Edelman Awards Gala

THE FRANZ EDELMAN AWARD
Achievement in Operations Research

THE INFORMS PRIZE
Sustained Integration of Operations Research

THE DANIEL H. WAGNER PRIZE
Excellence in Operations Research Practice

April 11, 2011

Chicago, Illinois

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The Edelman Awards Gala

2011 Franz Edelman Award Ceremony

Welcome

Cynthia Barnhart, Master of Ceremonies

Presentation of the Wagner Prize

C. Allen Butler, Chair, 2010 Wagner Prize Committee

Presentation of the Informs Prize

Erica Z. Klampfl, Chair, 2011 INFORMS Prize Committee

Introduction of the UPS George D. Smith Prize

Rina Schneur, INFORMS President

Randy Stashick, Senior VP for Engineering, UPS

Presentation of the Franz Edelman Academy

Cynthia Barnhart, Master of Ceremonies

The Franz Edelman Competition

Cynthia Barnhart, Master of Ceremonies

Recognition of the Class of 2011 Franz Edelman Finalists and Laureates

Cynthia Barnhart, Master of Ceremonies

Announcement of the 2011 Franz Edelman Award Winner

Rina Schneur, INFORMS President

Stephen Graves, 2011 Edelman Competition Chair

Master of Ceremonies

Cynthia Barnhart



At MIT, Cynthia Barnhart is the Ford Professor of Engineering and Associate Dean for Academic Affairs in the School of Engineering, Professor of Civil and Environmental Engineering and Engineering Systems, and director of Transportation@MIT.

Cynthia Barnhart is no stranger to the Edelman competition. She worked with a Franz Edelman team from UPS, which was awarded the Franz Edelman 2nd prize in 2003 for work optimizing the air network of the major package delivery company.

Barnhart is a former president of INFORMS. During her term, she introduced a program called "Doing Good with Good O.R.," which involved operations researchers addressing grand challenges with the goal of having major societal impact.

Barnhart is a member of the U.S. National Academy of Engineering and has also served at MIT as Interim Dean of the School of Engineering, and co-director of both the Center for Transportation and Logistics and the Operations Research Center. She has served in editorial positions for *Operations Research*, *Transportation Science*, and *Management Science*, as president of both the INFORMS Women in Operations Research/Management Science Forum and the INFORMS Transportation Science and Logistics Society, and as the liaison between the INFORMS Transportation Science Section and the INFORMS Aviation Applications Special Interest Group. Barnhart has been awarded the INFORMS Award for the Advancement of Women in Operations Research and Management Science and the Best Paper in Transportation and Logistics; the Mitsui Faculty Development Chair; the Junior Faculty Career Award from the General Electric Foundation, and a Presidential Young Investigator Award from the National Science Foundation.

Barnhart's work has been published in several books and in research journals such as *Transportation Science*, *Operations Research*, *Mathematical Programming*, and *Annals of Operations Research*. At MIT, she has developed and taught courses entitled, "Carrier Systems," "Optimization of Large-Scale Transportation Systems," "Transportation Systems Analysis," "Airline Schedule Planning," and "The Airline Industry." Each course describes models and methods for designing, planning, analyzing, and operating transportation and logistics systems.

Barnhart's teaching and research interests involve the development of optimization methods for large-scale transportation and logistics problems. Her approaches often require the development of new models and algorithms, and their implementations in real operating environments. Her research foci include integrated schedule planning, robust scheduling and real-time re-planning.

Barnhart earned a B.S. degree from the University of Vermont in 1981, and her S.M. and Ph.D. degrees from the Massachusetts Institute of Technology in 1985 and 1988, respectively.

Smarter technology for a Smarter Planet:

The anatomy of a decision.

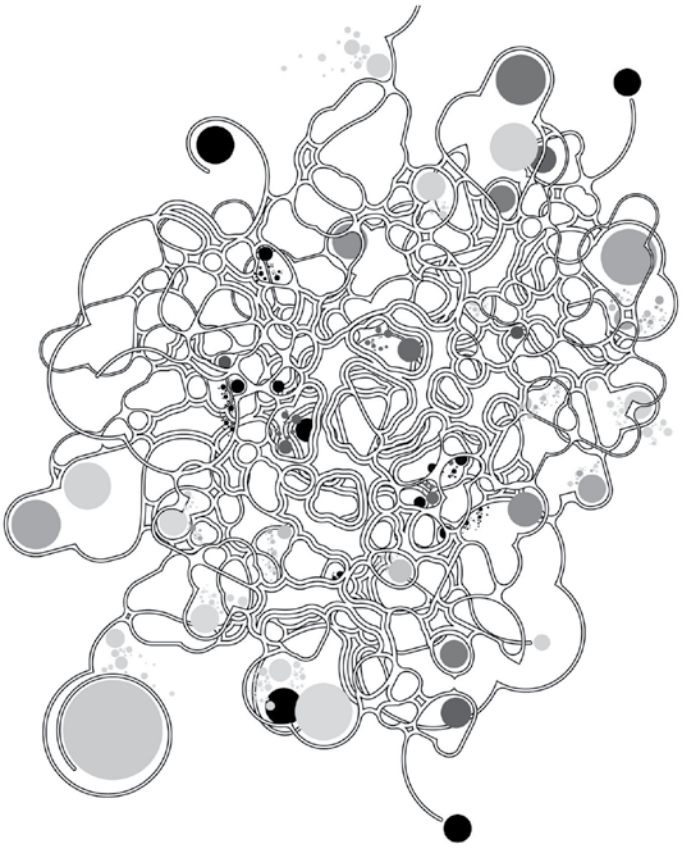
Our increasingly connected world is generating 15 petabytes of data a day. What if you could harness all that information to test new strategies and make better decisions? On a smarter planet, you can.

Today, with computation times compressed from days to seconds, Operations Research is becoming accessible to not only scientists and engineers, but business leaders as well—fundamentally redefining how real-world companies meet their performance goals.

Together with the advanced analytics and consulting expertise of IBM Research and Global Business Services®, IBM's industry-leading ILOG® Optimization technology is allowing businesses to take the guesswork out of decision making. Already, over 1,300 corporations and government organizations are using IBM ILOG CPLEX® Optimization Studio, a complete toolkit for mathematical and constraint programming, featuring a powerful IDE, modeling language, APIs and 3rd party connectors. And now with a connector to IBM SPSS Modeler, IBM offers an integrated toolkit bringing together predictive and prescriptive analytics capabilities.

A smarter business needs smarter software, systems and services.

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The Operations Research Profession

Introduction

by Rina Schneur, Verizon
President of INFORMS

An Analytical Journey

What do the New York State Department of Taxation, Latin America's largest shipping line, a Midwestern energy consortium, a leading international hotel chain, a top construction firm, and the leading bank in China have in common?

They are this year's Franz Edelman Award finalists for achievement in operations research, and we celebrate them tonight—along with the winners of the Daniel H. Wagner Prize and the INFORMS Prize—for their important contributions to business, government, and the public sector.

Just reviewing the powerful industries represented at this 40th Edelman competition provides a window into the way that advanced analytics and O.R. change our world for the better. These teams demonstrate the nearly unlimited potential of analytics to improve any enterprise.

Fulfilling that potential is a challenge in itself. Many of us who have been excited about a potential O.R. project have discovered how much effort is necessary just to identify and convince a decision maker—one executive who will be our champion—how much we can contribute. Of course, as we see from tonight's finalists, the effort is worth it.

We know that the necessary investment and effort in O.R. are small compared to the substantial impact of the results. As General Motors' Jeffrey Alden shows elsewhere in this program book, the contributions of operations researchers in the Edelman finalist teams alone exceeds $170 billion since the competition's inception in 1972.

As operations researchers, we have set out on a journey. It's a journey that involves many crucial steps—deeply understanding the problem in hand; modeling the problem in an analytical and often mathematical way; collecting usable data; examining the data and developing solutions; and, as a final step, putting the

results in the hands of those who will use them.

Tonight's Edelman finalists, along with their distinguished predecessors, give testimony to why we have set out on this journey, and how far we have come.

CSAV, the major Chilean shipper, confronted a classic challenge of making the best use of sending shipping containers full of products and avoiding the unprofitable enterprise of returning them empty. Fluor, the construction firm, faced up to the challenge of minimizing the cost and rancor that come when significant changes must be made to major projects.

Knowing that rapid expansion can be as threatening to a company as any business risk, the Industrial and Commercial Bank of China set out to plan carefully for growth in China's burgeoning economy. InterContinental Hotels Group, known for brands like Crowne Plaza Hotels and Resorts, used revenue management and price optimization to handle varying demand for hotel rooms at a time when the economy had driven occupancy down.

Midwest Independent Transmission System Operator, an energy cooperative, used O.R. to increase reliability and efficiency among power plants in 13 American states and a Canadian province. New York State, like nearly all the other states in the union suffering a fall in revenue in this recovering economy, used O.R. to bring order and method to the collection of delinquent taxes.

Tonight's Edelman finalists share the spotlight with the winners of two prestigious INFORMS awards. The INFORMS Prize is awarded to an organization for the body of its work, recognizing effective integration of operations research/management sciences in an enterprise. This year, Sasol, one of last year's Edelman finalists, returns to accept our prize for overall excellence.

A team from the IBM Thomas J. Watson Research Center will accept the Daniel H. Wagner Prize for Excellence in Operations Research. Their winning work is entitled "OnTheMark: Integrated Stochastic Resource Planning of Human Capital Supply Chains."

This year we salute a new practice prize at its inception. UPS is introducing the George D. Smith Prize, named in memory of its legendary leader, for effective and innovative preparation of students to be good practitioners of operations research. We are grateful to this leader in its field for encouraging schools to graduate the next generation of analytical leaders.

I hope that we can use the momentum and excitement of tonight's event and carry it forward tomorrow and the next day and the next. I've stood before the Edelman judges myself; hence, I know personally that participating in the competition is a daunting undertaking. All the more reason for me to thank the participants, judges, and coaches, and to congratulate the finalists and winners who have done so much. It's wonderful that you can receive the thanks you deserve.



together

we make the world better.
congratulations to the
2011 edelman finalists.

CISCO™

Operations Research Will Deliver New Benefits for Society

by Jaime Villaseñor
Chief Risk Officer, Mexican Central Securities Depository, Indeval

Reminiscences and Reflections from the 2010 Edelman Award Winner



We can't reflect on our own participation in the Franz Edelman Award process without giving due recognition to this year's Edelman Award finalists. The selection process guarantees that the proposals and achievements are indubitably great contributions to the advancement of operations research and serve as excellent case studies that should be carefully examined.

Last year, our greatest privilege when we were honored to be named finalists was to give light to the opportunities of O.R. in the financial services industry. Our work was not done in the now much beleaguered area of portfolio trading, derivative instruments or exotic financing, but in the unheralded field of securities settlement. The resultant benefits are evident to our clients in both operational and economic efficiency; however we still invest time with our peers explaining the scope of the solution. It is important that operational research professionals spend time to enlighten us on more areas of opportunity.

Twenty years ago, I was part of the finance faculty at a prestigious university in Mexico (ITAM), and had, as office neighbors, most of the operations research faculty. It was a thrilling experience to read their work and particularly hear about their contributions to industry. At that time, I was getting involved in what is now known as behavioral economics, which nowadays means departing from general equilibrium "rational expectations models" to the more accepted concept that modeling human behavior is more complex than originally thought. Nonetheless, I had already been "enlightened" by O.R.

Shortly after that, when I reluctantly left academia to work for a securities brokerage firm, I was surprised at the complexity and lack of both standardization and automation of

their operating processes. Every business procedure was complicated, and every suggestion of enhancement was met by expressions of disapproval and contempt. We were only permitted to work on limited scope projects, which had qualified success and minimal impact.

In 2004, the Central Securities Depository Board decided that it was ready for a major process reengineering of the national securities settlement system. This represented a once-in-a-lifetime opportunity to change established practices in our country. Fortunately, the Central Bank experts had also been working for years on conceptual solutions that had potential to be successful, but had not yet been fully implemented. We were also privileged that that same group of experts I had met while in my academic years was available to act as consultants to the project. What's more, they fully supported the seminal work that had been started within the Central Bank.

As Susan Albin, former president of INFORMS said when she was so kind to present the award in Mexico, "A major challenge for implementing such a new solution was to get the support of the whole industry, [to] persuade more than 100 direct market players … to change their operating procedures for handling transactions. [A new rule-based securities settlement system was] designed and tested … to improve the quality, reliability, and safety of the service … dozens, maybe hundreds of times."

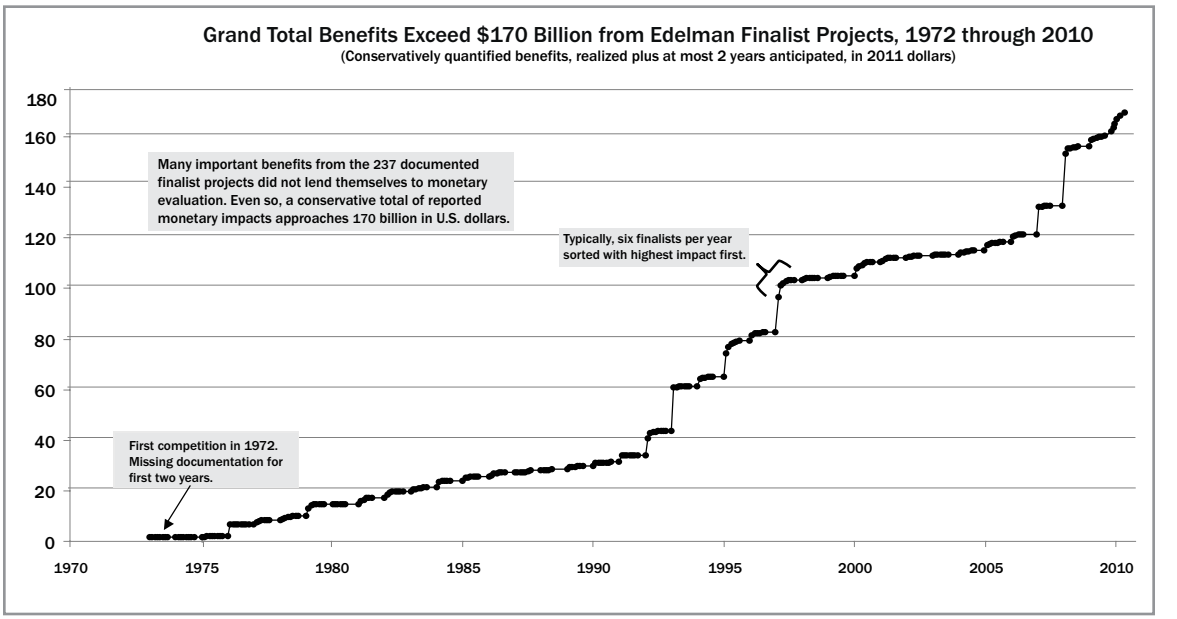
At the competition, the relative opacity of the work we do at the Central Securities Depository (CSD) had to be brought to light in a unique way, so one of the aspects of the presentation was that we did not want to use internal or client referrals. We either had to look for independent or real "peers" opinions that had specific weight in the industry and were convinced that this was a real achievement. We found this with Bruce Butterill, Executive Secretary of the America's Central Securities Depository Association; Fernando Yañez, CEO of the Chilean Central Securities Depository; Neeraj Sahai, Head of Operations at Citibank; and, last but certainly not least, Donald F. Donahue, Chairman and CEO of the Depository Trust and Clearing Corporation, the relevant CSD in the U.S.

The greatest thing about being involved in O.R. is the fact that most processes originate in an inefficient way, particularly it seems in the financial services industry. This allows for endless possibilities, since most of the quite original ideas that arise, especially in the finance field, are focused on the end result and disregard the best and controlled way to achieve the desired end. All of us have either been affected, sadly been witness to, or have been able to read how an original conception became the focus, rather than the best way to achieve the goal.

We seldom have the opportunity to contribute to our society in a significant way, I am grateful that our project gave us this possibility. The Franz Edelman Award has been a way to communicate this in a special way.

Operations Research, Billions and Billions in Benefits!

by Jeffrey M. Alden
Group Manager, GM Operations Research



Over $170 billion U.S. dollars of impact! That's impressive! Is it believable? What's behind these numbers? How were they were estimated? Is there more?

Beginning in 1974, the Edelman finalists were asked to publish their project accomplishments in the INFORMS journal called *Interfaces*. By reading all articles (almost 240), the monetary impact was estimated under the following guidelines:

- Be objective and conservative, yet make a serious attempt to somehow estimate cost savings and increased revenues.
- Use all past reported savings and, to be conservative, include at most two more years of anticipated impact.
- Ignore costs if insignificant like development and implementation costs.
- Include only one year of impact when enormous (billions, for example, in some military, utility, energy and governmental projects) to downplay huge leverage of organizational size and budget.
- Ignore relative impact analysis even though, for example, doubling company revenues to $10 million for one company may be far more impressive than saving $100 million for another company.

These guidelines are definitely conservative and do not include many important yet difficult-to-quantify benefits. Examples of the latter include legal dispute resolution, cancer treatments, airline security, hazardous material deposition, budget allocation, inclusion of risk in decision making, organizational structure, on-time railway performance, and space shuttle heat shielding performance. How do you place a dollar value on such improvements? It's not impossible, but definitely challenging! Furthermore, almost all finalist papers report such non-monetary benefits and frequently tout them as most important and long lasting by establishing, for example, ongoing practices and organizational changes that improve health, safety, cooperation, decision making, and job satisfaction. Great! Clearly, the reported monetary benefits understate the full impact of the Edelman finalist projects.

Another important indication of O.R.'s influence is the impressive breath of applications. The Edelman finalists represent over 100 different application areas including: air traffic, banking, broadcasting, canal operations, consumer products, delivery (express), defense (air force, army), education, financial (pension, investment, credit card, settlement), fire protection, forestry, health care (hospital, pharmaceutical, diagnosis, elderly), hotel management, energy production and distribution (coal, gas, hydroelectric, oil, nuclear), land use, manufacturing (electronics, food, paper, seeds, tires, vehicles, wood), marketing, printing, sanitation, security (airport, police), transportation (airline, highway, railway, space), treasure hunting, waste management, water (resources, quality, flow), and weapons dismantlement. There's many more … the list goes on and on!

Finally, the O.R. impact reported here is just the "tip of the iceberg" because the Edelman competition only captures those O.R. professionals choosing to compete! Just think, the entire set of Edelman finalist authors (over 800) represent less than 10% of the current INFORMS membership. Undoubtedly, a vast number of O.R. projects with significant impact did not compete due to confidentiality, lack of an internal advocate to compete (e.g., no one thought of it, too busy, lack management support, inadequate documentation), or the team was simply unaware of the competition.

The impact is immense. The O.R. professional has unquestionable reason to be proud of their profession—don't you like saying "billions and billions" when asked about the value of O.R.?

The Franz Edelman Award

Recognizing and Rewarding Real Achievement

The Franz Edelman Award Competition is administered for INFORMS by CPMS, the Practice Section of INFORMS.



The purpose of the Franz Edelman competition is to bring forward, recognize, and reward outstanding examples of operations research practice in the world.

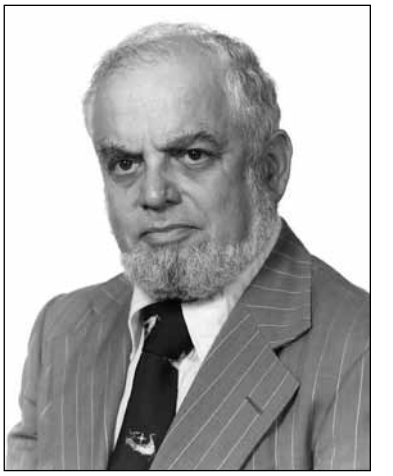
The annual Edelman Award Competition attracts top examples of innovation from large and small, profit and nonprofit, corporate and governmental organizations from around the world. The common theme characterizing all the final competing teams is the use of sophisticated analytical tools employed in operations research to make a major impact on an organization and the people it serves.

Abstracts from past Edelman Award winners are available through *Interfaces* online, and full-text versions of some of the *Interfaces* papers are available in an online archive. Streaming videos and DVDs of past competitions, suitable for teaching, marketing, or publicizing O.R. practice successes, are available from INFORMS.

The Institute of Management Sciences (TIMS), together with its College on the Practice of Management Science (CPMS), created the award competition in 1972.

In 1986, the CPMS/TIMS award was renamed in memory of Franz Edelman, one of the fathers of O.R. in North America.

After fleeing his native Germany in the late 1930s to escape Hitler and his Nazi regime, Franz found himself in England, where he was interned as an alien and sent to Canada for an interlude of lumberjacking. He received his undergraduate education at McGill University and later obtained a PhD in applied mathematics from Brown University.



Franz Edelman

Franz joined the RCA Corporation as an engineer and became involved in computational problems. Initially a physical science problem solver, Franz rapidly came to envision the great value of computer systems in business. His imagination and dedication made him a quintessential practitioner of operations research.

Franz established RCA's Operations Research Group, one of the first such groups in North America. Having become vice president of Business Systems and Analysis, he retired from RCA after 30 years of service to form Edelman Associates, an O.R. consulting firm. The Franz Edelman Award was named in his memory to advance the profession to which he contributed so much.

Congratulations to Edelman Award winners both past and present

Merrill Lynch salutes the honorees of the 2011 Edelman Awards. And we applaud INFORMS for understanding the value of innovations in operations research and management science. As a member of the Franz Edelman Academy, we proudly congratulate all Edelman Award winners.



Merrill Lynch
Wealth Management®
Bank of America Corporation

The Franz Edelman Award, presented annually by the Institute for Operations Research and the Management Sciences (INFORMS), recognizes outstanding examples of operations research, management science and advanced analytics in practice throughout the world.

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Edelman First-Place Award Recipients

2010 Indeval

"Mexican Financial Markets Benefit from Novel Application of Operations Research"

Indeval, the Mexican Central Securities Depository for all financial securities, manages Dalí, the securities settlement system (SSS) that settles securities operations averaging over $250 billion daily, more than 70% of the value settled in the Mexican payments system. In 2005, Indeval and its partners began implementing Dalí, a safer, more reliable, and more efficient SSS. The core of Dalí is an operations-research-based engine that is executed automatically and offers a continuous and secure operation, ensuring that settlement is irreversible. Now many transactions that would remain pending if processed individually are settled together, thus reducing liquidity requirements dramatically—by 52% in cash and 26% in securities. Indeval's SSS enhances and strengthens Mexico's financial infrastructure.

2009 Hewlett-Packard

"HP Transforms Product Portfolio Management with Operations Research"

Working with Strategic Management Solutions, HP developed two powerful operations-research-based tools for product variety management that together address the diverse needs of HP's businesses throughout their products' lifecycles. The first is a framework for evaluating the projected complexity-adjusted return on investment (ROI) for each proposed new product prior to its creation using a complexity ROI calculator. Once products have been launched and a sales history is available, HP applies a second OR tool called revenue coverage optimization. These tools led to hundreds of millions of dollars in bottom-line savings for HP, as well as a streamlined product offering, improved execution, faster delivery performance, lower overhead, and increased customer satisfaction and market share.

2008 Netherlands Railways

"The New Dutch Timetable: The O.R. Revolution"

By 2006, the volume of traffic on the Dutch passenger railway network had increased significantly; more and larger trains had been scheduled without changing the structure of the timetable, thus overloading the system and causing consumer nightmares. Operations researchers working with Netherlands Railways constructed an improved timetable. As a result, the percentage of trains arriving within three minutes of the scheduled time increased, commuter satisfaction improved, and the number of passengers grew. In 2007, this resulted in an additional annual profit of €40 million (approximately $60 million).

2007 Memorial Sloan-Kettering Cancer Center

"Operations Research Advances Cancer Therapeutics"

A key researcher from the Georgia Institute of Technology worked with Memorial Sloan-Kettering Cancer Center to reduce substantially the effects of treating prostate and breast cancer with radiation. The system saved an estimated $459 million per year on prostate cancer alone. Quality of life was improved by delivering less radiation to healthy organs.

2006 Warner Robins Air Logistics Center

"Warner Robins Air Logistics Center Streamlines Aircraft Repair and Overhaul"

At a time of war, the U.S. Air Force maintenance hub reduced its repair time for C-5 Galaxy transports from 360 to 250 days using lean initiatives, then further improved its turnaround time to just 160 days with Critical Chain Project Management, an O.R. technique. The work saves American taxpayers $50 million a year and decreases the demand to truck materiel through the Iraqi combat zone, saving lives as well.

2005 General Motors

"Increasing Production Throughput at General Motors"

Using operations research to achieve one of its signature benefits—greater efficiency—GM has saved over $2 billion through improved productivity at 30 assembly plants in 10 countries.

2004 Motorola, Inc.

"Reinventing the Supplier Negotiation Process at Motorola"

Combining O.R.-aided methods such as innovative bidding, online negotiations, and scenario-based optimization analysis, Motorola launched a comprehensive system to support the company's sourcing process.

2003 Canadian Pacific Railway

"Perfecting the Scheduled Railroad: Model-Driven Operating Plan Development"

Adoption of a newly optimized fixed-schedule railroad approach, including associated benefits from infrastructure and locomotive fleet investment and business process improvements, trimmed costs by CAD $300 million.

2002 Continental Airlines

"A New Era for Crew Recovery at Continental Airlines"

A globally optimized crew recovery solution deals successfully with several high-profile events such as the December 2000 and March 2001 Nor'easter snowstorms, the June 2001 Houston flood, and the September 11th terrorist attack. Throughout, Continental recovered from each event in record time and generated overall benefits worth tens of millions of dollars.

2001 Merrill Lynch, Inc.

"Pricing Analysis for Merrill Lynch Integrated Choice"

In early 1999 two models showed that revenue at risk for Merrill Lynch, due to the advent of electronic trading and the commoditization of trading, ranged from $200 million to $1 billion. As of September 2000, the Integrated Choice strategy helped client assets reach $93 billion in the new offer. During the first nine months of 2000, net new assets totaled $11 billion and the number of accounts increased 72%.

2000 Jeppesen Sanderson, Inc.

"Flexible Planning and Technology Management at Jeppesen Sanderson, Inc."

Jeppesen Sanderson's customer service level began to deteriorate when a growing product line of more than 100,000 charts overwhelmed its production system. The company developed a suite of optimization-based decision support tools that improved planning in each production area and revealed the value of OR/MS to Jeppesen managers. Jeppesen is now fully committed to O.R., with O.R.-based decision support systems spreading to all areas of the company, and realized cost reductions of $3 million.

1999 IBM

"Extended Enterprise Supply Chain Management at IBM Personal Systems Group and Other Divisions"

AMT consists of an optimization engine, a simulator, and a series of data extraction modules. It is used to study a wide range of issues, including inventory budgets, turnover objectives, customer service-level targets, effects of new product introduction, and supply chain scenario analyses.

1998 Bosques Arauco, S.A.

One of the largest Chilean forest firms, Bosques Arauco employs optimization systems designed by a team from the University of Chile. The impact of these systems has been organizational and financial, with Bosques Arauco reporting a total saving of

$5 million over a total annual timber production of $140 million.

1997 Societé Nationale des Chemins de Fer Français (SNCF) and Sabre Decision Technologies

The national railroad of France, Societé Nationale des Chemins de Fer Français (SNCF), and Sabre Decision Technologies teamed up to address the problem of train capacity allocation. The implementation of Rail Plus, composed of a Workset manager and modules on profitability, feasibility, capacity allocation, and routing, is credited with an overall profit increase of 3% to 5%, reductions in manpower and schedule development time, and improvements in planning and scenario evaluation.

1996 South African National Defense Force (SANDF)

A joint Deloitte & Touche and SANDF team created models to determine the size and shape of SANDF. The project resulted in force design savings of more than 22%.

1995 Harris Corporation/Semiconductor Sector

IMPReSS, a linear-programming-based production-planning system, produces plans for six major product lines encompassing over 18,000 individual products, enabling Harris to achieve 95% on-time delivery on commitments made since 1992.

1994 Tata Iron & Steel Company, Ltd.

An optimization-based model was designed in 1985–1986 for guiding marketing strategies in Tata's product mix area; the model is now used throughout the company. Since 1986, the model has contributed a cumulative benefit of $73 million in increased profits.

1993 AT&T

Over 400 Call Processing Simulator (CAPS) studies increased 800-number revenues by more than $1 billion in a $5 billion market. One reorganization yielded an 8% increase in calls completed, at annual savings of over $24 million in customer operating costs, with an increase of $2 million in AT&T revenue in 1992, $3 million in 1993, and a projected $7 million per year for each following year.

1992 New Haven Health Department

To combat the spread of HIV/AIDS via needle sharing among New Haven's drug injectors, a legal needle exchange program was implemented. A new data collection and analysis was developed that provided the needed parameters for mathematical models. Results suggest that the program has reduced HIV/AIDS incidence by 33%.

1991 American Airlines

American Airlines pioneered revenue management as an effective way to manage its seat inventory. The airline used sophisticated O.R. models to determine the overbooking levels of each flight and to allocate each flight's seat inventory to a variety of market/fare classes. By optimally overbooking flights and dynamically pricing the seats based on forecast demand, American Airlines generated an estimated $1.4 billion in incremental revenue over a three-year period.

1990 Health Care Financing Administration

Diagnosis Related Groups (DRGs), developed to measure hospital output in quantitative terms, required a search for structure through millions of patients' records plus the merging of clinical and statistical decision methods. Medicare, 20 states, and 18 other countries are currently using DRGs; Medicare payments to hospitals alone produced a projected reduction of $18 billion in 1990.

1989 ABB Electric, Inc.

O.R. models built sales strategies and accurate prediction of sales through extensive segmentation and attribute choice modeling. Predictions, integrated into production models, guided long-term supply and customer preference and helped make ABB an industry leader in 1988.

1988 City of San Francisco Police Department

An optimization-based decision support system for patrol officer deployment allows for "fine-tuning" of optimal scheduling, producing a 25% increase in patrol units available when needed; in addition, response times declined 29% and traffic citations increased 62%. Total benefit? Over $14 million annually.

1987 Syntex Laboratories, Inc.

A decision calculus model for salesforce size and deployment was devised by Syntex managers, with a time horizon of three years. Model predictions proved to be more accurate than standard forecasts and in financial terms resulted in increases of $25 million.

1986 Southland Corporation (CITGO Petroleum Corporation Subsidiary)

Optimization-based decision support and process control systems aided managers at CITGO in such crucial areas as crude oil acquisition, spot-market buying and selling, logistical operations, and price volume strategies. Forecasting models addressed corporate price and volume. Together, they contributed approximately $70 million in profit improvement per year.

1985 Weyerhaeuser Company

The VISION decision simulator was developed to implement dynamic-programming-based improvements in raw materials returns at Weyerhaeuser. Operational benefits to date exceed $100 million in increased profits, and management philosophy has been changed.

1984 (dual) Blue Bell, Inc.

Models for inventory targets, manufacturing requirements, and production scheduling were used with a seasonal demand-forecasting technique and diagnostic computer simulation to reduce inventories. Inventory reduction over 18 months was more than $100 million.

1984 (dual) The Netherlands Rijkswaterstaat and the RAND Corporation

An integrated system of models was developed to evaluate mixes of new facilities, changes in operating rules, and adjustments to prices and regulations. The system has resulted in a national water management policy, with savings in the hundreds of millions of dollars in investment expenditures and over $10 million in estimated annual savings.

1983 Air Products and Chemicals, Inc.

1982 Arizona Department of Transportation

1981 ANR Freight System

1980 Kelly-Springfield Tire Company

1979 The Greater New York Blood Program

1978 Cahill May Roberts, Ltd.

1977 Syncrude Canada, Ltd.

1976 American Telephone & Telegraph

1975 Xerox Corporation

1974 Canadian National Energy Board

1973 The Babcock & Wilcox Company

1972 The Pillsbury Corporation



Indeval

Congratulations to the 2011 finalists!

As the 2010 Edelman winner, Indeval recognizes the effort, quality, and innovation of this year's best Operations Research initiatives.

"We are what we repeatedly do.
Excellence, then, is not an act, but a habit."
- Aristotle

Grupo BMV



The Franz Edelman Award Process

The Finest Step Forward: The Franz Edelman Award Competition Process

by Stephen Graves, MIT
2011 Franz Edelman Committee Chair

Are You Ready for the Contest of Your Life?

Every year the Franz Edelman Award process begins with a call for entries in early September. Organizations are asked to provide a three-page summary of a completed practical operations research (O.R.) application and describe results that had significant, verifiable, and, preferably, quantifiable impact on the performance of the client organization.

Typically, over two dozen entries are received and reviewed by the Franz Edelman Award Committee. The committee consists of about three dozen experienced O.R. practitioners and academics from diverse organizations such as AT&T, Bank of America, Cisco, General Electric, HP, Intel, IBM, Lancaster University, MIT, Purdue University, SAS, Southwest Airlines, the University of Dayton, and the University of Western Ontario. Semifinalists are selected in early November, and the further selection of finalists is completed by mid-December.

The committee names as semifinalists a dozen or more entries that have a reasonable chance of becoming finalists if the verification process supports the entries' claims. To this end, each of the semifinalists is assigned a verifier who works with the relevant stakeholders to validate the claims made by their assigned entry.

The verifier's primary role is to completely comprehend the O.R. work presented in the assigned entry summary, as well as its potential impact, and to convey this information to the rest of the selection committee. The verifier will communicate directly with the entrant's O.R. team, the users of the work, and client management. Verification is a crucial element of the competition because it ensures that only the highest-quality O.R. work makes it to the Edelman Award finals. All verifiers are provided with written guidelines and sample verification reports, and novice verifiers are paired with more experienced verifiers.

From this group of semifinalists, the Edelman Award Committee then selects the five or six best entries to advance to the Franz Edelman Award finals. Each finalist must begin the preparation of a journal-quality paper and a 40-minute presentation. Each of the finalist teams is assigned an experienced coach to advise them throughout the process. A coach's major responsibility is to ensure that the team's paper and presentation convey the work clearly to a general operations research audience. Often a coach is paired with one or more assistant coaches who lend other perspectives to the process.

Two months prior to the spring INFORMS Analytics Conference, finalist papers are distributed to the judges. The judges study each of the papers and, shortly thereafter, discuss them among themselves. Each finalist is assigned a focal point judge who conveys feedback from the judging committee to the finalist's coach. This feedback helps to identify areas in which the finalist's presentation might be improved.

On the day of the competition, each team gives a 40-minute presentation, followed by a 10- to 15-minute period of questioning by the judges. After the presentations are complete, the judges sequester themselves until they reach a decision on which of the finalists best exemplifies the ideals and standards of the Franz Edelman Award for Achievement in Operations Research. Relevant factors considered include the importance of the application, the novelty and portability of the technical solution, the quality and effectiveness of the implementation, and the total impact of the project, in both quantitative and qualitative terms.

Following the competition, the finalists will work with the special editor of the January/February issue of *Interfaces* to prepare their papers for publication. All finalists are invited to reprise their work at a session of the INFORMS Annual Meeting in the fall, with the first-place team giving a keynote address. All of the finalists' presentations become available from INFORMS via streaming video in the summer.



The Verification Process & The 2011 Verifiers

The Edelman Award Committee wishes to thank the following individuals for their dedication and service as verifiers for this year's Edelman Award.

Each of the semifinalists is assigned a verifier who works behind the scenes, often with an assistant verifier, to validate the claims made by their entry. A verifier's primary role is to understand an applicant's O.R. work and its impact in detail, and to then convey this to the rest of the committee, both orally and in a written report. Verification is a crucial element of the competition since it ensures that only the highest-quality O.R. work with verified impact makes it to the Edelman Award finals.

Verifiers and Assistant Verifiers

- Layek Abdel-Malek, New Jersey Institute of Technology
- Peter Bell, University of Western Ontario
- Tony Brigandi, AT&T Laboratories
- Luz Adriana Caudillio Fuentes, The Walt Disney Company
- Alfred Degbotse, IBM
- Gavin DeNyse, HP
- Jérémie Gallien, London School of Business
- Michael F. Gorman, University of Dayton
- Yoshi Ikura, Saitech
- Ananth Iyer, Purdue University
- Shailendra Jain, HP
- Karl Kempf, Intel
- Grace Lin, World Resource Optimization
- Yingdong Lu, IBM
- R. John Milne, Clarkson University
- Murthy Mudrageda, Georgia Institute of Technology
- Patricia Neri, IBM
- Yanni Papadakis, Bank of America
- Graham Rand, Lancaster University
- Anne Robinson, Cisco
- Don Rosenfield, MIT
- Douglas Samuelson, Info Logix, Inc.
- Donald R. (Bob) Smith, Monmouth University
- Rajesh Tyagi, GE Global Research

The Coaching and Judging Process & The 2011 Coaches and Judges

The Edelman Award Committee wishes to thank the following individuals for their dedication and service as coaches and judges for this year's Edelman Award.

The major role of the coach is to ensure each team's paper and presentation convey the work in a manner that may be well understood by a general operations research audience. Often a coach is paired with an assistant coach who lends another perspective to the process.

The judges must work together, evaluating the evidence to determine which finalist is most deserving of the Franz Edelman Award for Achievement in Operations Research. The award is for implemented work that has had significant, verified, and preferably quantified impact.

Coaches and Assistant Coaches

- Alfred Degbotse, IBM
- Yoshi Ikura, Saitech
- Ananth Iyer, Purdue University
- Shailendra Jain, HP
- Karl Kempf, Intel
- Grace Lin, World Resource Optimization
- R. John Milne, Clarkson University
- Patricia Neri, IBM
- Yanni Papadakis, Bank of America
- Don Rosenfield, MIT
- Rajesh Tyagi, GE Global Research

Judges

- Stephen Graves, Chair, MIT
- Susan Albin, Rutgers University
- Peter Bell, University of Western Ontario
- John R. Birge, University of Chicago
- Srinivas Bollapragada, General Electric
- Graham Rand, Lancaster University
- Randall S. Robinson
- Leon Schwartz, Informed Decisions Group, Ltd.
- Michael A. Trick, Carnegie Mellon University

The Edelman Laureates

The men and women who author Edelman finalist papers are deemed Franz Edelman Laureates.

Authors of finalist papers are recognized with this distinction, and each is formally presented with the Franz Edelman Medal.

Laureates are recognized for their significant contribution to work that each year is selected as representative of the best applications in the world of analytical support for decision making.

The Laureate recognition is distinct and separate from membership in the Franz Edelman Academy.



The Edelman Academy

Each year, a limited number of organizations may be inducted as members of the Franz Edelman Academy.

The primary client organization, or beneficiary of the finalist work, is inducted into the Academy at the annual Edelman Award Ceremony.

In addition, organizations that played a major role in the work, and therefore deserve academy membership, may also be inducted. The most common example would be an organization that provided the professionals who did the majority of the analytical work.

The membership of the Franz Edelman Academy represents 40 years of extraordinary contributions to society through the innovative application of operations research.

Nothing But the Best:

The 2011 Franz Edelman Finalists

Introduced in the pages that follow are the six finalists for the 2011 Franz Edelman Award.

Over the past several months these teams have demonstrated to the judges that their work is among the finest examples of operations research practice in the world. One of these organizations will be recognized as the best in class, the first-place recipient of the 2011 Franz Edelman Award.

Each finalist's work is described here in a shortened summary. Full papers will be published in the January/February 2012 issue of Interfaces*, the INFORMS journal dedicated to improving the practical application of operations research and the management sciences in today's organizations and industries.*

The Finalists for the 2011 Franz Edelman Award Are

CSAV

Fluor Corporation

Industrial and Commercial Bank of China

InterContinental Hotels Group

Midwest Independent Transmission System Operator, Inc.

State of New York

2011 Edelman Competitors

by Barry List, INFORMS

O.R. in a Changing World

As operations researchers today analyze large systemic problems, they find themselves in a world of volcanic fluctuation. In the West, the tremendous forces that shook the global economy starting in 2007 are still reverberating. In countries that are growing economically, controlling growth is proving a challenge as well. Increased demand for energy and the need to tackle climate change put pressures on organizations. Change even comes in the form of an industry leader pointing to a glaring problem and stepping forward with the courage to solve it.

This year's Edelman finalists have taken on such challenges. The six finalists proved their mettle in the first round of the Edelman competition.

Among the American entities that have been hardest hit by the economy are the 50 state governments. As tax dollars decline, pressure to reduce lost tax dollars has increased. In collaboration between the **New York State Department of Taxation and Finance** and IBM's Research and Global Business Services divisions, an operations research (O.R.) team developed a tax collections optimization solution to increase collection. The solution optimizes collections by agents charged with increasing long-term returns while taking into account the complex interplay of business needs, resources, and legal constraints. Since its inception in December 2009, New York State has seen an 8%, $83 million increase in annual revenue, doing its part to battle a paralyzing drop in state coffers.

InterContinental Hotels Group, a leading international hotel company, suffered from the economy before the global downturn of 2007–2008. In response, the company enhanced its revenue management by relaxing its assumption of independent demand by market segment and modeling demand as a function of price. Now O.R. systems determine price response models for every IHG hotel. The deliverable is better determined rates that are generated based on hotel capacity, forecasted demand, current bookings, and competitor prices. To date, this retail price optimization has rolled out to more than 2,000 IHG hotels, and the result has been a strong 2.7% increase in revenue.

When **CSAV** uses its 20-foot equivalent unit (TEU) containers to ship products among its seven international regions, it often finds itself shipping from a country like China, a net exporter, to a country like the United States, a net importer. Translation: a large number of containers have been emptied of their contents in a port where many of those containers will not be filled. CSAV found itself pressured even more than before to answer two questions that—luckily for them—fit well within the operations research portfolio: (1) when (and how) to reposition empty containers to fulfill needs in specific ports

and (2) what number of empty containers should be stocked at every time and place to handle uncertainty in demand. The results of CSAV's O.R. model was that last year empty containers declined by half, and the company saved $56 million.

As the West confronted a downturn, China faced the threat that uncontrolled growth can surprisingly visit upon an economy. **Industrial and Commercial Bank of China (ICBC)** is the largest publicly traded bank in the world. With new urban areas and satellite cities emerging and a growing need for financial services, ICBC had to plan fast. In 2006, ICBC partnered with IBM to develop a customized branch network optimization system by applying O.R. It allocates branches to match local needs, models an area's financial potential based on geographic and demographic data, and determines good locations and personnel levels, all the while minimizing cost and speeding good decision making. The result has been 16,000 more and better performing branches across China.

In the Midwest, American competitiveness met the need to bring shared improvements. Following the mandates of the Federal Energy Regulatory Commission, which encouraged the industry to reduce individual utilities' market power and drive more efficiency, regional transmission organizations were born. **Midwest Independent Transmission System Operator (Midwest ISO)** launched in 2001. In 2005 it began using O.R. to reduce costs, and in 2009 it expanded its capabilities. Midwest ISO used O.R. to pool advantages among regional energy providers, improve



reliability, and increase efficiencies. As a result, it realized nearly $3 billion in savings through last year and estimates as much as $8.1 billion of value through 2020.

Leadership at the **Fluor Corporation** confronted the elephant in its industry's room: unplanned change. Construction projects often require major changes in scope, design, and schedule, and those changes in turn can lead to unwanted surprises in cost, schedule, and performance. The industry practice had been to deal with the effects of change after the fact, but that often put builders at odds with clients and led to contract disputes. Fluor's solution was to implement a model that forecasts the possible impact of changes, identifies timing and causes of the impacts, and quantifies benefits that can be achieved by management intervention. All told, in the first five years of using the O.R.-based model, Fluor has identified over $800 million in savings. In addition, the industry is adopting these improved methods.

This year's Edelman finalists are not only among the best O.R. teams; they are also masters at confronting gargantuan forces of change, proving that the best operations researchers can triumph over the greatest problems confronting organizations throughout the world.


CSAV

CSAV

Strategic Empty Container Logistics Optimization in a Major Shipping Company

Project Summary

CSAV has seven regional offices that decide upon commercial and operational matters within their geographical influence with the aim of achieving superior service quality for the company's clients and customers.

The container fleet of 700,000 containers, referred to as TEUs (20-foot equivalent units), is valued at approximately $2 billion and represents the second most important cost factor after fuel for vessels. The fleet plays a key role in CSAV's strategy.

Whereas some zones are net exporters (e.g., China), others are net importers (e.g., the United States), creating a major imbalance of empty containers between regions and forcing empty container repositioning. There are important issues of uncertainty, particularly in customer demand for empty containers. The company used to manage its container fleet based on decentralized decisions made by regional offices. However, the high level of interconnection required for these decisions led to significant shortcomings in container management, reflected mainly by large stocks of empty containers held to satisfy expected demand.

Because profit margins in this industry are small, it became crucial to develop an optimized policy for empty container storage and a smart strategy to reallocate them.

The team's contribution was the development of the O.R.-based Empty Container Logistics Optimization System (ECO), which optimizes CSAV's empty container logistics by integrating operational and commercial decisions at all regional offices.

The goal was to minimize global costs while guaranteeing high service quality. The main decisions made by ECO are (1) how and when the company should reposition empty containers to fulfill needs in specific ports and (2) the number of empty containers required to handle uncertain demand at each location and time period.

ECO is based on two decision models supported by a forecasting system. The first, an inventory model determines the safe stock level at each point. The second, a multicommodity, multiperiod network flow model supports empty container

repositioning and inventory levels, thus assuring sufficient available stock to maintain flexible, quality service. ECO is a collaborative Web-based optimization framework in which several agents make decisions related to different objectives and business conditions. With ECO in place, planners worldwide can participate in fine-tuning the optimization model and reviewing the optimized plans, leading to coordination and shared decision making.

CSAV and the University of Chile started the project in 2006. The initial version was implemented in Chile and Brazil in late 2007. The 2008 financial crisis hit the shipping industry particularly hard. CSAV decided to face the crisis by gaining a competitive advantage through excellence in the management of its container fleet, and ECO played a key role in achieving this goal. ECO was implemented globally at full speed and became operational worldwide in January 2010.

The project had an impact that was both wider and deeper than originally intended. The requirements of the optimization model led to significant improvements in data gathering, communications in real time, automation of data handling, and improved processes, allowing managers to make decisions with better, standardized



information. ECO made it possible to make global decisions that were clearly superior to those obtained previously by individual regions, achieving impressive results.

In 2010, empty container inventory stocks were reduced by 50%, and container turnover increased by 60%. CSAV saved $56 million in 2010 and expects yearly savings of another $56 million in the next two years. These results were most relevant for CSAV in overcoming the crisis and positioning itself as one of the world's top 10 carriers. The company's value increased 55% during 2010, surpassing the average gains of the top shipping companies listed on stock markets. The implementation of the ECO strategy was significant in CSAV's performance and ability to overcome the crisis.

Organizational Overview

The Chilean company Compañía Sud Americana de Vapores (CSAV) is the sixth largest shipping company in the world and the largest in Latin America, with operations in over 100 countries and more than 2,000 terminals and depots worldwide. One of the oldest shipping companies in the world, CSAV was founded in 1872.





Fluor Corporation

Using System Dynamics to Manage Projects and Changes

Project Summary

As a global leader in the $600 billion engineering/procurement/construction industry, Fluor manages projects for clients in nearly every market and geography. Managing large projects to cost and schedule in this industry is a major challenge. Every project has unique challenges, and most require some degree of change from original plans to accommodate revised client needs, schedule requirements, regulations, and technologies.

Five years ago Fluor analyzed hundreds of billions of dollars worth of projects and the changes (scope changes, design changes, and schedule changes) that were made to them. The company determined that changes can account for 20% of revenues or more—in an industry with typical operating margins at 3–6% of revenues. Leadership concluded that how they dealt with project changes would define success with clients, in the market, and for shareholders.

For decades the industry's practice has been to report change impacts retrospectively and sort out later who will pay for how much (after the impact amounts become painfully evident). In projects with many changes, this led to late surprises in cost and schedule performance. It placed contractors at odds with their clients over cost responsibility, sometimes leading to formal contract disputes and lawsuits. A change in dealing with changes was needed.

Fluor turned to management science. Starting in 2006, the company implemented a system dynamics model-based system to actively analyze the performance of large projects. The model is tailored to simulate each engineering/construction project, to forecast its cost and schedule performance, to quantify in advance the impacts of changes, and to test in advance different impact-avoidance measures. To do so, the model had to be rapidly customizable and able to accurately simulate a diverse range of projects and changes. Since 2006, the company has deployed the model on well over 100 projects throughout the entire company and trained hundreds of managers worldwide.

Several elements of business analytics came together to make the system successful. A system dynamics model





describes the cause–effect relationships that drive project costs, schedules, staffing, work progress, productivity, rework, and their determinants. Fluor built and used large databases of projects and market characteristics, and conducted a worldwide survey of managers with over 40,000 person-years of industry experience. Using this data with the system, the company can now, with a high degree of accuracy, rapidly tailor the model to each subject project. The system uses hill-climbing algorithms to calibrate the model parameters so that it can accurately simulate the project plan.

By pulling together all of these analytical elements with company-wide training, Fluor provides each project's management team and client with advanced analyses that (a) forecast the anticipated impact of changes, (b) identify timing and causes of the impacts, and (c) quantify benefits that will be achieved by different management actions. This information allows project teams and clients to make more informed decisions and reduce costs.

The tool is used at different stages throughout projects. Before one North American project started, a client considered executing a design effort before preliminary engineering was complete; analyses showed a savings of $34 million by working to a different design schedule, which was adopted. During one European project, the client took Fluor analyses to its corporate management to replan the entire construction schedule, saving $23 million.

All told, Fluor estimates that the cost reductions on over 100 projects amount to over $770 million. In addition to those cost savings, Fluor recognized over $70 million in added revenue from change impacts that would not otherwise have been foreseen. The total quantified benefit over the first



five years, therefore, is at least $840 million, and the usage and benefits continue to grow throughout the company.

Beyond these quantified impacts, the change in mindset achieved may be even more important to the long-term strategy of the company. The industry's past change analyses were typically simplistic, retrospective, and too often an exercise in finding blame. The new system not only helps avoid costly disputes; now the approach is routinely active, seeking impact avoidance and savings—a "win–win" for the company and its clients. Moving from a reactive approach to a positive, active one is truly a fundamental change in Fluor's business of managing projects.

Organizational Overview

Fluor Corporation is one of the world's largest publicly owned engineering, procurement, construction, maintenance, and project management companies. Fluor is a Fortune 500 company that is ranked Number 1 in *Fortune* magazine's "Engineering, Construction" category of America's largest corporations. Fluor is also ranked Number 3 in the same category on Fortune's annual survey of the World's Most Admired Companies. Overall, on the Fortune 500 list of America's largest corporations, Fluor ranked Number 111. *Engineering News-Record* (*ENR*) ranks Fluor Number 1 on its Top 100 Design-Build Firms list and Number 2 on its Top 400 Contractors list.

Fluor maintains a network of offices in more than 30 countries across six continents. Fluor serves clients in a wide variety of traditional and evolving commercial and institutional industries worldwide, including chemicals and petrochemicals, government services, health care, life sciences, manufacturing, microelectronics, mining, oil and gas, power, renewable energy, telecommunications, and transportation infrastructure.




ICBC
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Industrial and Commercial Bank of China

Branch Reconfiguration Practice through Operations Research in ICBC

Project Summary

Industrial and Commercial Bank of China (ICBC) is the largest publicly traded bank in the world measured by market capitalization, deposit volume, and profitability. ICBC, with a vast branch network of over 16,000 branches, serves over 200 million individual customers and 3.6 million corporate clients. In China, ICBC has 38 provincial and large city divisions and over 300 city units. Internationally, ICBC has a global network of over 200 overseas institutions and more than 1,400 correspondent banks. The branch network is fundamental to ICBC business development. It is one of the core competencies and one of the most valuable assets for sustainable future growth at ICBC.

The financial market in China is rapidly changing with the increased economic level, modernization, urbanization, and globalization of China. Many new urban districts and satellite cities are emerging in this rapid urbanization process. As personal wealth increases, people require more financial services. In this fast-changing and competitive market, a critical strategic problem for ICBC was the reconfiguration of the branch locations and service capabilities to match the regional economy and customer distribution, along with the quick identification and relocation to new high-potential market areas. It was necessary for ICBC to develop a systematic methodology and analytical system to support the branch network optimization for all ICBC branches.

ICBC wanted a scalable, quantitatively rigorous branch reconfiguration methodology tailored for the specific needs of ICBC to optimize the branch networks to improve branch performance and to increase the return on investment of branch rebuilding and personnel allocation.

In 2003, IBM started working on branch network optimization models for banks, and had developed capabilities and service experiences. In 2006, ICBC partnered with IBM to develop a customized branch network optimization system known as branch reconfiguration (BR) by applying operations research and management science techniques while considering the practical business needs of banks.

BR matches advanced operations research and management science techniques to the practical managerial issues of ICBC. BR has a customer resource prediction model that uses a semisupervised regression method and formulates a large-scale branch network optimization problem that is solved by a hybrid nested partition algorithm. Branch reconfiguration

1. allocates branch resources to match the economic situation and financial potential of the local area;
2. models the financial potential of a market based on geographic and demographic data and identifies new high-potential market areas and good branch locations;
3. determines the right locations and personnel arrangements of new, relocated, and rebuilt branches, and helps improve branch management;
4. improves the decision making of branch reconfiguration to minimize capital costs, allows quicker decision making, and reduces the chances of costly mistakes caused by poor branch investment choices.



The ICBC BR project has achieved significant results:

1. Deployment across China. Beginning in 2006, BR was implemented and tested in seven representative cities, including Beijing, Guangzhou, and Suzhou. In 2009, ICBC started deploying the system to 100 cities (Shanghai, Tianjin, Shenzhen, Chongqing, Nanjing, Hangzhou, and more) with completion expected by the middle of 2011. The deployment will continue until all 16,000 branches have been analyzed.
2. Improved branch performance. So far, BR has been implemented in over 40 major cities in China. The increase in deposits attributable to BR in a typical major city like Suzhou was USD 1.04 billion. Over time it is expected that ICBC will continue to experience additional deposits.
3. Increased efficiency of branch rebuilding. This project provides a quantitative basis for making reconfiguration decisions. It helps minimize the cost and risks associated with opening low-profit branches. ICBC has achieved a competitive advantage by identifying profitable markets locations.
4. Improved methodology and efficiency of branch management. BR provides a quantitative view of how each branch and area is performing that helps management more reliably make branch planning decisions.



The ICBC BR project is a successful use of operations research and management science to transform the service channels of a large bank with excellent results. It will continue to improve business development and decision making for ICBC.

Organizational Overview

ICBC

Industrial and Commercial Bank of China (ICBC) is the largest publicly traded bank in the world measured by market capitalization, deposit volume, and profitability. At the end of 2009, ICBC was the top bank in the world with a market capitalization of USD 269 billion, and it defended its position as the world's most profitable bank, reporting a net profit of RMB 129.35 billion, up by 16.4% from 2008.

IBM Research - China

IBM Research - China (CRL) was established in Beijing in 1995. In October 2008, CRL opened a new research facility in Shanghai to provide local partners greater accessibility to IBM research capabilities. CRL conducts advanced research across multiple disciplines, including mathematical science, computer science and human-centric computing. Its current research is focusing on analytics and optimization, cloud computing, and edge computing. The driving demands come from its focus in contributing research advancements to the IBM Smarter Planet strategy, especially in application domains on smart banking, smart supply chains, smart energy and utilities, and smart cities.



InterContinental Hotels Group

Retail Price Optimization at InterContinental Hotels Group

Project Summary

InterContinental Hotels Group is an international hotel company whose goal is to create great hotels that guests love. The company has more guest rooms than any other hotel company in the world—more than 650,000 rooms and over 4,500 hotels in 100 countries and territories. IHG's guests make over 130 million stays in IHG hotels every year. The company operates familiar hotel brands like InterContinental, Crowne Plaza, Indigo, Holiday Inn, Holiday Inn Express, Staybridge Suites, and Candlewood Suites. IHG uses pricing and revenue analytics to drive key strategic priorities like improving brand performance and generating excellent hotel returns.

Since their widespread adoption by the hotel industry in the early 1990s, revenue management systems have evolved to become a key capability to optimize occupancy and revenue. A fundamental assumption of these systems has been that demand by segment—particularly rate segment—is independent. In effect, industry leaders assumed that demand was independent of the price offered. Under this assumption, the benefits of revenue management derived from optimizing the allocation of inventory when demand exceeded capacity. Prices were predetermined via manual processes using little or no analytics. Most recognized the fault in the assumption of independent demand, but revenue management worked well enough under normal economic conditions.

The hospitality recession of 2002–2003, when the industry suffered occupancy declines of 10–15%, coupled with the growth and transparency of Internet distribution channels motivated a reexamination of revenue management methods. IHG resolved to enhance its revenue management capabilities by relaxing the assumption of independent demand by segment and directly modeling demand as a function of price. In 2005, IHG initiated a series of projects that led to the development of a price optimization capability.

IHG's Retail Price Optimization is a significant, large-scale enterprise implementation of price optimization within the hospitality industry. This



capability was designed to accommodate a globally distributed hotel organization with more than 4,000 users distributed with varied knowledge levels.

The key operations research components include a market response module and a price optimization module. The market response module computes price response models for each hotel. The team developed various segmentation schemes and facilitated a hierarchical implementation allowing segments with insufficient data to be estimated using aggregate data. The core price optimization module is innovative and new to the industry. Modeling demand as a function of price and competitor rates requires that the objective function is nonlinear. Additional decision variables accounting for length of stay significantly increased the complexity of the model. A special optimization method was implemented and rates are generated in an automatic fashion based on hotel capacity, forecasted demand, current bookings, and competitor prices.

Retail Price Optimization has been rolled out to more than 2,000 hotels globally, and benefits measurement studies point to a 2.7% increase in revenue. This number was verified and acknowledged in the IHG 2009 Annual Report.





Organizational Overview

IHG

IHG is the world's largest hotel group based on number of rooms. IHG owns, manages, leases, and franchises through various subsidiaries over 4,500 hotels and more than 650,000 guest rooms in nearly 100 countries and territories around the world. The group owns a portfolio of well recognized and respected hotel brands including Intercontinental Hotels, Hotel Indigo, Crowne Plaza Hotels and Resorts, Holiday Inn Hotels and Resorts, Holiday Inn Express, Staybridge Suites, and Candlewood Suites, and also manages the world's largest hotel loyalty program, Priority Club Rewards, with 52 million members worldwide.

IHG's goal is to grow by making its brands the first choice for guests and hotel owners. IHG operates hotels in three different ways: as a franchisor, a manager, and an owned-and-leased business. IHG's strategy is focused on increasing the number of its franchised and managed hotels. Its hotel development pipeline is the industry's largest—over 1,200 hotels (nearly 200,000 rooms).

Revenue Analytics

Revenue Analytics is a leading consulting firm in designing visionary capabilities in pricing and revenue management for a wide range of industries. Revenue Analytics helps Fortune 500 companies make more money by selling the right product to the right customer at the right time for the right price. It does this by using sophisticated analytics to improve decisions in pricing, discounting, promotions, and inventory allocation. The firm's principals have successfully helped more than 100 previous clients uncover over $10 billion in additional revenues.





Midwest Independent Transmission System Operator

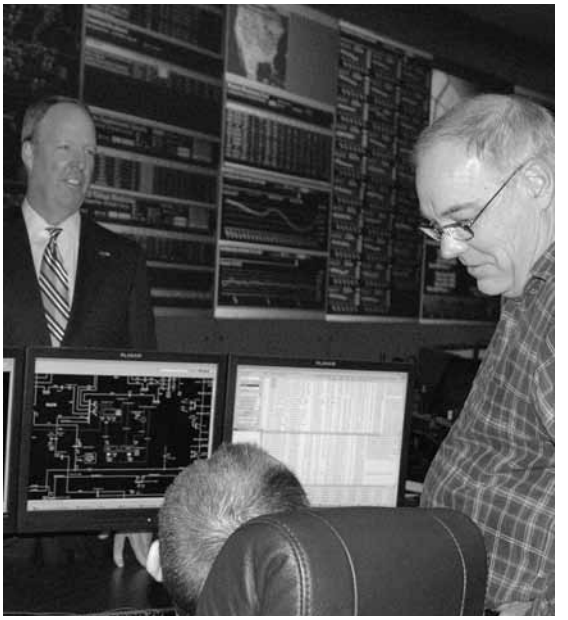
Midwest ISO Applies Operations Research to Energy and Ancillary Services Markets, Unlocking Billions in Savings Through User Adoption of Inventory Tools

Project Summary

The Midwest Independent Transmission System Operator (Midwest ISO) used operations research (O.R.) to design and launch its energy and ancillary services markets. Through these markets, O.R. allowed the Midwest ISO to improve reliability and to increase efficiencies in the use of power plants and transmission grid assets, resulting in billions of dollars saved.

For many years, the power industry in the United States consisted of utilities that focused locally and ignored the possibility that there might be better, regional solutions. This localized focus, as well as the utilities' complete control of their transmission lines, created barriers for other utilities wanting to buy and sell electricity from each other. This resulted in utilities maximizing the use of their own power plants and transmission lines at the expense of the larger electrical system.

During the 1990s, the Federal Energy Regulatory Commission (FERC), a power industry regulator at the national level, pushed to restructure the industry to reduce individual utilities' market power and to drive more efficiency into the utilization of the U.S. fleet of power plants and transmission lines. As a part of this restructuring effort, FERC began encouraging the formation of Regional Transmission Organizations (RTOs). RTOs are the "air traffic controllers" of the transmission grid—they assure that power travels where it needs to go at the lowest possible cost and with the highest level of reliability, considering the physical constraints of the electricity system. In 2001, FERC approved the Midwest ISO as the nation's first RTO.



Driven by the goal of minimizing delivered energy costs in a reliable fashion, the Midwest ISO leveraged advances in computing capabilities and O.R. algorithms to launch its original energy market on April 1, 2005, and its upgraded energy and ancillary services markets on January 6, 2009.

The Midwest ISO's energy and ancillary services market is a commodities market that facilitates real-time and day-ahead trade transactions. Through market bids and offers, the Midwest ISO notifies power plants every five minutes of the amount of energy required to meet demand. The power plants providing the energy are the lowest-cost producers that satisfy demand while respecting the physical constraints of the electrical system. Running the markets over a large region further maximizes efficiencies due to economies of scale. In 2009, the Midwest ISO cleared $24 billion in market transactions.

By leveraging O.R., the Midwest ISO added significant value to the Midwest region through improved reliability and increased efficiencies of the region's power plants and transmission assets. Based on its annual Value Proposition study, the Midwest ISO region realized between $2.1 and $3.0 billion in cumulative savings from 2007 through 2010. The Midwest ISO estimates an additional $6.1 to $8.1 billion of value will be achieved through 2020.

"The Midwest ISO is able to provide this value by applying new, complex analysis and optimization techniques on a broad regional basis," said John R. Bear, president and CEO of the Midwest ISO. "This enables both improved use of existing electric system assets as well as a reduced need for future assets."





Organizational Overview

Midwest ISO
Midwest ISO is an essential link in the safe, cost-effective delivery of electric power across a region comprising 13 U.S. states along with the Canadian province of Manitoba and serving approximately 40 million people. Members of the Midwest ISO include 35 transmission owners and 100 non-transmission owners. The Midwest ISO has operational control over 55,000 miles of transmission lines and over 1,500 power plants totaling 145,966 megawatts of power plant capacity.

Alstom Grid
Alstom Grid is a supplier of advanced energy management software and systems, with solutions operating today that control 40% of all power flowing through the U.S. energy grid and that manage five of the country's seven energy markets.

Paragon Decision Technology
Paragon is an innovative technology company with offices in Seattle, the Netherlands, and Singapore. For over 20 years, Paragon has been developing and selling AIMMS, a mathematical optimization platform. AIMMS customers can create optimization engines and solutions that enable optimal decision making on complex strategic, tactical, or operational problems. Paragon's customers include Alstom, Arcelor Mittal, BNP Paribas, BP, Dow Chemicals, ExxonMobil, Heineken, Merck, Midwest ISO, Petrobras, Procter & Gamble, Shell, TEGAZ (Total), TNT, and Unilever.

State of New York

Tax Collection Optimization for the State of New York

Project Summary

The state of New York collects over $1 billion annually in assessed delinquent taxes. Recent economic conditions, including the need to reduce growing state deficits, require that every dollar that can be collected is collected—and in the most efficient way possible. The Tax Collections Division is being asked by the governor to increase collections to reduce the budget deficit, but to do so in a manner that respects the rights of citizens by taking actions commensurate with the individual situations of each debtor. This needs to be accomplished within an environment that also includes limited resources that, if anything, will become more limited in the future.

The debt collection process is highly complex, with a large number of legal and business constraints involved. Because of this complexity, it is common practice to follow rigid, manually constructed rules to guide the collection activities. Even in state-of-the-art rule-based systems for collections, the role of data analytics is typically limited to augmenting the rule engine with scores given by analytics. Manually constructed rules are not adaptive to changes in the environment, and hence the need for a more adaptive approach has been recognized.

In collaborative work between the New York State Department of Taxation and Finance and IBM's Research and Global Business Services divisions, a novel tax collections optimization solution was developed to address this challenge. The solution is a unique combination of data analytics and optimization based on the unifying framework of constrained Markov decision processes (C-MDP). It optimizes the collection actions of agents with respect to maximization of long-term returns while taking into account the complex dependencies between business needs, resources, and legal constraints.

The C-MDP system became operational in December 2009, and the results to date are compelling.





New York State has seen an $83 million increase in revenue from 2009 to 2010 (8%), using the same set of resources. In addition, the department has increased the productivity from primary enforcement actions with, for example, a 22% increase in the dollars collected per warrant and an 11% increase in the dollars collected per levy. (A warrant is effectively a "tax lien," and a levy compels financial institutions to turn over debtors' assets.) Additional good news is that the department has seen a 10% decrease in age of case when it is assigned to a field office. (Older cases tend to have lower probability of collection.) Given a typical annual increase of 2–4%, the expected benefit of the developed system is approximately $150 million over the next three years, far exceeding the initial target of $99 million, and is expected to improve still more in the future as the system further adapts.

The developed system possesses a number of notable characteristics. First, via the tight coupling of data analytics and optimization in the C-MDP framework, it realizes a level of automation that has never been achieved before. With the optimization process being guided by data analytics, the resulting collection policy is adapted to various changes in the environment.

Another advantage is its ability to optimize the collection rules with respect to long-term return, which is critical in this domain because not all collections actions (for example warrants as prerequisites to levy) enjoy immediate rewards. Indeed, this aspect is key in freeing the department from reliance on manual sequential workflow rules, which to date has hindered automation of collections processes. Although the sequential dependencies between various collection stages are automatically discovered, the system also accepts hard constraints expressed as rules for use in its optimization process.

Hence, the system brings together three principal elements of operations research—analytics, optimization, and rules—in a novel, coherent, and effective manner, and simultaneously attains their corresponding benefits of adaptability, optimality, and practicality.



Organizational Overview

New York State Department of Taxation and Finance

The New York State Department of Taxation and Finance is responsible for two major functions: the administration of the state's tax laws, including the administration of related local taxes, and the management of the state treasury. In the fiscal year ending March 31, 2010, the department collected over $55 billion in state revenue and nearly $36 billion on behalf of localities.

The department continually promotes and facilitates voluntary compliance. The majority of revenue, approximately 96%, is collected through taxpayer voluntary compliance. When it is necessary to determine liability and collect tax, the department uses the most efficient and fair means possible.

IBM

International Business Machines Corporation is a global technology and innovation company headquartered in Armonk, New York. IBM is the largest technology employer in the world, with more than 400,000 employees serving clients in 170 countries. The company offers a wide range of infrastructure, hosting, and consulting services; a broad portfolio of middleware for collaboration, predictive analytics, software development, and systems management; and the world's most advanced servers and supercomputers. Utilizing its business consulting, technology, and research and development expertise, IBM helps clients around the world become "smarter" as the planet becomes more digitally interconnected. That includes working with organizations and governments to build systems that improve traffic congestion, food safety, the availability of clean water, and the health and safety of populations.



Call for 2012

Franz Edelman Award Applications

Call for 2012 Applications

THE FRANZ EDELMAN AWARD

41st Annual International Competition for Achievement in Operations Research

A $15,000 Competition with a $10,000 First Prize
Call for Success Stories

INFORMS and CPMS, the Practice Section of INFORMS, are pleased to announce the 41st International Competition for the Franz Edelman Award for Achievement in Operations Research. The competition will take place at the 2012 INFORMS Conference on Business Analytics and Operations Research in Huntington Beach, California.

Any work done in recent years is eligible, unless it has already been described by a Franz Edelman Award finalist. Previous publication of the work does not disqualify it. Anyone is eligible for the competition except a member of the 2012 judging panel.

The purpose of the competition is to recognize and reward outstanding examples of O.R. in practice. The prize is awarded for implemented work, not for a submitted paper or for the presentation describing the work. The client organization that used the winning work receives a prize citation; the authors receive a cash award. In addition, finalist organizations become members of the Franz Edelman Academy; authors receive the Franz Edelman Medal and are officially recognized as Laureates.

To submit, provide a 3-page summary of your achievement and a 60-word abstract, plus the name, address, phone number, and affiliation of each author by Wednesday, October 19, 2011.

Complete instructions will be announced online at **www.scienceofbetter.org/Edelman**.

Each finalist group will give an oral presentation of their work on April 16, during the analytics conference in California.

See you at the 2012 Franz Edelman Award Competition!
www.scienceofbetter.org/Edelman

The INFORMS Prize:

Sustained Integration of Operations Research

2011 Winner



The 2011 INFORMS Prize is awarded to Sasol for demonstrating sustained, effective and creative use of operations research to improve decision making and impact the company's bottom line. For 60 years, Sasol has demonstrated its innovative spirit in the energy and chemicals sectors in South Africa and has grown to become the country's leading fuel provider and an international leader. Ensuring Sasol's success requires that complex operations be managed across value chains, business units and sites. Sasol Technology's Value Chain Optimisation Group applies operations research across the business for a wide range of uses such as improving polymer production processes, minimizing the cost of stricter fuel specifications, and studying the reliability and sustainability of key units in the production process. The group has grown from a few analysts to a multidisciplinary team of over 30 specialists who are Sasol's experts in linear programming, simulation, supply chain modeling, process integration, and human resource modeling. The team's impact and reputation have also grown steadily, culminating in their recognition as Edelman finalists and as Sasol's Chief Executive's "Team of the Year" in 2010.

By awarding the 2011 INFORMS Prize to Sasol, INFORMS recognizes the company's widespread application of innovative world-class operations research.



The INFORMS Prize

A History

This is the fourth year that INFORMS is presenting its most prestigious practice prizes at the Edelman Awards Gala. The Franz Edelman Award and the Wagner Prize recognize operations research practice projects that are among the very best in the world during a given year. In that same year, the INFORMS Prize recognizes long-term, multiproject achievement by honoring sustained, successful work in operations research practice.

The INFORMS Prize is awarded annually to recognize effective integration of operations research into organizational decision making. The award is given to an organization that has repeatedly applied the principles of O.R. in pioneering, varied, novel, and lasting ways.

INFORMS Prize Winners

2011 Sasol
2010 Jeppesen
2009 Intel *Decision Technologies Group*
2008 GE Global Research *Risk & Value Management Laboratory*
2006 Schneider National, Inc.
2005 Air Products & Chemicals, Inc.
2004 Procter & Gamble
2003 UPS
2002 Hewlett-Packard
1999 IBM
1998 Lucent Technologies
1997 Merrill Lynch Private Client Group
1996 Pfizer Inc
1995 Bellcore
1994 AT&T and US West Technologies
1993 New York City *Office of Management and Budget* and United Airlines
1992 San Miguel Corporation
1991 American Airlines and Federal Express

2011 INFORMS Prize Committee

Erica Z. Klampfl,
Ford Research, Chair
Jeff Camm, U of Cincinnatti, Past Chair
Michael Gorman, University of Dayton
Stefan Karisch, Jeppesen
Ivan Oliveria, SAS
Julie Ward, HP Laboratories
Sean Willems, Boston University

Notes:
Prior to 1995, the award was called the ORSA Prize.
No prize recipients were chosen in 2000 and 2001.

To adjust to the new INFORMS Prize presentation schedule, no award was given in 2007.



The INFORMS Prize

Criteria

Variety of Applications of O.R. The demonstrated use of a wide set of disciplines and application areas led to a richer set of offerings, leading to greater opportunities for impacting the winning organization.

Competitive Advantage to the Organization. O.R. adaptation within an organization is clearly varied among organizations. There are examples where O.R. permeates the parent organization's operations and was considered integral and of strategic competitive advantage for the organization. Companies that soundly demonstrate this type of adaptation were rated higher by the prize committee.

Impact. There are several ways that O.R. professionals can quantify and qualify the impact their work is having on the organization as a whole. The prize committee took one-off project impacts into consideration, as well as those O.R. applications that were used on a sustained, systemic manner and the quantifiable value they delivered. Some applicants demonstrated instances in which O.R. made fundamental changes to the client organization's overall business model and/or organizational structure, and the prize committee considered these examples in which O.R. truly made an impact on the organization's operations.

Model for Success. Applicants' business models vary, based on different industries. Some are represented very well, including marketing, budgeting, cost recovery, research funding approaches, and strategic planning. This provides a sense of sustained, growing capability, and of direction for O.R. in the organization.

Endorsements. Strong submissions include personally written endorsements from top-level organization management.

Overall Quality of the Application. The best applicants clearly put extra effort into creating a singular submission with all supporting references and endorsements. A well-written application, taken together with the overview statement, aids the prize committee and, in turn, the applicant.

Call for 2012

Informs Prize Nominations

Call for 2012 Nominations



Applications for the 2012 INFORMS Prize are now being accepted.

Organizations in the public and private sectors are eligible. Outside contractors to a candidate organization are not eligible, unless a proven, dedicated relationship exists over a prolonged time period between the vendor and the client organization. In this case, the client organization and vendor will be co-recipients of the prize, presented to appropriate executives of both organizations.

The measurement of the contribution is judged relative to the impact OR/MS has had on the overall success of the organization. Thus, a multibillion dollar firm that has a large OR/MS staff but integrates OR/MS techniques only occasionally might be ranked relatively lower than a small firm that uses OR/MS throughout its activities.

Potential applicants can be assured that strict guidelines regarding the confidentiality of their application are enforced.

The Awards Committee may conduct site visits to those organizations selected as finalists. The award is presented to the key executive in charge of OR/MS activities within the organization.

Please include the following with your application:
A summary description (1-3 pages) of the scope, scale, and impact of OR/MS activities in the organization, and more detailed descriptions (1 page each) of two or three major OR/MS projects and their impact. For more information about the application process, please visit: **www.informs.org/informsprize**.

Deadline is December 1, 2011.

See you at the 2012 INFORMS Conference on
Business Analytics and Operations Research!
April 15–17, 2012, in Huntington Beach, California.

The Wagner Prize:

Excellence in Operations Research Practice

2010 Winner
The Daniel H. Wagner Prize
for Excellence in Operations Research Practice

The first place winners are

Heng Cao
Jianying Hu
Chen Jiang
Tarun Kumar
Ta-Hsin Li
Yang Liu
Yingdong Lu
Shilpa Mahatma
Aleksandra Mojsilović
Mayank Sharma
Mark Squillante
Yichong Yu

Their paper, "OnTheMark: Integrated Stochastic Resource Planning of Human Capital Supply Chains," describes the development and implementation of an integrated suite of operations research (O.R.) models and methods, called OnTheMark (OTM), that supports the effective and efficient management and planning of human capital supply chains.

Much research has been done, and many products exist, for dealing with a traditional manufacturing supply chain. Conceptually, it is easy to view the hiring, training, assigning and job planning of employees as a supply chain problem. However, the model of human resources as a supply chain is quite different from classical supply chain models and introduces a number of new and interesting problems. OnTheMark addresses these problems and consists of novel solutions for:

1. the statistical forecasting of future resource demand and requirements;
2. a new form of risk-based stochastic resource capacity planning;
3. the stochastic modeling and optimization/control of supply evolutionary dynamics over time;
4. a new form of optimal multi-skill supply–demand matching; and
5. the stochastic optimization of business decisions to manage resource shortages and overages.

These O.R. models and methods have been developed and integrated to optimize the performance of an IBM business line within the information technology services industry, and various applications beyond the internal IBM deployment are on the horizon. The OTM suite is implemented within an end-to-end solution that has been, and continues to be, deployed as a critical part of the human capital management and planning process within IBM, providing the fact-base to drive better business performance. These O.R. models and methods include important contributions in the areas of stochastic models and stochastic optimization/control, as well as the innovative use and integration of these models and methods in human capital management and planning applications.

The Daniel H. Wagner Prize for Excellence in Operations Research Practice

2010 Finalists

This is the third year that INFORMS is conferring the Daniel H. Wagner Prize for Excellence in Operations Research Practice at the Franz Edelman Awards Gala. The award now shares the spotlight with the two other great INFORMS practice awards, the Edelman Award and the INFORMS Prize.

A special issue of *Interfaces* will publish the winning paper along with those of the other four finalists:

Hannah K. Smalley, Pinar Keskinocak; Georgia Institute of Technology, Faramroze G. Engineer; University of Newcastle, and Larry K. Pickering; Centers for Disease Control and Prevention:
"Universal Tool for Vaccine Scheduling: Applications for Children and Adults"

Casey Chung; Blockbuster Distribution, Milind Dawande, Chelliah Sriskandarajah, and Divakar Rajamani; School of Management, University of Texas at Dallas:
"A Short-Range Scheduling Model for Blockbuster's Order Processing Operation"

Ramasubramanian Sundararajan, Tarun Bhaskar, Abhinanda Sarkar, Sridhar Dasaratha, Debasis Bal, Jayanth K Marasanapalle; GE Global Research, India, Beata Zmudzka, and Karolina Bak; GE Capital, Bank BPH:
"Marketing Optimization in Retail Banking"

Nazrul Shaikh, Vittal Prabhu; Pennsylvania State University, Danilo Abril, Esteban Rodríguez, David Sánchez, Jorge Arias, and Germán Riaño; Kimberly-Clark Corporation:
"Kimberly-Clark Latin America builds an Optimal Scheduling System"

The Daniel H. Wagner Prize for Excellence in Operations Research Practice

A History

The Wagner Prize is awarded annually in honor of the late Dr. Daniel H. Wagner.

During his years as president and principal owner of Daniel H. Wagner Associates, Dr. Wagner brought many high-quality mathematicians into the operations research community. This led to significant advances in the firm's fields of endeavor and delivery of significant applications to the Navy, Coast Guard, and other clients. Many of the applications are still in service today.

Dan Wagner earned his PhD in mathematics from Brown University in 1951. His dissertation, "On Free Products of Groups," was published in the *Transactions of the American Mathematical Society* in 1957. Dr. Wagner joined the Navy's Operations Evaluation Group at the Pentagon, working on operations research for naval warfare. He worked there until 1956, with a one-year leave of absence for postdoctoral research on free algebras at MIT. Dr. Wagner then joined Burroughs Research Center, where he directed a group of mathematicians performing analysis for the development of digital computers.

In 1957, Dr. Wagner and Dr. John D. Kettelle formed the partnership of Kettelle and Wagner, which was dissolved in 1963. In 1963 he formed a new company, Daniel H. Wagner Associates, Inc. This company applied itself to cutting edge work in the mathematics of naval tactics, especially antisubmarine warfare, detection theory, and search planning.

After retirement from the firm he founded, Dr. Wagner held various teaching and research positions with the U.S. Naval Postgraduate School and the U.S. Naval Academy.

Dr. Wagner was a member of INFORMS/ORSA for more than 40 years. Dan passed away in March 1997.

2010 Wagner Prize Committee

C. Allen Butler,
Daniel H. Wagner Associates, Inc., Chair
Charles Beall, Verizon Retiree
Peter C. Bell, University of Western Ontario
William J. Browning,
Applied Mathematics, Inc.
Manoj Chari, SAS Institute
Joseph H. Discenza, SmartCrane, LLC
Howard Finkelberg, MAGIC, LLC
Art Geoffrion, UCLA Anderson School
Russell P. Labe, Bank of America
Randall S. Robinson
Lawrence D. Stone, Metron, Inc.

Call for 2011

The Wagner Prize Applications

Call for 2011 Abstracts

THE DANIEL H. WAGNER PRIZE

Excellence in Operations Research Practice

Deadline Midnight May 1, 2011

The Wagner Prize is given to the authors of a previously unpublished paper detailing a real-world, provably successful application of operations research that required innovative mathematical development, a unique new algorithm, or a series of coherent O.R. advances.

The application process begins with a 1- to 2-page abstract, written verification of application success, and a commitment, if selected as a finalist, to give a 30-minute oral presentation at the INFORMS Annual Meeting in Charlotte, North Carolina, and, if selected as a winner, to reprise the presentation at the spring Analytics Conference in Huntington Beach, California. The finalist papers are published in a special issue of *Interfaces*.

Submissions can be made to the Wagner Prize Chair, Dr. C. Allen Butler, at allen.butler@va.wagner.com. For more details on the application process, please visit **www.informs.org/wagnerprize**.

The prize amount for 2011 is $1,000.

CPMS thanks the firms of Metron, Inc., Daniel H. Wagner Associates, Inc., and Applied Mathematics, Inc., for the generous endowments that enable the funding of this prize.

All finalists' presentations can be viewed in the INFORMS Video Learning Center at http://livewebcast.net/INFORMS_AM_Wagner_Prize_2010.

See you at the 2011 Wagner Prize competition!
www.informs.org/wagnerprize

The UPS
George D. Smith Prize

The UPS George D. Smith Prize



The UPS George D. Smith Prize is an exciting new award created in the spirit of strengthening ties between industry and the schools of higher education that graduate young practitioners of operations research.

Beginning in 2012, INFORMS will award the prize to an academic department or program for effective and innovative preparation of students to be good practitioners of operations research, management science, or analytics.

The UPS George D. Smith Prize is named in honor of the late UPS Chief Executive Officer who was a patron of operations researchers at the leading Fortune 500 corporation. George D. Smith was the second CEO of UPS, holding the position from 1962–1972. He joined UPS as an accountant in 1925, and at some point in his long and illustrious career held almost every functional title within the company.

While his background was steeped in finance, George Smith had a keen engineering mind. In the late 1940s, after learning about operations research, George Smith realized that intuition alone would not be enough to help UPS master the many issues it faced as it grew in size from a regional to nationwide carrier.

> As we grow in size, our problems increase geometrically. Without operational research, we would be analyzing our problems intuitively only, and we would miss many opportunities to get maximum efficiency out of our operation.
>
> George D. Smith,
> CEO, UPS 1962-1972

George Smith recognized O.R. as an engineering approach to making decisions, and started advocating the use of operations research concepts in UPS. Quantitative analysis became the bedrock on which UPS's engineering function was built. Because of George's vision, UPS now employs thousands of engineers whose focus is efficiency, sustainability, and service.

He was a strong believer in investing in our younger generation. For him, nurturing them was the key to sustained prosperity. This new prize embodies George Smith's beliefs: to recognize the importance of operations research in practice, and ensure that our younger generation gets proper exposure to its value, and in turn benefit society.

Call for 2012

George D. Smith Prize Applications

Call for 2012 Applications

THE GEORGE D. SMITH PRIZE

Bridging the Gap Between Academia and Industry

Deadline for Applications is Monday, October 31, 2011.

The UPS George D. Smith Prize is created in the spirit of strengthening ties between industry and the schools of higher education that graduate young practitioners of operations research. INFORMS, with the help of CPMS, will award the prize to an academic department or program for effective and innovative preparation of students to be good practitioners of operations research, management science, or analytics.

The UPS George D. Smith Prize is named in honor of the late UPS Chief Executive Officer who was a champion of operations researchers at a leading Fortune 500 corporation. UPS has generously underwritten the award in his memory.

The prize will be awarded to an academic program or department. It will include a trophy and a $10,000 cash award. The first UPS George D. Smith Prize will be announced at the 2012 INFORMS Franz Edelman Gala.

The application process begins with a summary of the role of operations research in the academic program and why competence in operations research practice is one of the goals of the program, written verification of application success, and a commitment, if selected as a finalist, to give a 30-minute oral presentation at the spring Analytics Conference in Huntington Beach, California, and, if selected as a winner, to reprise the presentation at the INFORMS Annual Meeting in Phoenix, Arizona. The finalist papers are published in a special issue of *Interfaces*.

Submissions can be made to dsmith@monmouth.edu.
For more details on the application process, please visit **www.informs.org/smithprize**.

See you at the 2012 INFORMS Conference on Business Analtytics and Operations Research!
www.informs.org/smithprize

The Institute for Operations Research and the Management Sciences

About INFORMS, Its Activity and Its History

The Institute for Operations Research and the Management Sciences is the largest professional society in the world for professionals in the field of operations research, the management sciences, and analytics.



The Institute for Operations Research and the Management Sciences (INFORMS) is the largest professional society in the world for professionals in the field of operations research (O.R.). It is rapidly becoming the central organization serving those in the field of analytics.

INFORMS was established in 1995 with the merger of the Operations Research Society of America (ORSA) and The Institute of Management Sciences (TIMS). The international scientific society, which contains over 10,000 members, is dedicated to applying scientific methods to help improve decision making, management, and operations. Members of INFORMS work in business, government, and academia. They represent fields as diverse as airlines, health care, the military, finance, telecommunications, and business analytics. Over the last year, INFORMS leadership has recognized the growing role of analytics in the business world and is providing leadership to professionals with skills in both O.R. and analytics.

INFORMS is reaching out to the business world through the magazine *Analytics*, an online publication for those who analyze data in the marketplace and those who work with them and direct their departments. The magazine's new online homepage, www.analytics-magazine.com, offers breaking news, feature articles, and an Executive Edge column written by guest writers like UPS vice president Chuck Holland.

INFORMS is also expanding its services to analytics practitioners by creating an analytics special interest group. The Executive Forum, Analytics Connect job event, and the special tracks for analytics professionals at this conference are part of INFORMS' new contributions to the rapidly expanding movement.

INFORMS is also exploring new initiatives like training and certification programs in analytics.

INFORMS retains its traditional side. Since the pioneering days of people like Franz Edelman, operations researchers have taken pride in quietly improving the world. Saving billions of dollars annually, model-based support solutions developed by INFORMS members are now relied upon in such diverse areas as airlines, telecommunications, health care, homeland security, the armed forces, and government. Research pioneers in O.R. disciplines represented by INFORMS have contributed importantly to the development of algorithms and methodologies now employed widely in engineering, science, and business.





INFORMS is often a leader in identifying the world's foremost researchers—for example, honoring Nobel Prize winners John F. Nash and Harry Markowitz before they were recognized by the Nobel Academy.

The society serves the scientific and professional needs of O.R. educators, investigators, scientists, students, managers, and consultants, as well as the organizations they serve, by such services as publishing 12 scholarly journals that describe the latest O.R. methods and applications and a membership magazine with news from across the profession. The society organizes national and international conferences for academics and professionals, as well as for members of the society's special interest groups. The Institute serves as a focal point for O.R. professionals, permitting them to communicate with each other and reach out to other professional societies, as well as to the varied clientele of the profession's research and practice.

INFORMS is a member of the International Federation of Operational Research Societies (IFORS).

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Congratulations to the 2011 Edelman finalists for achieving outstanding results with operations research!

HP Salutes the 2011 Edelman Award Finalists

Your commitment to Operations Research
Demonstrates a drive for excellence in
process innovation and data-driven
decision making.

Bringing You a Crown Jewel of the Operations Research Profession

By Randall S. Robinson, Chair, CPMS: The Practice Section of INFORMS

Background of the Edelman Award and an Invitation to Participate



As we celebrate the outstanding achievements of this year's Franz Edelman Award finalists, let's take a look at the background of the influential Edelman Award, including the central role of CPMS, the Practice Section of INFORMS.

"CPMS" is an acronym originally derived from "College on the Practice of Management Science." A long-standing acronym often becomes the name, and later we rarely think of its origin. Consider for example AT&T, which once stood for American Telephone and Telegraph, yet is still the acronym even though "telegraph" is no longer part of the AT&T business. So it is for CPMS. "College" was terminology used within The Institute of Management Sciences (TIMS), which merged with the Operations Research Society of America (ORSA) in 1995 to found INFORMS; more appropriate today is the term "Section."

CPMS supports the practice of operations research and the management sciences (OR/MS) – also called the practice of advanced analytics. Rather than giving attention only to specific technical methods or areas of study, CPMS, like a family physician, focuses on general practice: how OR/MS may be carried out successfully in any and all organizations where executives and operating personnel seek assistance from qualified practitioners to help improve real organizational performance.

Probably the most significant activity of CPMS is administering the Franz Edelman Award. This present stewardship directly evolved from the earlier CPMS role in initiating, nurturing, and growing the competition in stature and visibility. First established by TIMS in 1971 as the CPMS Prize, the award was renamed for Franz Edelman shortly after his death in 1982. Franz was the founder of one of the first industrial operations research



groups (at RCA). Today, becoming an Edelman finalist is widely viewed to be rigorous certification that an organization has benefited from state-of-the-art, high-organizational-impact, applied operations research. The finalist stories and their presentations, available from the INFORMS Video Learning Center, in papers published in the journal *Interfaces*, and on DVD, are widely employed in education and otherwise to help strengthen the profession. Past and present finalist organizations and team members are rightfully honored at our gala award ceremony every year, during the spring analytics conference where the competition takes place.

Administration of the competition is a rigorous, highly organized effort. The committee of volunteers who operate the competition consists of 35 to 45 OR/MS professionals, most of whom are CPMS members. The committee's chair, typically serving a two-year term, is assisted by 8 to 10 judges, 10 to 15 coaches and assistant coaches, 20 to 25 verifiers and assistant verifiers, and 35 to 40 reviewers (some volunteers take multiple roles).

The competition would not be possible without an effective support-and-





evaluation infrastructure. If you would like to help administer the Edelman competition in the future, a good starting point is to volunteer to become one of the reviewers.

CPMS also oversees a number of other activities important to practitioners, including the Daniel H. Wagner Prize and the new UPS George D. Smith Prize (both recognized during the gala award ceremony), cluster sessions at INFORMS meetings, Isolated Practitioner workshops, and a newsletter.

We constantly strive to become even more valuable to the widespread community of OR/MS practitioners. If you have ideas about ways to do this, please contact us (randy.robinson@mac.com).

Better yet, if you are not a member of INFORMS or of CPMS within INFORMS, please join us and pitch in as we serve all full-time practitioners, part-time practitioners, and researchers interested in practice. If you are already a member but not actively involved, contact us to find out how you can further benefit from your membership through participation. As the cliché goes about university lecturing, "Nobody learns as much as the teacher." There is no better way to learn the ropes of successful OR/MS practice!

The Edelman Laureates

2010
Gerkotze Bonthuys
Ebert Cawood
Jay Cunningham
Esmi Dreyer
Ingrid Farasyn
Andrea Feunekes
Ugo Feunekes
Marc Fischer
Michele Fisher
Tjark Freundt
Wolfgang Giehl
Francisco J. Herrería
Salal Humair
Johan Janse van Rensburg
Jaco Joubert
Joel I. Kahn
Peter Kolesar
Miguel de Lascurain
Willem Louw
John MacNaughton
Kim Mathisen
Marlize Meyer
David Fernando Muñoz
John J. Neale
Arturo Palacios-Brun
Steve Palmer
Hylton Robinson
Omar Romero-Hernandez
Oscar Rosen
Ruan Rossouw
John Ruark
Luis de los Santos
James Serio
Francisco Solis
Gerrit Streicher
William Tarlton
Hentie van den Berg
Anette van der Merwe
Wim Van de Velde
Lorraine van Deventer
Jaime Villaseñor
Glenn Wegryn
Sean P. Willems
Cecile Wykes

2009
Dharma Acharya
Jason Amaral
Dirk Beyer
Ann Brecht
Matt Callahan
Brian Cargille
Felipe Caro
Russ Chadinha
Kathy Chou
Matt Collins
Juan Correa
José Manuel Corredoira
Prashant Dave
Gavin DeNyse
Miguel Díaz
Alexey Ershov
Graeme Everett
Qi Feng
Chris Fry
Jérémie Gallien
Javier García
Rune Gjessing
Michael F. Gorman
Sharon Hormby
Shailendra Jain
Shiva Kumar
Rick Lawrence
Michele Meyers
Holger Mishal
Marcos Montes
Julia Morrison
Thomas Olavson
Cookie Padovani
Claudia Perlich
Andy Philpott
Sesh Raj
José Antonio Ramos
Saharon Rosset
David Sellers
Kurt Sunderbruch
Robert Tarjan
Timothy Tenca
Kjetil Vatn
Krishna Venkatraman
Julie Ward
Joseph Woods
Bin Zhang
Jing Zhou

2008
Erwin Abbink
Terra Baranowski
Jonathan Berry
Erik Boman
Michael Brennan
Robert Carr
Lorne Cass
Michael Cirillo
Maria Delbom
Charles B. Duke
Helga Einarsdottir
Mats Eklund
Patrik Eveborn
Pieter-Jan Fioole
Matteo Fischetti
Marte Fodstad
Kim Fox
George Gray
William Hart
Lars Hellemo
Jonathan Herrmann
Ken Howard
Dennis Huisman
Robert Janke
Leo Kroon
Miro Lehky
Vaughn Lowe
Gábor Maróti
Kevin Morley
Regan Murray
James Oiesen
Cynthia Phillips
Cyndi Quan-Trotter
Sudhendu Rai
Lee Ann Riesen
Frode Rømo
Mikael Rönnqvist
Thomas Scheermesser
Lex Schrijver
Adri Steenbeek
Ved Sud
Midori Tanino
Thomas Taxon
Asgeir Tomasgard
James Uber
Jean-Paul Watson
James Wetherly
Roelof Ybema

2007
Corne Aantjes
Deirdre Borrego
Dwight Branvold
Vinayak Deshpande
Kent Everingham
Matt Gaskins
Jerry Hwang
Tim Hyatt
Irina Ionova
Ananth Iyer
Michael Jacks
Goos Kant
Alexei Khavaev
Eva K. Lee
Patty Mackenroth
Venu Nagali
Gary Polaski
Mark Pridgen
Frederick C. Riedlin
David Sanghera
Patrick Scholler
William V. Shearin
Michael A. Shirk
Greg Shoemaker
Jorge Silva-Risso
Tim Thurston
Marco Zaider

2006
William Best
Raymond H. Bittel
Richard Carnevale
Sridhar Chandrasekaran
Louis Cox, Jr.
Ross Darrow
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Ulrich Koester
William H. Lee
Per Olav Myrstad
John J. Nestor
Atle Nordli
Asmund Olstad
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B.V. Rao
Alf Reistad
Barry C. Smith
Mandyam Srinivasan
Geir Teistklub
Russell Wooten
Faker Zouaoui

2005
Jeffrey Alden
Dennis Begg
D.A. Beis
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Craig Jackson
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Kevin Kohls
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Jonathan Owen
Y. Pyrgiotis
Tuomas Sandholm
Mihiro Sasaki
Katsushige Sawaki
Mike Self
Atsuo Suzuki
Mark Turnquist
David VanderVeen
K.G. Zografos



2004
Martin Barkman
John C. Butler
Alexander Chebeskov
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Mathieu Clerkx
Ton de Kok
Jacques Desrosiers
Yvan Dumas
James Dyer
Thomas A. Edmunds
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Jianmin Jia
Mike Kanaley
Joshua Kanner
Alev Kaya
Byung-In Kim
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Benoit Lacroix
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Thomas Morris
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Winfried Peeters
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Sridhar Tayur
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Mitchell Tseng
Jan van Doremalen
Erik van Wachem
Yat-Wah Wan
Elan Yaniv

2003
Kirk Abbott
Surain Adyanthaya
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Cynthia Barnhart
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Ronit Meiri
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Julie Unruh Rapp
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Alysia M. Wilson
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Ron Woestemeyer

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Chae An
Michael Argüello
Fred Blakeley
Burçin Bozkaya
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Wolfang Hall
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Arnd Huchzermeier
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Jayant Kalagnanam
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Gilles Kern
Jospeh Knolmajer
Manfred Krafft
Ho Soo Lee
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Sandra McCowan
Ed Ng
Alain Patchong
Grant Reid
John Rich
Gao Song
Rodney Traub
Anna White
Gang Yu

2001
Stuart Altschuler
Rick Ayer
Vince Barabba
Donna Batavia
Jeff Bennett
Srinivas Bollagragada
Robert Butchers
José Vicente Caixeta-Filho
Hong Chen
Fred Cooke
Antonio de Pádua Wagemaker
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Marc Garbiras
Tim Gibbs
Gregory Hoscheit
Chet Huber



Mark Humphresville
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Robert Leachman
Bonnie Liao
Vincent Lin
Kevin Lyman
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Je Oh
Mark Paich
Greg Parlier
Mary Phillips
Nick Pudar
Surya Sahoo
Michael Scholes
Jim Smith
Jan Maarten van Swaay-Neto

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Eric Bibelnieks
Mark Bullock
E. Rod Butchers
Deb Campbell
Kan Chang
Kenneth Chelst
Harlan Crowder
Paul R. Day
Randy Erdahl
Andrew P. Goldie
Michael Haydock
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Peter Lyon
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Alex Przebienda
Robert Rice
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Amanda Scott
Laura Shisler
John Sidelko
Midori Tanino
William Tarantino
Ralph Tiedeman
Chris Wallace
Michael Wambsganss

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Rob Allan
Ken Ambs
James Angelo
Nader Azarmi
Sugato Bagchi
Steve Buckley
Rony Cremmery
Sebastian Cwilich
Nicolas De Schuyter
Mei Deng
Markus Ettl
Gordon Gould
Ron Holcomb
Terry Holeman
Richard Hopson
David Houck
John Hudson
Dean Jones
Kerry Kim
Edwin Kjeldgaard
Lisa Koenig
Marc Lambrecht
David Lesaint
Grace Lin
George List
David Lynch
Clive Morgan
Charles Muir
John Mulvey
Bret Naccarato
George Pfeil
Shahram Taj
Mark Turnquist
Nico Vandaele
Christos Voudouris
Dicky Yan
David Yao

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Henry Alden
Dean P. Angelides
Franz Behlau
Dimitris Bertsimas
Buyang Cao
James Causby
Christopher Darnell
Rafael Epstein
Matthew J. Etzenhouser
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R. Jaikumar
Ralph Kaiser
Albert Kuttner
Ramiro Morales
Frederic Murphy
Murthy Murrageda
Kumar Rajaram
Jorge Seron
Robert Soucy
Raymond Taylor
Izaak van de Wege
Franz van Esch

Michael Vasu
Don Weigel
Andrés Weintraub
Steven Welch

1997
Nejib Ben-Kheder
Paul Brinkley
Mitchell Burman
W. David Carr
John Folger
Stanley Gershwin
Claudia Grief
Kristopher Haag
Jackie Hueter
Raymond Johnson
Josephine Kintanar
Kuanlian Liou
Cecile Queille
Eric Schweitzer
David Stepto
William Stripling
Curtis Suyematsu
Alva Svoboda
William Swart
Alireza Vojdani
Detlof von Winterfeldt
Kui Wang
Fulin Zhuang

1996
Sally Botha
Jeffrey Camm
Roy Carr-Hill
Thomas Chorman
George Curnow
Franz Dill
A.A. Elimam
James Evans
Kevin Geraghty
Kamal Golabi
Maurice Gripis
Ivan Gryffenberg
Geoffrey Hardman
Rauten Hofmeyr
Ernest Johnson
Gary Kochman
S. Kotob
Jean Lausberg
Stephen Martin
Steven Meester
Ruppert Nicolay
Stuart Peacock
Dabashish Sarkar
Trevor Sheldon
Richard Shepard
Willem Smit
Peter Smith
Dennis Sweeney
Stephanus Uys
Willie van der Merwe
Glenn Wegryn
Gysbert Wessels
Keith Wilton

1995
Tal Barnea
Michael Barnum
Dan Benanav
Robert Benson
David Bowen
Kabir Dutta
Ivy Eisenberg
Jim Euchner
Elissa Gilbert
Afshin Goodarzi
Shravan Kotha
Robert Leachman
Edwin Lee
Yu-Ling Lin
Chihwei Liu
Leon Marom
John Martin
Richard Ormerod
Justin Peterson
Randy Pope
Dale Raar
Rangu Salgame
Sanjeev Sardana
Gary Sevitsky
Yishay Spector
Miguel Taube-Netto

1994
Bruce Arntzen
Gerald Brown
B.S. Chandrasekaran
A. Roy Choudhury
Zhang Chuntai
Peter Cook
Steven Cosares
Zhou Dadi
David Deutsch
Scott F. Donahue
Anthony Durso
Goutam Dutta
Lin Fatang
Terry Friesz
Terry Harrison
Toshiharu Hasegawa
Michael Kuby
Niloy Mitter
Susan Neuman
Rong Qiang
Shi Qingqi
P.N. Roy
Iraj Saniee
Tsuna Sasaki
Gao Shenhuai
S.B. Singh
Gopal Sinha
Linda Trafton
Ondria Wasem
Thawat Watanatada
Cao Wei
Yu Xiaodong
Sun Xufei
Wang Xusheng
Tsuyoshi Yoshino
Xie Zhijun

1993
Anthony Brigandi
David Carino
Dennis Dargon
Paul Fischbeck
Paul Katz
Terry Kent
Roy Marsten
David Myers
M. Elizabeth Paté-Cornell
John Quillinan
Amir Sadrian
Richard Scheff
Thomas R. Sexton
Michael Sheehan
Sally Sleeper
Thomas Spencer
Celine Stacy
Radhika Subramanian
Mike Sylvanus
Robert Taggart
Patrick Tendick
Andrew Turner
Kouji Wantanabe
D. Steve Wiper
William Ziemba

1992
Benedo Beltrán
William Burnett
Michael F. Cahn
A. Dale Flowers
Earl D. Geyer Sr.
Louis Goldring
Bruce Hoadley
Edward H. Kaplan
Paul Katz
Richard Larson
Dominic Monetta
José Pablo Nuño
Elaine O'Keefe
José Manuel Padillo
Amir Sadrian
Martin Shell
Dan Shunk
Barry Silverman
Arthur Swersey

1991
Yosi Ben-Dov
John Braklow
Ingrid Busch
Michael Cerby
Ross Darrow
Anura de Silva
Fred DiLisio
Jefferey L. Dodge
Joseph Ecker
William Graham
Donna Granfors
Gerald Hahn
Glen Harrison
Stephen Hassler
Lakhbir Hayre
Michael Hilliard
Carolyn Jack
Sheng-Roan Kai
Ronald Kraemer
John Leimkuhler
Cheng Liu
William Makuch
Ken Peck
Vincent Pica
Warren Powell
Alexander Shulman
Barry Smith
Rajendra Solanki
Lawrence D. Stone

1990
Ranga Anbil
Bruce Andrews
J.T. Day
S.R. Erwin
A. A. Farley
Robert Fetter
Eric Gelman
Lonny Gorban
Jim Griffith
K.D. Le
E. William Moore
Henry Parsons
Bruce Patty
Phillip Quinn
Rajan Tanga
Alberto Vasquez-Marquez
Janice Warmke
J.T. Wood
C.K. Yin

1989
Nicola Aversa
Jean-Yves Blais
Anthony Brigandi
Angel Chiarri
Morris Cohen
Dennis Dargon
Ron Dembo
Hisham El Sherif
Kenneth Fordyce
Dennis Gensch
Jesus Gomez Martin
Pasumarti Kamesam
Paul Kleindorfer
Jacques Lamont
Hau Lee
Steven Moore
Luis Paradinas
Jean-Marc Rousseau
Michael Sheehan
Thomas Spencer
Gerald Sullivan
Armen Tekerian

1988
Adedeji Badiru
Donald Brenner
Hung-Po Chao
Stephen Chapel
Charles Clark
Calvin DeWitt
Bobbie Foote
Paul Green
Richard Grimes
Stephen Huxley
Ibrahim Kavrakoğlu
Ali Riza Kaylan
Leon Lasdon
Lawrence Leemis
Simon Melhem
Peter Morris
Süleyman Özekici
A. Ravindran
M. James Sandling
Marsha Scarbrough
James Schierer
Douglas Shifflet
Kenneth Stott
Güniz Tamer
Phillip Taylor
Francis Vasko
Allan Warren
Larry Williams
Jerry Wind
Floyd Wolf

1987
Susan Atherton
Richard Box
Kevin Butterbaugh
Donald Chung
Ellen Curtis
Amir Elger
Donald Herbe
Jonathan Jacobs
Leonard Lodish
Michael Ness
Kenneth Nickerson
Warren Powell

James Selsor
Yosef Sheffi
M. Kerry Simpson
Jacob Ulvila

1986
James Beam
Bell Beckert
Dennis Blumenfeld
Robert Breitman
Gerald Brown
Lawrence Burns
Carlos Daganzo
Dennis Dare
Elmer Dougherty
Carol Ellis
Michael Frick
Glen Graves
Randolph Hall
P.A. Hutchinson
Jim Keyes
Darwin Klingman
John Lastavica
Enrico Lombardino
John Lucas
Charles Noon
Nancy Phillips
David Ronen
Gary Salton
David Steiger
Warren Young

1985
T.A. Araripe Neto
Judson Bryn
Uli Chi
George Gross
J.F.R. Gussow
Gene Hall
Thomas Holloran
Yoshiro Ikura
Mark Lembersky
Anne Litke
Joseph Miller
M.V. F. Pereira
Lucius Riccio
P. R.H. Sales
L.F. Silva
L.A. Terry
Norma Welch

1984
Raymond Boykin
Bill Bulloch
Douglas Cochard
Mark Daskin
David Eaton
Jerry Edwards
Bruce Goeller
Glen Jansma
Peter Kleutghen
J.C. McGee
Dennis Simmons
Harvey Wagner
William P. Wood
Kirk Yost

1983
Walter Bell
Ronald Bierbaum
Louis Dalberto
James Farrell
Marshall Fisher
Arnold Greenfield
Thomas Hatch
Donald Holland
R. Jaikumar
Gerald Katz
Pradeep Kedia
Russell Leslie
Robert Mack
Paul Putzman
Robert Sauder
Alvin Silk
Glen Urban
William Westerman

1982
Emily Bassman
James Dyer
Kamal Golabi
Joseph Graves
Ram Kulkami
Alan Kuritsky
John Little
W.L. McMahan
Alvin Silk
Bruce Smith
George Way

1981
Henry Barker
Donald Brout
Lewis Chakrin
Wayne Dawson
Luca Donno
Warren Erickson
Said Hilal
S. Lakshminarayan
Andre Landry
J. Bruce McLeod
Joseph Pilskin
Dilip Sen
Ed Sharon
Janet Showers
William Swart
Eileen Tell

1980
Lee Brosch
Richard Buck
Dale Cooper
Kenneth Cooper
Lynn Davidson
Robert King
Robert Love
Shmuel Oren
Michael Rothkopf
Richard Smallwood
William Sparrow
James White

1979
William Bingham
William Boyce
Eric Brodheim
Fred Glover
Carl Hamilton
Gene Jones
Andrew Kalotay
David Karney
John Mote
Greg Prastacos
Miles Vogel

1978
Dalip Bammi
Deepak Bammi
D. Wayne Darnell
Joseph Debanne
Adel Gaballa
Harry Harrison
William Jahnke
Ronald Lanstein
Jean Noël Lavier
Carolyn Loflin
Richard Thomson
Charles Tiplitz

1977
John Chambers
Stephen Chen
Dwight Crane
Martin Edelstein
William Fudge
Ronald Hudson
Robert G. Johnston
Frederick Knoop
Leonard Lodish
Charles McCallum
Myron Melnyk
William Pettigrew
Thomas Saaty
F. Paul Wyman

1976
J.H Henry
R. Jaikumar
M.E. Kamrass
D.B. Kotak
J. McDonald
J. Orlansky
U.R. Rau
R.E. Reichenbach
T.C. Rowan
K.W. Shepherd
J.A. Svestka

1975
Joseph Balintfy
Douglas Beene
William Bleuel
James Bruce
Robert Clark
Joseph Debanne
James Gilean
Suresh Jain
James Reddy

1974
David Ahlers
Homer Bishop
Edward Blum
Grace Carter
Dale Cooper
Joseph Debanne
Wayne Drayer
Sidney Hess
Ronald Hudson
Edward Ignall
Peter Kolesar
Robert Machol
A.K. (Raj) Nigam
Steve Seabury
Arthur Swersey
Warren Walker

1973
R.L. Anderson
L.D. Bodin
Leo Boucher
T.O. Carroll
Donald P. Coveleski
James Fitzsimmons
Mark Grossman
Allen Lee
Robert Stark
Sally Stout
Elden D. Thomas

1972
Donald Blumberg
Julio Bucatinsky
Richard Condon
Robert Cutler
Ralph Keeney
Robert Meyer
Peter Salomone



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Chinese University of Hong Kong
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Dept. of Transportation- State of CA
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Hanshin Expressway Public Corp.
Harris Corp./Semiconductor Sector
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Hazardous Waste Remedial Actions Program
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Intelligent Systems Research
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Kenan Systems Corporation
KeyCorp
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Kutztown University
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Kyoto University
Lawrence Livermore National Laboratory
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Marriott International
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Memorial Sloan-Kettering Cancer Center
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Merrill Lynch Management
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Metron, Inc.
Mexico City
M-Factor, Inc.
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Ministry of Railways
Mobil Oil Corporation
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Monash University
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Motorola, Inc.
MPSA
MPT Associates, Inc.
MultiModal Applied Systems, Inc.
Nanzan Educational Complex
Nanzan University
NASA
Nash, Phillips-Copus Company
National Airlines
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National Bureau of Standards
National Car Rental System
National Dong Hwa University
Naval Postgraduate School
NC Dept. of Public Instruction
Netherlands Railways
New Brunswick Dept. of Transportation
New England Merchants Leasing Corp.
New Haven Fire Dept.
New Haven Health Dept.
New York City Fire Dept.
Norfolk Southern Corp.
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Norske Skog Tasman Ltd.
Nortel
North American Van Lines
North-Atlantic Traffic System
North Carolina State University
North Dakota State University
Northeast Computer Services
Northern Telecom
Northwest Airlines
Northwestern University
Norwegian School of Economics & Business Admin.
NYNEX
Office of Technology Assessment
OFMD
Ohio State University
Old Dominion University
Olympic Organizing Committee
Omya Hustadmarmor
Omya International AG
Optiant, Inc.
Optima, Inc.
Optimal Decision Technologies Ltd.
Optimal Solutions
Oregon State University
ORTEC
Pacific Gas & Electric Company
Pacific Lumber Company
Pantex
Pennsylvania State University
Pfizer, Inc.
Philadelphia Federal Reserve District
Philip Morris, USA
Philips Semiconductors
Pillsbury Company
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Procter & Gamble Company
PROS Revenue Management
Prudential Securities, Inc.
Prudential-Bache Capital Funding
PSA Peugeot Citroën
Purdue University
Quantas Airways, Ltd.
Queues Enforth Development, Inc.
Rand Corporation
Rappaport Institute
RCA Corp.
Realization Technologies
Remsoft
Rensselaer Polytechnic Institute
Reynolds Metals Company
Rhenania Group
Richard Costain Ltd.
River Logic
Rolls-Royce Commercial Marine
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