produce a correct ranking of the top few ideas.

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