2015 Edelman Gala

RECOGNIZING DISTINCTION IN APPLICATIONS OF ANALYTICS, OPERATIONS RESEARCH, AND MANAGEMENT SCIENCE



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2015 Edelman Gala

For Distinction in Applications

THE FRANZ EDELMAN AWARD

Achievement in Operations Research

Emphasizing Beneficial Impact

THE INFORMS PRIZE

Sustained Integration of Operations Research

Emphasizing Long-Term, Multiproject Success

THE DANIEL H. WAGNER PRIZE

Excellence in Operations Research Practice

Emphasizing Innovative Methods and Clear Exposition

UPS GEORGE D. SMITH PRIZE

Strengthening Ties Between Academia & Industry

Emphasizing Effective Academic Preparation

April 13, 2015

Huntington Beach, California

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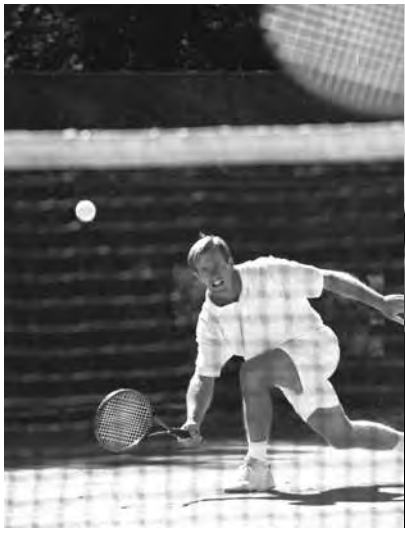
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The Edelman Gala

2015 Franz Edelman Ceremony

Welcome, Acknowledgments, and Awards to be Presented

Jack Levis, Master of Ceremonies

Summaries of 2015 Edelman Finalist Work

IBM
Ingram Micro

Presentation of the Wagner Prize

C. Allen Butler, Chair, 2014 Wagner Prize

Summaries of 2015 Edelman Finalist Work

LMI and Defense Logistics Agency
Saudi Arabia Ministry of Municipal and Rural Affairs

Presentation of the UPS George D. Smith Prize

Ranganath Nuggehalli, CAP, Chair, 2015 UPS George D. Smith Prize
Randy Stashick, Senior VP for Engineering, UPS

Summaries of 2015 Edelman Finalist Work

Syngenta
U.S. Army and Sandia National Laboratories

Presentation of the Informs Prize

Peter Buczkowski, Chair, 2015 INFORMS Prize

Recognizing Members of the Franz Edelman Academy

Jack Levis, Master of Ceremonies

Announcement of the 2015 Franz Edelman Award Winner

L. Robin Keller, President, INFORMS
Michael A. Trick, Chair, 2015 Edelman Award

Master of Ceremonies

Jack Levis



A 38-year UPS veteran, Jack Levis started his career loading packages at UPS. In his current role, Jack drives the development of operational technology solutions that make extensive use of advanced analytics to streamline and improve package operations. During his distinguished career, Jack has overseen the integration of multiple planning and control systems resulting in expansive process reengineering. These systems allow the seamless integration of the physical and virtual networks at UPS.

As the business owner and process designer for the UPS award-winning package flow technology and ORION (on-road integrated optimization navigation) system, Jack has led breakthrough changes for UPS, and has reduced millions of driving miles, while giving UPS significant competitive advantage.

Jack is a longtime active and influential member of INFORMS. In 2003, his team won the INFORMS Prize, and was an Edelman Prize runner-up. He has served INFORMS as the vice president of practice (2010-2013), member of Strategic Planning Committee, Sections/Societies Committee, Professional Recognition Committee, Certification Task Force, Meetings Committee, and Analytics Conference Chair (2007). To strengthen ties between academia and industry, Jack and CPMS collaborated with the INFORMS Board and UPS C-suite to create the UPS George D. Smith Prize.

Jack has received numerous professional honors, including awards from InfoWorld, CIO Top 100, Technology Association of Georgia, Gartner Business Intelligence, Society for Information Management, and Computerworld Premier 100.

As an analytics expert, Jack is regularly invited to keynote industry conferences and holds advisory council positions with U.S. Census Scientific Advisory Board, Analytics Certification Board, METRANS Advisory Board, and George Mason University SE/OR Advisory Board.

Jack holds a BA in psychology from California State University, Northridge and a master's in project management from George Washington University.

When he is not working as an analytics evangelist, Jack enjoys margaritas, watching baseball, scuba diving, skiing, home electronics, and Corvettes. He lives in York, PA with his wife and four children.



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Analytics and

Operations Research Today

Introduction

by L. Robin Keller, University of California, Irvine
President, INFORMS

Having completed 20 years since INFORMS formed in the merger of ORSA and TIMS in 1995—this is also the year before we mark the 10th anniversary of this gala—I welcome you to our annual celebration of excellence in operations research and analytics practice.

What a 20 years it has been! INFORMS has grown from the incipient years of the Internet and computing technology, when our members were still hampered by limitations on the technology they could bring to complex problem solving with large amounts of data, to an era when our members harness ever-improving tools to make more and better decisions in the era of Big Data.

This gala has grown, too. In our first year we elevated the tributes we paid to all the Edelman competition finalists—at last declaring that every one of the finalist teams had reached a near-Olympian status



and that singling out the Edelman winner accented the accomplishments of all.

This year's teams continue the Edelman history of fascinating, diverse entries—two teams are associated with computers and technical solutions, two are in national defense, one concentrates on feeding

people's bodies, and the last concentrates on protecting people's bodies as they attend to a deeply religious devotion.

Over the years we realized that it was fitting to pay homage to all those who translate theory into practice, so we used the occasion of this ceremony to present three additional awards—the INFORMS Prize, the Daniel H. Wagner Prize, and the UPS George D. Smith Prize.

The INFORMS Prize recognizes the overall body of work by a corporation, government agency, or other organization. In a sense, this year's award to Chevron is phoenix-like: energy, oil, and gas companies, especially those using O.R. in refineries, were an important feature of O.R. practice work for years. Now, this market is returning to the spotlight with Chevron's accomplishments. Chevron also received the inaugural Raiffa-Howard Award for Organizational Decision Quality from the Society of Decision Professionals at the 50th Anniversary of Decision Analysis Gala at the INFORMS Annual Meeting in San Francisco.

The Daniel H. Wagner Prize competition has long ensured that practitioners doing elegant work for their organizations receive kudos. Now the Wagner Prize is awarded at this gala. We recognize the 2014 winner, a team bringing together Ford Motor with researchers from MIT and Cornell, for their work addressing disruptions that once threatened to interfere with a manufacturer responding to consumers. Hats off, as well, to the additional Wagner finalists in healthcare, the travel industry, and manufacturing.

Several years ago UPS approached INFORMS about bridging the unfortunately large gap between academics and industry (one that is starting to narrow through INFORMS' efforts to connect companies with business and engineering schools that turn out graduates who respond to industry needs). UPS introduced the UPS George D. Smith Prize to encourage universities to keep the employer in mind as they design their programs. This year's finalists are Carnegie Mellon University's H. John Heinz III College, the Enterprise Systems Center and Department of Industrial and Systems Engineering at Lehigh University, and the COE/MMOR Program at the University of British Columbia's Sauder School of Business. They show the way for universities to provide students with innovative preparation to graduate top industry-focused operations researchers. This is quite a way to mark the 20th anniversary of INFORMS. We hope you enjoy the gala and appreciate how much progress we've made over the last two decades.

Finally, to all of the award nominees and recipients at the gala: please accept my heartfelt congratulations. You're an inspiration to all of us, and an example to those just entering the profession of what we expect them, in turn, to accomplish in the future. Congratulations!

CARL H.
LINDNER *College of Business*

The University of Cincinnati
Center for Business Analytics
congratulates the 2015
Franz Edelman Award Competition
Finalists



Learn More: **business.uc.edu/analytics-center**

Join us for Analytics Summit 2015: **May 29, 2015**
business.uc.edu/analytics-summit

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Wiping Out Polio

by Kimberly M. Thompson, President, Kid Risk, Inc.

Leader of U.S. Centers for Disease Control (CDC)/Kid Risk team

Reflections on Winning the 2014 Franz Edelman Award



March 31, 2014, 1:50PM, Dr. Peter Bell called on our team to make our presentation to the Edelman judges. He set the timer for 40 minutes. This moment culminated months of effort preparing a paper and presentation describing our more than a decade-long collaboration with the U.S. Centers for Disease Control and Prevention (CDC) to use integrated analytics to improve global polio eradication decisions.

Just making it to the finals represented a big accomplishment, and we all felt the excitement. Before our talk, we spent the cold Boston morning watching outstanding presentations from the other finalist teams that described their impressive work, listening to the great questions from the nine expert judges and the team responses, and appreciating the helpful interactions with our coaches, Dr. Sid Hess, who knew and shared stories about Franz Edelman, and recent Edelman finalist Dr. Pelin Pekgun. Despite all of our preparations, a few minutes into our talk we realized that the teleprompter contained our rehearsal script instead of our final script! This necessitated adaptation that we later appreciated as similar to other circumstances we encountered throughout the years of our collaboration. We finished our presentation with less than 20 seconds left on the clock—some people may think this left too much time while others will see it as cutting it close. We just felt relieved, and then the judges started to ask us questions.

At the end of our talk, we stayed to watch the remaining outstanding finalist presentations and we continued to gain inspiration from their work. We then attended the award ceremony and banquet, where we excitedly received the huge honor of hearing our team announced as the winner!

As a federal agency, CDC works 24/7 to protect Americans and the world from health, safety, and security threats, often through a focus on prevention. People generally hear about CDC when public health emergencies occur (e.g., Ebola, measles outbreaks), but CDC does so much more. CDC actively engages as a major international partner in public health programs, such as polio eradication. Team member Dr. Stephen Cochi, who helped to launch the CDC/Kid Risk collaboration in 2001, said that "at the polio partners meeting that occurred shortly after the Edelman Award ceremony, the partners celebrated the award as recognition of all of our collective contributions toward achieving global polio eradication." CDC continues to expand its efforts to use evidence and powerful analytics to support its mission and global policies. Team member Dr. Steven Wassilak, who leads the research efforts in the CDC Polio Eradication Branch, notes that "our work motivated broader support for polio modeling and led other modeling teams to focus on remaining critical polio programmatic decisions."

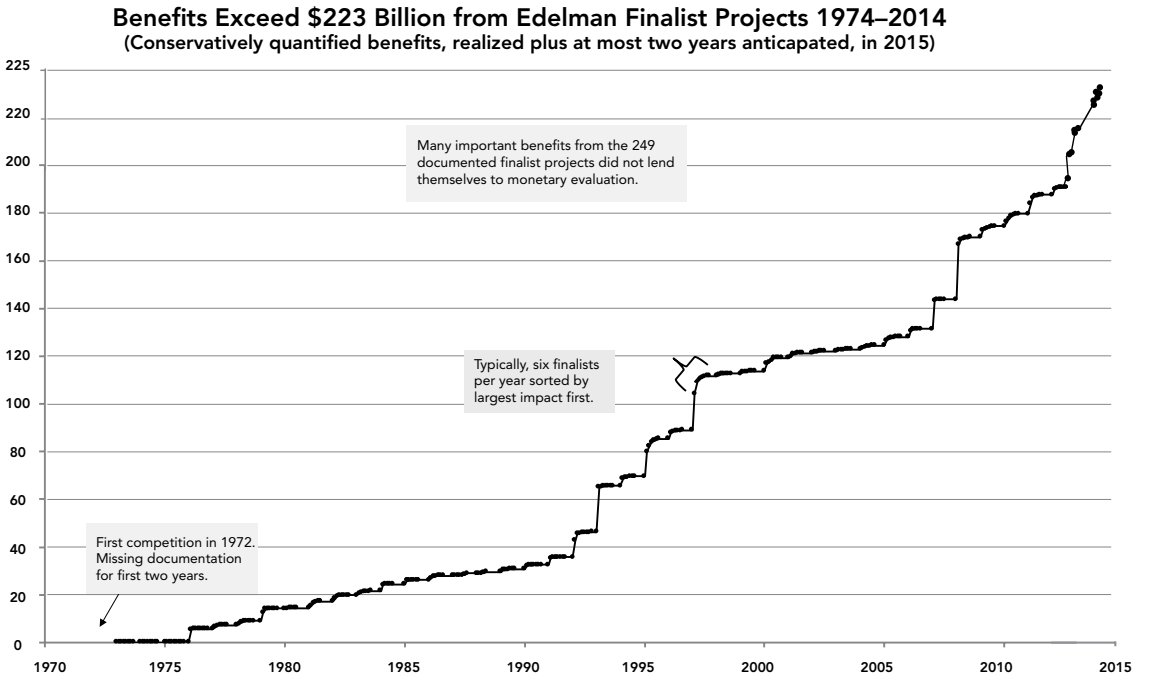
As the analysts, Dr. Radboud Duintjer Tebbens and I continue to collect, synthesize, and analyze the available evidence using mathematical models that integrate multiple analytical tools to characterize the benefits, costs, and risks of options for managing polioviruses and global polio vaccine policies. We also consider the complexity of polioviruses and variability, uncertainty, and time. The novelty of our approach mainly stems from the need to meet high expectations from our CDC collaborators and decision makers for good information and insights that they can use to support high stakes global decisions affecting human lives and involving billions of dollars.

Upon reflection, preparing for the Edelman Award competition gave us the opportunity to review the important impacts of our work, hear the perspectives of key polio eradication stakeholders, and share our work with the broader analytics community. The award shines a spotlight on the contributions made by analysts who primarily function in the background, and in our case, analysts working within public health. Team member Dr. Mark Pallansch, who leads the CDC Division of Viral Diseases and accepted the Edelman Award for CDC, said that the award "helps to raise the visibility within CDC of the impact that collaborative modeling efforts can achieve and supports the best use of knowledge and information available to subject matter experts for public health policy decisions."

Overall, the most important recognition of our work, however, comes from its continued use by the national and global decision makers, and we remain grateful that they continue to find our work useful and helpful. The Edelman Award recognized the integrated analytics that we used and provided external validation from the most important community for our work from an analytics perspective: our peers. We thank the judges and all of the INFORMS community members who congratulated us during the past year.

Billions Achieved with Business Analytics

by Jeffrey M. Alden
Group Manager, GM Operations Research



Over $223 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 *Interfaces*. By reading all 249 articles, the monetary impact was estimated under the following guidelines:

- Be objective and conservative, yet make a serious attempt to estimate cost savings and increased revenues.
- Use all past reported savings and, to be conservative, include at most two more years of anticipated impact.
- Include only one year of impact when enormous (billions, for example, in some military, utility, energy, and government 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 a larger 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, epidemic disease control, organizational structure, on-time railway performance, and space shuttle heat shielding performance. For example, a CDC project to reduce fatalities in a U.S. epidemic could be conservatively (and roughly) estimated to be billions, but can we really get agreement on such an estimate to make a monetary benefit claim?[1] Furthermore, almost all finalist papers report non-monetary benefits and frequently tout them as most important and longer lasting by establishing, for example, ongoing practices and organizational changes that improve health, safety, cooperation, decision making, and job satisfaction. Clearly, the reported monetary benefits understate the full impact of the Edelman finalist projects.

Another important indication of the influence of O.R. is the impressive breadth of applications. The Edelman finalists represent more than 100 different application areas including: air traffic, banking, broadcasting, canal operations, consumer products, express delivery, defense (Air Force, Army), education, financial (pension, investment, credit card, settlement), fire protection, forestry, healthcare (hospital, pharmaceutical, diagnosis, elderly, disease control), hotel management, energy production and distribution (coal, gas, electric, oil, nuclear), land use, manufacturing (electronics, food, paper, seeds, steel, tires, vehicles, wood), marketing, printing, sanitation, security (airport, police), tax collection, transportation (airline, highway, railway, space), treasure hunting, waste management, water (resources, quality, flow, flood), and weapons dismantlement, among others.

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 (1024 counted) represent less than 10% of the current INFORMS membership. Undoubtedly, there is a vast number of O.R. projects with significant impact that did not compete due to confidentiality, lack of internal support to compete (e.g., no one thought of it, too busy, no management support, inadequate documentation), or the team was simply unaware of the competition.

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

[1] For the US: $3B = 314M population * 5% epidemic penetration * 10% die under current practices * (1-80% fatality reduction under improved practices) * 1 epidemic per 200 years * $40K per capita income * 50% work life lost per fatality. (Discounting is ignored as income would grow with inflation.) Motivating article was: "Advancing Public Health and Medical Preparedness with Operations Research", *Interfaces*, Vol. 43, No. 1, January–February 2013, pp. 79–98. Note Figure 6. Some of these numbers are just reasonable values offered by the author.


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For more than 80 years, Jeppesen has been transforming safe travel.
OR/MS is a key part of our business and future success, and we're proud to support INFORMS and the Edelman Gala.
Congratulations to all the finalists!

Recognizing and Rewarding Real Achievement

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



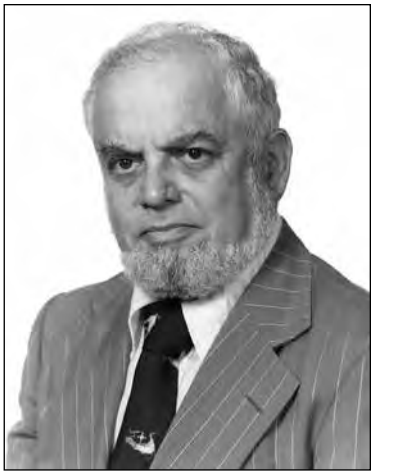
The purpose of the international Franz Edelman competition is to bring forward, recognize, and reward outstanding real-world applications of operations research, management science, and analytics.

Awarded annually to an organization that sponsored, implemented, and benefited from an operations research project, the Edelman competition attracts entries from organizations large and small, profit and nonprofit, business and governmental, private and public, worldwide. The common theme shared by all selected finalists is having realized substantial benefit from practical application of the advanced methods of operations research and analytics.

Abstracts from papers prepared by past Edelman Award finalists are available through *Interfaces* online; full-text versions of some of those *Interfaces* papers are available in an online archive. Streaming videos and DVDs of past competition presentations—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, this CPMS/TIMS award was renamed in memory of Franz Edelman, one of the earliest industry practitioners of O.R. in North America. Twenty years ago, in 1995, TIMS merged with the Operations Research Society of America to create INFORMS and the Edelman Award became an INFORMS award.

Franz Edelman was a leader who overcame adversity. After fleeing his native Germany in the late 1930s to escape Hitler and the Nazi regime, the young Franz Edelman 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; later he earned a PhD in applied mathematics from Brown University. He joined the RCA Corporation as an engineer concentrating on computational topics. Initially a physical science problem solver, he rapidly came to envision the great value of computer systems that would assist with management and business operations. In the early 1950s, this insight led him to establish RCA's legendary Operations Research Group, one of the first such groups in a North American corporation.



Franz Edelman

Franz Edelman was well known in the O.R. profession for advocating that success in operations research requires excellence in information technology (IT)—computer software, computer hardware, and communications. Reflecting his great interest in IT, he ultimately became vice president of Business Systems and Analysis, responsible for IT as well as O.R. at RCA. He likely would have been pleased to see our present focus on "analytics" and "business intelligence," where strong analysis combines with strong IT.

After 30 years of service, Franz Edelman retired from RCA to form Edelman Associates, an O.R. consulting firm. Throughout his career, Franz's O.R. achievements, forward-looking insights, and positive influence on others made him a quintessential practitioner. The Franz Edelman Award was named in his memory because this award advances the operations research practice to which he contributed so much.



Congratulations to Edelman Award winners both past and present

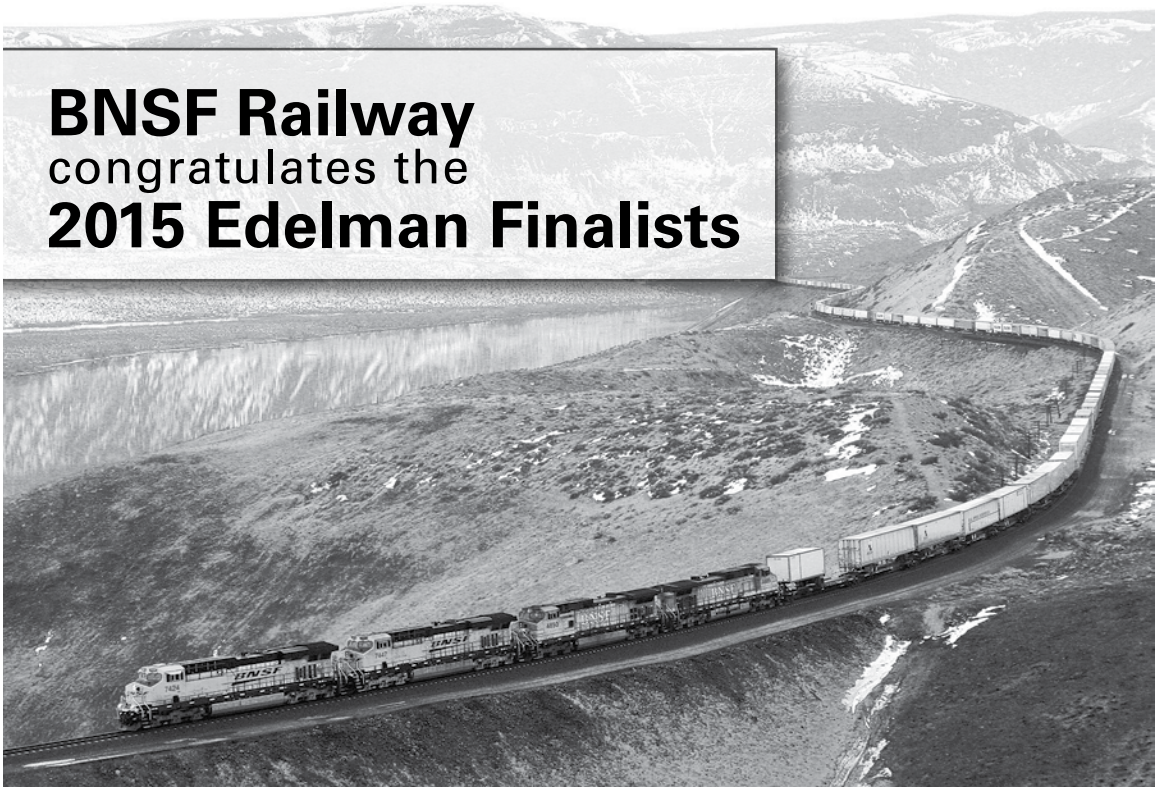
Merrill Lynch salutes the finalists of the 2015 Edelman Award. And we applaud INFORMS for celebrating excellence in the practice of operations research and management science. As a member of the Franz Edelman Academy, we proudly congratulate all Edelman Award winners and finalists.

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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

2014 U.S. Centers for Disease Control

"Eradicating Polio Using Better Decision Models"

Wiping out polio requires global stakeholders to invest human and financial resources in interventions that prevent virus transmission. Reaching this goal depends on effective tools and interventions. CDC, a partner in the Global Polio Eradication Initiative, collaborated with Kid Risk, Inc. to develop integrated analytical models to answer important policy questions about managing poliovirus risk. The collaboration combined OR/MS tools to help policy makers understand and quantify the implications of their choices. These modeling efforts produced faster responses to polio outbreaks, leading to a global resolution and significantly reduced outbreak sizes. The model results helped make the economic case for continuing efforts and helped raise billions of dollars. The investments will prevent devastating cases of polio and realize an estimated $40–$50 billion in benefits.

2013 Delta Programme Commissioner

"Economically Efficient Flood Standards to Protect the Netherlands Against Flooding"

Protection against flooding is a vital issue in the Netherlands because 55% of the country is susceptible to flood risk. The Dutch Water Act sets down flood protection standards for the country's dike ring areas. In 2008, the Second Delta Committee advised the government to increase the protection standard of all dike ring areas by a factor of 10. To form a scientific basis, the company Deltares was asked to determine economically efficient flood protection standards. A cost-benefit model was developed to derive the optimal investment strategy for each dike ring area. State-of-the-art mixed integer nonlinear programming techniques were used to find optimal strategies. In conclusion, it was only necessary to increase protection standards for three regions. The O.R. approach resulted in a significant increase in protection for these regions, where two-thirds of all improvements were concentrated. These O.R. methods saved €8 billion in investment costs.

2012 TNT Express

"Supply Chain–Wide Optimization at TNT Express"

The application of O.R. improved decision-making quality at TNT Express. TNT's global optimization (GO) program initiative led to the development of optimization solutions to assist the operating units of TNT Express and improve their package delivery in road and air networks. TNT Express established communities of practice, where internal and external subject matter experts meet three times a year. TNT Express created a unique two-year learning environment, the GO Academy, where TNT Express employees are taught the principles, use, and deployment of optimization techniques. As a result of these combined initiatives, O.R. is now an effective part of the core values at TNT Express. Over a seven year period, TNT Express used these O.R. methods to save €207 million.

2011 MISO

"Midwest Independent Transmission System Operator Applies Operations Research to Energy and Ancillary Services Markets, Unlocking Billions in Savings"

MISO used O.R. to design and launch its energy and ancillary services markets. For many years, the U.S. power industry consisted of utilities that focused locally. During the 1990s, the Federal Energy Regulatory Commission (FERC), a power industry regulator at the national level, pushed the industry to reduce individual utilities' market power and to drive more efficiency through the formation of regional transmission organizations (RTOs). In 2001, the FERC approved MISO as the nation's first RTO. Driven by the goal of minimizing delivered energy costs in a reliable fashion, MISO 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 MISO region realized between $2.1 and $3 billion in cumulative savings from 2007 through 2010 and anticipates an additional $6.1 to $8.1 billion of value through 2020.

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 O.R.-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 substantially reduce 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%–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.

1993 AT&T

1992 New Haven Health Department



1991 American Airlines

1990 Health Care Financing Administration

1989 ABB Electric, Inc.

1988 City of San Francisco Police Department

1987 Syntex Laboratories, Inc.

1986 Southland Corporation (CITGO Petroleum Corporation Subsidiary)

1985 Weyerhaeuser Company

1984 (dual) Blue Bell, Inc.

1984 (dual) The Netherlands Rijkswaterstaat and the RAND Corporation

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

The Finest Step Forward: The Franz Edelman Award Competition Process

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, more than two dozen entries are received and reviewed by the Franz Edelman Award Committee. The committee consists of about two dozen experienced O.R. practitioners and academics from diverse organizations such as AT&T, Bank of America, BNSF Railway, General Electric, HP, Intel, IBM, Lancaster University, MIT, Purdue University, SAS, Verizon Wireless, Carnegie Mellon, and the Ivey School of Business. Semifinalists are selected in early November, and the further selection of finalists is completed by mid-December.

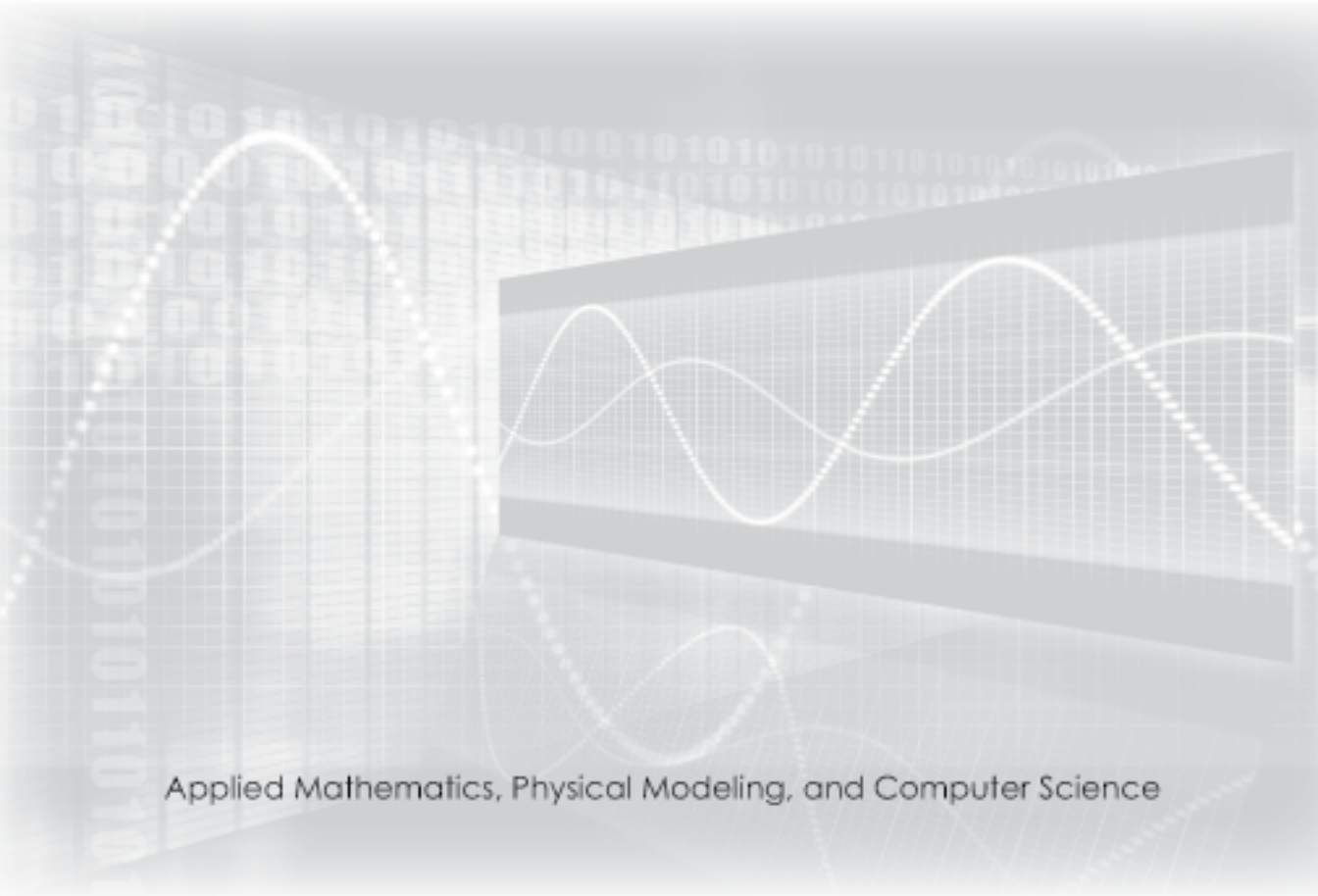
The committee names as semifinalists a dozen or more entries that have a reasonable chance of becoming finalists if the verification process supports the entries' claims. To this end, each of the semifinalists is assigned a team of verifiers who work with the relevant stakeholders to validate the details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



Congratulations to the
2015 Franz Edelmen Finalists!

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The verifiers' 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 verifiers 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 finals. Each finalist must begin the preparation of a journal-quality paper and a 40-minute presentation. Each of the finalist teams is assigned a team of experienced coaches to advise them throughout the process. The coaches' major responsibility is to ensure that the team's paper and presentation convey the work clearly to a general operations research audience.

Two months prior to the spring INFORMS Conference on Business Analytics and Operations Research, finalist papers are distributed to the judges. The judges study each of the papers and, shortly thereafter, discuss among themselves. Each finalist is assigned a focal point judge who conveys feedback from the judging committee to the finalist's coaches. 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 10–15 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 include the total impact of the project in both quantitative and qualitative terms, the novelty and portability of the technical solution, the importance of the application, and the quality and effectiveness of the implementation.

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 online.

The Verification & The 2015 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 associate 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 because it ensures that only the highest-quality O.R. and analytics work with verified impact makes it to the Edelman Award finals.

Verifiers

- Layek Abdel-Malek, NJ Institute of Technology
- Carrie Beam, Carrie Beam Consulting
- Peter Bell, Ivey Business School at Western University
- Sudip Bhattacharjee, University of Connecticut
- John R. Birge, University of Chicago
- J. Antonio Carbajal, CAP, Turner Broadcasting System, Inc.
- Gavin DeNyse, HP
- Pooja Dewan, BNSF Railway
- William Fox, Naval Postgraduate School
- Stephen Graves, MIT
- Arnold Greenland, CAP, University of Maryland
- Roger Gung, University of Phoenix
- Yoshiro Ikura, SAITECH
- Ananth Iyer, Purdue University
- Shailendra Jain, HP
- Grace Lin, Institute for Information Industry
- Irvin Lustig, CAP, Princeton Consultants
- Anna Olecka, PricewaterhouseCoopers
- Pelin Pekgun, University of South Carolina
- Graham Rand, Lancaster University
- Anne G. Robinson, Verizon Wireless
- Randall S. Robinson
- Michael Trick, Carnegie Mellon University

The Coaching and Judging Process & The 2015 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 associate 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

- Layek Abdel-Malek, NJIT
- John R. Birge, University of Chicago
- Ken Fordyce, Arkieva
- Arnold Greenland, CAP, U of Maryland
- Yoshiro Ikura, SAITECH
- Ananth Iyer, Purdue University
- Shailendra Jain, HP
- Irvin Lustig, CAP, Princeton Consultants
- Anna Olecka, PricewaterhouseCoopers
- Greg Parlier, Institute for Defense Analyses
- Pelin Pekgun, University of South Carolina
- Randall S. Robinson

Judges

- Michael A. Trick, Chair, Carnegie Mellon University
- Susan Albin, Rutgers University
- Carrie Beam, Carrie Beam Consulting
- Srinivas Bollapragada, General Electric
- Pooja Dewan, BNSF
- Mark Hayward, Mayo Clinic
- R. John Milne, Clarkson University
- Jonathan Owen, CAP, GM
- Anne G. Robinson, Verizon Wireless

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 is selected each year 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 Gala.

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 44 years of extraordinary contributions to society through the innovative application of operations research.

Introduced in the pages that follow are the six finalists for the 2015 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 2015 Franz Edelman Award.

Each finalist's work is described here in a shortened summary. Full papers will be published in the January/February 2016 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 2015 Franz Edelman Award Are:

IBM

Ingram Micro

LMI and Defense Logistics Agency

Saudi Arabia Ministry of Municipal and Rural Affairs

Syngenta

U.S. Army and Sandia National Laboratories

2015 Edelman Competitors

by Barry List, INFORMS

Body and Soul

Going on a pilgrimage where thousands of lives are at risk, promoting popular golf and tennis tournaments, distributing consumer electronics, adding enough grain to the world's food supply to feed billions, efficiently stocking military equipment so it is ready at once, wisely selecting the Army's vast fleet of vehicles—all these demonstrate the many industries that benefit from analytics and operations research. Collectively, we see what the 2015 Edelman finalist teams—the people doing the best analytics work in the world—look like today.

While most people interested in sports limit their participation to reacting with fervor and delight to the televised event, behind the scenes numerous people, including top math modelers, make sure that the fan experience is not only exciting but technically capable of reaching millions through today's technology. **IBM** has long promoted premier sporting events, such as the Australian Open, Masters Golf Tournament, French Open, Wimbledon, U.S. Open Golf, US Open Tennis, and China Open Tennis. Fans use social media to communicate their passion as these competitions unfold, and when one heats up, so does the social media chatter. The 2012 Australian Open Men's Singles final between Novak Djokovic and Rafael Nadal evolved into the longest final in Grand Slam Tennis history, lasting nearly six hours and putting a strain on the support system that allows fans to Tweet and express themselves on other platforms. To manage the impact sporting events have on digital platforms, IBM began forecasting demand on digital platforms in near real time. Its researchers created a predictive Cloud computing system that examines Internet traffic demand, guaranteeing service and ensuring that spectators around the world can tweet it up without bringing down the system.

A pilgrim should set out on a journey anticipating spiritual fulfillment, not dreading accidental death. Yet that was the specter that haunted pilgrims making the hajj to Makkah for many years, as the number of those making their holy journey swelled so much that extreme crowding led to death. In 2006, the **Ministry of Municipal and Rural Affairs** of the Kingdom of Saudi Arabia set out to prevent further tragedy and applied operations research, known for its routing and queuing insight. The resulting Pilgrim Scheduler successfully manages the flow of thousands of people. The mixed-integer program prevents pilgrims' deviation from schedule during high volume times in a ritual focal point. Constraint programming ensures smooth use of roads, tunnels, and a key bridge. Although the problem size involves more than three million variables, the program can generate results in minutes.

It also allows individual pilgrims to create the most convenient possible personal schedule. The result is everything that was desired: a fulfilling religious experience without a single fatality since the program was initiated.

As the global population continues to grow, an alarming number of people live at or below subsistence nutritional levels, and the need to provide affordable crops and food is high. **Syngenta** has addressed this challenge by concentrating efforts on crop breeding using operations research to make critical decisions that increase plant productivity. O.R. helped Syngenta achieve the goals of enriching the pool of genetic resources, shortening the time to develop improved crop varieties, transferring favorable traits among varieties, improving data quality and thus forecasting, and ultimately making better decisions. Syngenta has substantially improved its research and development, along the way reducing costs by nearly $300 million.

If you're a person-to-person business, how do you transform your company into a data-driven organization? **Ingram Micro** is the largest broadline two-tier IT distributor in the world, but operating in a high volume/low margin environment meant that profit margins were a miniscule 2%. Realizing the urgency, the Fortune 500 Company developed three analytics/OR tools to optimize prices, derive insights from data, and provide sales teams with a mobile app so they could operate at the highest level. The results have been transformative: since their introduction,



Ingram Micro has added $1.12 billion in incremental product revenue and modernized its use of data and analytics.

If the **U.S. Defense Logistics Agency** (**DLA**) was a corporation, its $38 billion in annual sales, 131,000 daily customer orders, and five million stock numbers would put it at the center of intense business press retailing coverage. Although the public is barely aware of DLA, the U.S. Armed Services make up for that with their dependence on the agency not only to supply common items but also to deliver those that are only needed on rare occasions. These occasions may be rare, but when an emergency order arrives, a soldier's life may be at stake. The consulting firm LMI originally developed its inventory control solution, Peak and NextGen (PNG), to help DLA manage logistics items that were not needed frequently. Such items account for the majority of hardware stocked. LMI found that forecasting methods for items with infrequent or highly variable demand were leading to bad business outcomes.

The hardware supply chains were either stocking too many or too few items. PNG changed DLA's approach to inventory management, moving the supply chain managers away from forecasting to a strategy that emphasizes risk management. Just two years after implementation, PNG has made strong progress: the number of available stock units increased and so did the readiness of weapon systems warfighters. PNG also helped DLA reduce the number of procurement requests by more than a third and lower procurement cancellations by more than two thirds, saving taxpayer dollars in the process.

One of the most hateful words used in Washington, DC in recent years has been "sequestration," the Congressional mechanism for setting a severely limiting cap on necessary and less necessary government spending. The **U.S. Army** faced tremendous budget pressures, which created a challenge for those seeking to modernize the ground combat fleet that





is such an integral part of the Army's strength. In response, the Army worked with important partners to develop a Capability Portfolio Analysis Tool (CPAT) that guides critical decisions about multibillion dollar acquisitions that affect national defense and the protection of American troops. CPAT optimizes highly complex fleet modernization problems and permits quick responses to fiscal demands that require immediate attention. It has already allowed the Army to make two confident decisions: to cancel production of one controversial combat vehicle and move forward smartly with another. Along the way, CPAT saved $5 billion and improved project performance.

As INFORMS looks forward to the 10-year anniversary of the Edelman Gala, the 2015 Edelman finalists demonstrate that analytics and operations research make a crucial difference to both body and soul.



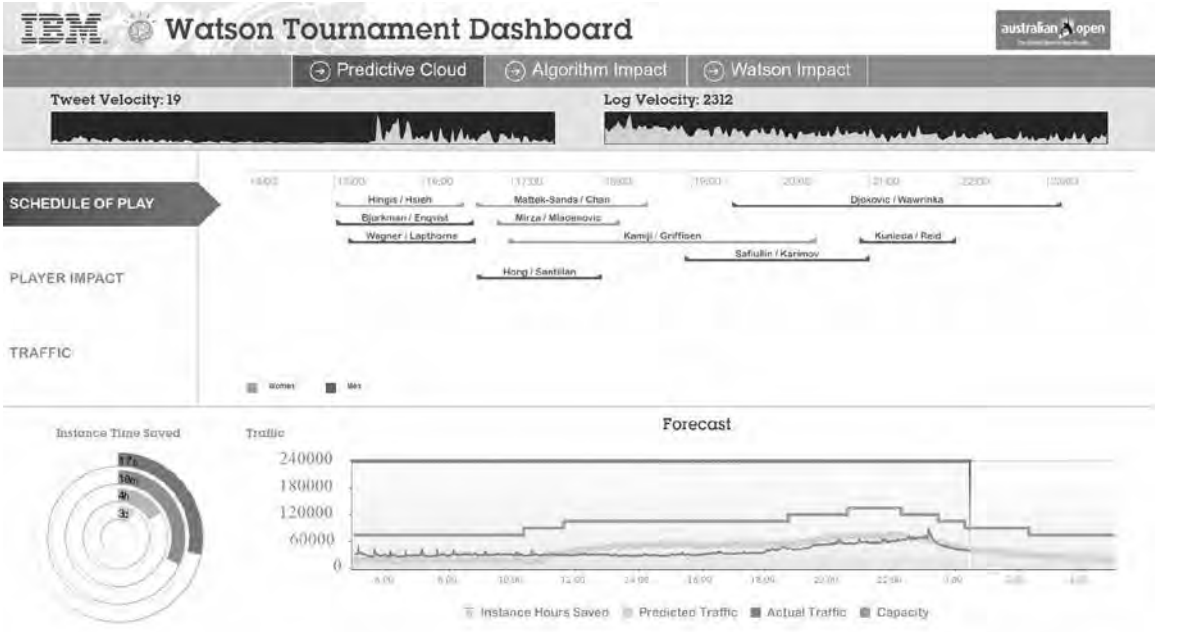
IBM

Predictive Cloud Computing with Big Data: Professional Golf and Tennis Forecasting

International Business Machines (IBM) invests upwards of $1.2 billion on marketing and promotional activities each year[1], of which a portion is allocated toward growing IBM's long partnership history with many premier sporting events, such as the Australian Open, Masters Golf Tournament, French Open, Wimbledon, U.S. Open Golf, US Open Tennis, and China Open Tennis. IBM offers an exceptional digital experience during these events through the development and delivery of mobile applications, Web-based applications, scoring, social leader boards, live video, analytics, cloud computing services[2], and on-premise support.

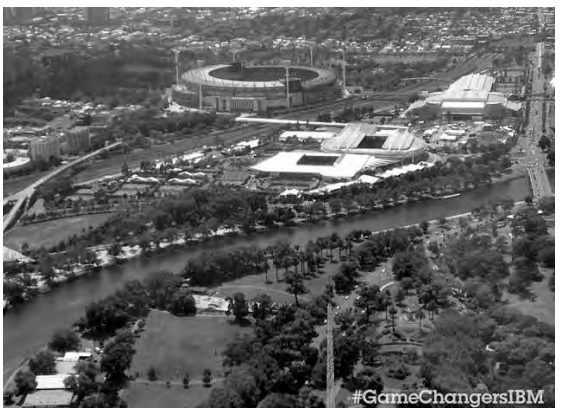
Professional Grand Slam tennis tournaments and golf major championships attract the best athletes in the world to compete on an international stage with worldwide public and media attention. In 2014 IBM's cloud computing platform supported 1.5 billion page views, 191 million sessions, 60 million unique visitors, 7.5 million live scoring updates, and 105,000 editorial updates per day, all growing at a rapid and dynamic rate driving increased and unforeseen demands on cloud infrastructure resources.

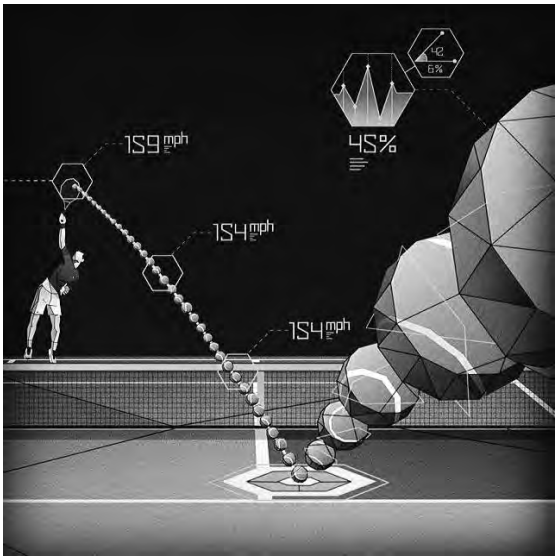
Sporting events have a way of engaging with people, fans or not, through the building of an unscripted storyline that unfolds in real time. Witnessing the story unfold and feeling the emotions resonating from the athletes and fans draws personal interest and the desire to share the experience with others, say through social media. An example would be the 2012 Australian Open Men's Singles final between Novak Djokovic and Rafael Nadal. When the final started there was no indication that it would turn into the longest final in Grand Slam tennis history, lasting 5 hours and 53 minutes. As the match progressed, and it started becoming evident that history might be in the making, the buzz in social media channels such as Twitter, increased, which in turn drove unplanned traffic to the cloud platform.



In any given tournament the cloud platform can experience an 800% increase in Internet traffic when comparing pre-tournament week to tournament week traffic patterns and orders of magnitude more increases comparing day-to-day traffic during a tournament. To better manage the impact sporting events have on digital platforms, especially computing and infrastructure services, in 2012 IBM launched a project focused on predicting future demands on digital platforms in near real time. Using multiple advanced analytics techniques, a predictive cloud computing (PCC) system was invented that predicts Internet traffic demands in near real time, allocating computer resources as needed, guaranteeing service fulfillment, and ensuring that spectators around the world can experience the dramatic developments that unfold during live sporting events.

Since the production launch of PCC in the fall of 2012, 16 patents have been filed with a 20-year intellectual property valuation of $81 million. In 2014 the system was used to support eight tournaments and reduced the required computing capacity by 51% and labor costs by 96%. The near real-time predictive features provide a method of protecting brand image for IBM and the tournaments, and continue to have a positive influence on driving increased revenue for IBM as proof of IBM's capabilities in the cloud, analytics, and social market.





Organization

IBM is a multinational corporation that was incorporated in 1911 and employs more than 400,000 employees worldwide. Since 1998, the Global Technology Service's group, Continuous Availability Services—Events Infrastructure team, has worked with the Olympics, Super Bowl, Grand Slam tennis tournaments, golf major championships, and large entertainment events such as the Tony Awards and Oscars providing superb digital experiences to fans around the world.

—

[1] 2013 IBM Financial Statements
[2] Cloud Computing Services: Shared compute & infrastructure resources consumed as a service





Ingram Micro

End-to-End Business Analytics and Optimization in Ingram Micro's Two-Tier Distribution Business

Ingram Micro, the world's largest technology distributor, operates in a high volume/low margin environment. The company started its Business Intelligence & Analytics practice in its North America (NA) company about six years ago. Since then the group has built and deployed a scalable, highly innovative price optimization engine, IMPRIME™, for NA's $8 billion spot business, a set of analytics apps, IMSmart™, for its internal sales organization, and an integrated digital marketing platform, intelligence.ingrammicro.com, to run data-driven marketing campaigns to its customers and end customers.

How do you become a data-driven organization when the entire ecosystem is built on relationships? This is the question that Ingram Microsystems set out to answer four years ago. Ingram Micro is the largest broadline two-tier IT distributor, with a presence in 39 countries worldwide, presenting approximately 1,400 suppliers, and serving more than 200,000 solution providers and value added resellers in approximately 170 countries, reaching eight million end users/businesses with over 100 million orders processed every year. A Fortune 500 Company, Ingram Micro operates globally with revenues over $43 billion.

With margins less than 2%, the use of data to create value and mitigate risk in decision making becomes crucial. Ingram Micro arguably has the richest data assets in the IT distribution and manufacturing world. Ingram didn't have any systemic approach to generate actionable, forward-looking insights from this valuable data. Initially, Ingram Micro NA started a Business Intelligence & Analytics center of excellence with a small infrastructure and two analysts. Since then, the group has grown to more than 40 quantitative analysts and rapid product developers, more than 90% of them with advanced degrees in O.R., statistics, machine learning, economics, computer science, and psychology. This center is a key differentiator for the company.





Ingram Micro NA developed and deployed three applications:

- IMPRIME™, a patent pending, scalable, B2B pricing optimization engine that generates data-driven price setting, including the list or matrix price, as well as data-driven negotiation guidance for high transaction volume environment (representing more than 450 million price calls per year and $8 billion in revenue for Ingram Micro NA).
- intelligence.ingrammicro.com, an integrated, analytics-driven digital marketing platform to activate the data insights at the customer and end-customer levels.
- IMSmart™, a data-driven mobile app for sales teams to find account level opportunities.

Since 2011, these products and analytical programs have yielded a cumulative benefit of $1.12 billion in incremental product revenue and $28 million in incremental gross profit.

Ingram Micro's next step is to drive these best practices within the company's other regions outside North America and continue these outstanding sales enablement activities.



Organization

Ingram Micro helps businesses "Realize the Promise of Technology™." It delivers a full spectrum of global technology and supply chain services to businesses around the world. Deep expertise in technology solutions, mobility, cloud, and supply chain solutions enables its business partners to operate efficiently and successfully in the markets they serve. Unrivaled agility, deep market insights, and the trust and dependability that come from decades of proven relationships, set Ingram Micro apart and ahead.






SMITH
U.S. AIR
AMC
IG

LMI and Defense Logistics Agency

Peak and NextGen: Effective Inventory Control for Items with Infrequent or Frequent, Highly Variable Demand

The consulting firm LMI originally developed its inventory control solution, Peak and NextGen (PNG), to help the Defense Logistics Agency manage logistics items that weren't needed frequently—those with isolated spikes in demand—as well as items with high variability within their demand histories. Such items account for the majority of hardware stocked by the Defense Logistics Agency (DLA). In early research, LMI found that forecasting methods for items with infrequent or highly variable demand—no matter how sophisticated the forecasting model—were leading to bad business outcomes for DLA and its customers in the Armed Services and government agencies. The hardware supply chains were either stocking too many items (an overinvestment of resources) or not enough (an inability to fulfill customer orders). LMI's goal in developing PNG was to help DLA find an approach that would significantly improve business outcomes.

By any standard, DLA—with $38 billion in annual sales, 131,000 customer orders per day, and more than five million stock numbers—is a large business, but DLA's business is extremely complex for reasons other than its sheer size and scope. The operating environment for the military is dynamic and unpredictable, and customer demand for items is driven by wars, post-war drawdowns, politics, and congressional budget turbulence. DLA's motivation to find a better method of inventory control was strong, as two segments of its inventory had long suffered from excessive inventory for some items, shortages for others, excessive procurement recommendations (which led to a large number of cancellations by planners), and the overall inefficient use of limited working capital.

PNG entirely changed DLA's approach to inventory management, moving the supply chains away from forecasting entirely to a strategy that focuses more on risk management. The PNG model generates curves that offer a simultaneous three-way tradeoff between customer service, inventory value, and procurement workload.



DLA implemented PNG in January 2013, and the agency is achieving its goals for better customer service and reduced buyer workload with no increase in inventory. Using the PNG tradeoff curves as a reference, DLA can now make a single, integrated stock investment decision that aligns with overall business objectives.

Just two years after implementation, PNG has made considerable progress toward those goals, and the benefits are clearly evident. Material availability increased, which greatly affects weapon system and warfighter readiness. PNG also helped DLA reduce the number of procurement requests by 35 percent (which resulted in an estimated $18 million in labor savings) and lower the number of procurement cancellations by a remarkable 70 percent (which saves $7.5 million in taxpayer money). More impressive is the better use of working capital: PNG narrows the gap between what DLA spends on inventory and what it sells, resulting in a reduction of $391 million in unused working capital over what the old process would have spent in a single year, 2014. Looking ahead five years, the $7 million cost to develop PNG will yield a $2 billion reduction, all from buying more of what sells and less of what doesn't.

Following the PNG successes at DLA, the Office of the Secretary of Defense (OSD) initiated an inventory improvement plan, including a policy to stop forecasting infrequent and highly variable demand items. OSD is also funding a pilot study to apply PNG to unforecastable reparable items at the Army and Air Force. PNG has applications in other related industries, such as automotive and commercial aircraft, high tech and electronics, and service and aftermarket parts suppliers.

Organizations

Defense Logistics Agency (DLA)

As America's combat logistics support agency, the Defense Logistics Agency provides the Army, Marine Corps, Navy, Air Force, other federal agencies, and partner nation armed forces, with a full spectrum of logistics, acquisition, and technical services. DLA sources and supplies nearly all of the consumable items America's military needs to operate—from food, fuel and energy, to uniforms, medical supplies, and construction material. DLA also supplies nearly 90 percent of the military's spare parts, manages the reutilization of military equipment, provides catalogs and other logistics information products, and offers document automation and production services to a host of military and federal agencies. Headquartered at Fort Belvoir, Va., DLA is a global enterprise—wherever the United States has a significant military presence, DLA is there to support.





LMI

LMI is a government consulting firm committed to helping government leaders and managers reach decisions that make a difference. LMI draws on its 50 years of experience as a pioneer in logistics by applying an unmatched knowledge of people, processes, and assets to a variety of sectors, including defense, intelligence, healthcare, energy and environment, homeland security, and civil government.

LMI employees come from diverse backgrounds: government and defense, business and industry, and academia and research. More than half are veterans or former civil servants, and more than 70 percent have advanced degrees. They work for LMI because they believe in LMI's mission of improving the management of government.

Public sector organizations value LMI's not-for-profit status services in logistics, acquisition and financial management, infrastructure management, information management, organizational improvement, and policy and program support.

Saudi Arabia Ministry of Municipal and Rural Affairs

A Decision Support System for Hajj Crowd Management

The Hajj is the Islamic pilgrimage to the Makkah made by every faithful Muslim at least once in his life. It is also the largest annually occurring pedestrian problem in the world.

Every year up to four million pilgrims come to holy sites in the Makkah region to perform their religious duty. The Hajj comprises several rituals on consecutive days at different sites. The Jamarat Bridge, where the stoning-of-the-devil ritual is performed, is a focal site. Over a four-day period, pilgrims throw pebbles against the Jamarah pillars (representing the devil) that are embedded in the Jamarat Bridge. Attendance at this ritual has been dangerously crowded. Until 2006, stampedes causing thousands of casualties occurred due to overcrowding. In the aftermath of the 2006 crowd disaster, the Ministry of Municipal and Rural Affairs of the Kingdom of Saudi Arabia (MOMRA) launched projects totaling $7 billion to prevent future deaths.

MOMRA developed an effective crowd management system using operations research, analytics, and crowd dynamics. At the heart of this trailblazing decision support system a Pilgrim Scheduler assigns stoning-ritual appointments. In addition, flow is controlled as pilgrims are assigned to one-way paths that lead from their accommodation to the Jamarat complex, preventing counter or intersecting flows. The Pilgrim Scheduler is a mixed-integer program that minimizes deviation of the assigned stoning-ritual times from the preferred times. A set of constraints ensure smooth utilization of infrastructures such as roads, tunnels, and the five-story Jamarat Bridge. Due to the problem size (more than three million variables) a multistage fix-and-optimize heuristic was developed to provide high quality solutions in minutes. Additionally, to using the Pilgrim Scheduler MOMRA employs sophisticated operations research tools to assign pilgrims to stations and trips of the Al Mashaaer Makkah Metro that moves pilgrims between the holy sites. The tools also plan a layout of the tent city that accommodates the pilgrims. Additional essential elements of the decision support system are tools for simulation and control: state-of-the-art analytical models of pedestrian dynamics simulate the flow of pilgrims through





infrastructures like metro stations and streets. MOMRA also uses radio-frequency identification and video technology to control pilgrim flow. Together, simulation and control systems rapidly forecast alarmingly high crowd density. Overall, the technology provides an effective alert-and-response strategy.

The decision support system enables uncongested and smooth flows of the pilgrims as well as maximum satisfaction to pilgrims concerned about their ritual schedules. Operations research also helped reduce operational and maintenance costs; for example, well-balanced flows enabled a dramatic reduction in security personnel and a 20% savings in personnel costs. But most importantly: operations research significantly contributes to saving lives. Since 2007 no stampedes have occurred and no lives have been lost. Lessons learned from Hajj crowd management and the integration of operations research can help manage and operate mass gatherings all over the world.







Organizations

Ministry of Municipal and Rural Affairs, Kingdom of Saudi Arabia
The Ministry for Municipal and Rural Affairs, which was established in 1975 (1395 AH), is responsible for the administration of municipalities throughout the kingdom. Its primary functions include city and town planning, and the development and maintenance of the basic infrastructure, such as roads, sanitation, and hygiene. MOMRA is one of the largest ministries in Saudi Arabia. The Central Directorate for Development of Projects Deputy Ministry is responsible for planning and executing large national projects in Makkah's holy places for Saudi building specifications and materials.

University of Hamburg, Germany
University of Hamburg is the largest institution for research and education in the north of Germany. Nobel Prize winners such as Otto Stern, Wolfgang Pauli, and Isidor Rabi were active at the University.

University of Technology Dresden, Germany
The TU Dresden is one of 11 German universities identified as an "excellence university." Committed to science and engineering before the reunification of Germany, TU Dresden is now a multidiscipline university also offering instruction in the humanities, social sciences, and medicine.

ETH Zürich, Switzerland
ETH Zurich is one of the leading international universities for technology and the natural sciences. ETH Zurich regularly appears at the top of international rankings as one of the best universities in the world. Some 21 Nobel Laureates have studied, taught, or conducted research at ETH Zurich.



Syngenta

Good Growth through Advanced Analytics

Providing adequate food for the world's population is humanity's toughest challenge. An environmentally sustainable solution is to improve crop output through plant breeding. However, with current breeding methodologies the rate of increase in crop production is not sufficient to meet today's food needs. Syngenta is changing that by applying operations research (O.R.) methods to make better breeding decisions that reduce the time and cost required to develop crops with higher productivity. This data-based transformation is making a quantifiable contribution to Syngenta's commitment to meeting the world's growing food needs in an economically and environmentally sustainable way.

Four O.R. tools (described below) have been developed by Syngenta R&D since 2010, allowing progress toward meeting the following five objectives:

1. enriching the pool of genetic resources with favorable traits;
2. reducing the time required to develop new varieties containing favorable traits;
3. building a process to efficiently transfer favorable traits among varieties;
4. improving data quality, prediction of progeny performance, and characterization of environments; and
5. making better decisions to positively impact the probability of success (POS), cost, and time of the variety development pipeline ('pipeline').

Each of the four O.R. tools is supporting one or more of the three pipeline phases: variety design, variety development, and variety evaluation.



The trait introgression (TI) tool and the breeding project lead (BPL) tool use discrete-event simulation platforms to make processes within the pipeline more efficient. The project lead is using the TI tool to design a strategy for transferring favorable traits from one soybean variety to another and the BPL tool to design a strategy for developing varieties with higher productivity. With each tool, the project lead compares alternative TI and breeding strategies until a strategy is identified with a high POS and uses minimal amounts of cost and time.

Yield trial design (YTD) Optimizer and data quality cart (DQC) tools are supporting decisions that impact the quality of variety selection and advancement toward commercialization. The project lead uses the DQC tool's residual analysis and correction capabilities to identify and correct for systematic error in field trial data resulting in dramatic improvements in data quality and variety selection decisions. The YTD Optimizer uses probabilistic modeling, discrete-event simulation, optimization, and sensitivity analysis to enable the project lead to effectively allocate field trial resources such that variety selection accuracy improves and costs decrease.

The new analytical tools dramatically improve project lead training, decision making, and planning, resulting in a cost avoidance for soybean R&D of more than $287 million from 2012--2016 and substantially improve the probability of successfully delivering a portfolio value exceeding $1.5 billion. Syngenta recognizes the positive impact these tools have on soybean R&D and is initiating a multi-year effort to customize and launch similar tools across all major crops.

Syngenta crop R&D program operations are transformed and their products are more competitive as a result of using advanced analytics and O.R. methods.

Organization

Syngenta is one of the world's leading companies with more than 28,000 employees in over 90 countries dedicated to the purpose of bringing plant potential to life through world-class science that helps increase crop productivity, protect the environment, and improve health and quality of life.

Syngenta is focused on sustainable agriculture: helping conserve the world's natural resources—land, water, and energy—for future generations while helping farmers achieve better yields to feed a rapidly growing world population. Its innovation ranges from developing plant varieties that improve the efficiency of agricultural production on existing farm land to helping plants grow where they could not before by using water more effectively.

Syngenta was formed in 2000 when Novartis and AstraZeneca spun off their agribusinesses, which merged to become Syngenta—the first global group focusing exclusively on agribusiness. However, the company has a lineage and traditions going back 250 years when Geigy began in 1758.

Syngenta's success reflects the breadth of its portfolio of solutions, innovation through research and development, and focus on agriculture.

To feed the growing population, farmers will need to achieve at least a 70% increase in food production by 2050. Achieving food security will not be easy considering the megatrends of growing population, greater affluence, and increasing urbanization. Not only are more people demanding more food, but they want greater variety, including meat, dairy, fruits, and vegetables.

While demand for food is growing, farmers' ability to increase productivity is facing unprecedented challenges. Scarcity of water, energy, and land is expected to define food production in the coming decades. Already, agriculture uses 40% of the world's land surface and 70% of all available fresh water. The need to address food security has never been greater and is moving up national agendas around the world. Everyday nearly one billion people go to bed hungry—even more are malnourished. And this figure could potentially rise with the global population expected to reach nine billion by 2050.



U.S. Army and Sandia National Laboratories

Maximizing U.S. Army's Future Contribution to Global Security using the Capability Portfolio Analysis Tool (CPAT)

The United States Army has faced tremendous portfolio management challenges due to unprecedented budgetary pressures that have put many important programs at risk. Regardless of such budget pressures, modernizing the Army's ground combat fleet—over a planning horizon of 25–35 years, with thousands of vehicles assigned to dozens of unique mission roles—poses a significant challenge on its own. To compound the problem, traditional Army acquisition processes lacked holistic, analytics-driven methodologies for optimally prioritizing investments. To address these challenges, the Army and supporting team developed and applied the Capability Portfolio Analysis Tool (CPAT) to guide critical multibillion dollar Army acquisition decisions through unusually challenging fiscal environments, providing maximal future capability and protection to U.S. troops.

The Program Executive Office Ground Combat Systems (PEO GCS) is charged with acquiring maximal ground combat capability for the Army within a broad and complex set of cost, production, and schedule constraints. In 2010, PEO GCS assembled a cross-cutting team (including Sandia National Laboratories, a wide array of Army organizations, and other agencies) to develop an analytically rigorous process that best informs critical fleet modernization decisions using cutting edge operations research methodologies. The result of this work, CPAT, employs a novel multistage mixed-integer linear program to optimize highly complex fleet modernization problems, and enables interactive analytics and immediate responsiveness to evolving fiscal environments.

CPAT has been used in more than 40 analysis studies, informing stakeholders up to the senior-most acquisition decision makers in the Army and the Office of the Secretary of Defense.

Most importantly, it was used to inform critical funding decisions for major at-risk programs, such as the Army's new-start Ground Combat Vehicle (GCV)—projected to cost $28 billion over the 2014–2030 timeframe (and approximately $1 billion in 2014 alone, nearly one-third of the $2.9 billion PEO GCS 2014





pre-sequestration budget). A decision to discontinue this program was informed by CPAT results showing that, under hefty budget cuts, continued investment in GCV caused significant detriments to other critical Army missions and programs. The strategic decision to end the GCV program freed tens of billions of dollars that the Army could redirect to maintain and modernize other critical programs in the ground vehicle portfolio.

Another key decision involved modernization of the Stryker family of vehicles, which was originally targeted for cancellation until CPAT results demonstrated that modernized Strykers had a very desirable performance-to-cost ratio and were consistently part of optimal portfolio plans, even under significantly reduced budget scenarios. As a result of CPAT analysis, the program has since become a high priority Army investment.

By cancelling GCV, prioritizing Stryker, and modifying other programs, CPAT modernization plans demonstrated cost savings of up to $5 billion and up to 30% greater final performance improvement per dollar than previous Army plans.

Senior Army leaders have called CPAT a "game changer," and the Army's Acquisition Executive (the Assistant Secretary of the Army for Acquisition, Logistics, and Technology) has enthusiastically adopted it as a best practice – ushering in a cultural change that has led to follow-on applications for PEOs managing the Army's enterprise information technologies and transportation/support vehicles. Through the application of sound operations research methods, Army leadership can now base investment decisions on rigorous portfolio analytics, allowing billions of taxpayer dollars to be optimally prioritized and providing maximum capability and protection to U.S. troops in the decades to come.





Organizational Overview

U.S. Army ASA (ALT)

The Office of the United States Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA (ALT)) leads the execution of the Army's acquisition function and the acquisition management system. Responsibilities include providing oversight for the life cycle management and sustainment of Army weapons systems and equipment from research and development through test and evaluation, acquisition, logistics, fielding, and disposition.

U.S. Army, Program Executive Office Ground Combat Systems

Program Executive Office Ground Combat Systems (PEO GCS) is responsible for providing world-class affordable, relevant, and sustainable ground combat equipment to Joint Warfighters. The systems include the Abrams Main Battle Tank, Bradley Family of Vehicles (FoV), Self-propelled Howitzer Systems, Stryker FoV, M113, M88, Armored Knight, and Armored Security Vehicle. With a focus on developing advanced technologies, PEO GCS is leading the design and development of the Army's Future Fighting Vehicle and Armored Multi-Purpose Vehicle.

Call for 2016

Franz Edelman Award Applications

Call for 2016 Applications

THE FRANZ EDELMAN AWARD

45th 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 45th International Competition for the Franz Edelman Award for Achievement in Operations Research. The competition will take place at the 2016 INFORMS Conference on Business Analytics and Operations Research in Orlando, Florida.

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 2016 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 three-page summary of your achievement and a 60-word abstract, plus the name, address, phone number, and affiliation of each author by Wednesday, October 14, 2015.

Complete instructions will be announced online at **www.informs.org/edelman**.

Each finalist group will give an oral presentation of their work on April 11, 2016 during the Analytics Conference in Orlando.

See you at the 2016 Franz Edelman Award Competition!
www.informs.org/edelman

The Wagner Prize:

Excellence in Operations Research Practice

2014 Winner
The Daniel H. Wagner Prize
for Excellence in Operations Research Practice



The first place winners are William Schmidt, Cornell University; Yehua Wei, Duke University; Oleg Gusikhin, Don Zhang, Yao Ge, Keith Combs, and Michael Sanders, Ford Motor Company; and David Simchi-Levi and Peter Y. Zhang, Massachusetts Institute of Technology.

Their paper, "Identifying Risks and Mitigating Disruptions in the Automotive Supply Chain," is outstanding work in the development of a novel risk exposure model that assesses the outcome and risk of a high impact, low probability disruption originating anywhere in the firm's supply chain. This new approach defers the need to estimate the probability associated with any specific disruption risk until after the company learns how the realization of such a disruption will impair its operations. As a result, the company can make more informed decisions about where to focus its limited risk management resources. Ford has applied this model to identify previously unrecognized risk exposures, evaluate pre-disruption risk mitigation actions, and develop optimal post-disruption contingency plans, including circumstances in which the duration of the disruption is unknown.

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

2014 Finalists

The final component of the 2014 Wagner Prize competition took place at the INFORMS Annual Meeting in San Francisco, California. There, six teams gave presentations to a CPMS judging committee seeking to demonstrate that the quality and coherence of their analysis in a real-world application qualified them to win this prestigious award for outstanding practice of operations research and advanced analytics.



All finalists' presentations can be viewed at the INFORMS Video Learning Center by scanning the QR code to the left. A special issue of *Interfaces* will publish the winning paper along with those of the other five finalists:

Airline Crew Augmentation, Decades of Improvements from Sabre
Xiaodong Luo, Yogesh Dashora, and Tina Shaw, Sabre Corporation

Statistical and Optimization Techniques for Laundry Portfolio Optimization at P&G
Ivan Oliveira, Rob Pratt, and Ming Zhao, SAS
Kevin Norwood, Nats Esquejo, and Kevin Miller, Procter & Gamble

Gerrymandering for Justice: Redistricting U.S. Liver Allocation
Sommer Gentry, United States Naval Academy
Eric Chow, Allan Massie, and Dorry Segev, Johns Hopkins University School of Medicine

Vaccine Prioritization for Effective Pandemic Response
Eva K. Lee and Fan Yuan, Georgia Institute of Technology
Ferdinand Pietz and Bernard Benecke, Centers for Disease Control and Prevention

Project Portfolio Planning at Intel Corporation
Siddhartha Sampath and Karl Kempf, Intel Corporation
Esma Gel and John W. Fowler, Arizona State University

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.

Dr. 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 John D. Kettelle formed the partnership of Kettelle and Wagner, which was dissolved in 1963. That same year, 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. He passed away in March 1997.

2014 Wagner Prize Committee

C. Allen Butler, Daniel H. Wagner Associates, Inc., Chair
Susan L. Albin, Rutgers University
Ann Bixby, Aspen Technology
William J. Browning, Applied Mathematics, Inc.
Joseph H. Discenza, SmartCrane, LLC
Russell Labe, CAP, Bank of America
Uday S. Rao, University of Cincinnati
Randall S. Robinson
Lawrence D. Stone, Metron, Inc.

Call for 2015

The Wagner Prize Applications

Call for 2015 Abstracts

THE DANIEL H. WAGNER PRIZE

Excellence in Operations Research Practice

Deadline: Midnight, May 1, 2015

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

The application process begins with a one- to two-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 Philadelphia, Pennsylvania, and, if selected as a winner, to reprise the presentation at the spring Analytics Conference in Orlando, Florida. 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 WagnerPrize@informs.org. For more details on the application process, please visit www.informs.org/wagnerprize.

The prize amount for 2015 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.

See you at the 2015 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 awarded to an academic department or program for effective and innovative preparation of students to be good practitioners of operations research, management science, or analytics. It is accompanied by a $10,000 cash award.

The prize committee is pleased to announce the finalists for 2015 (in alphabetical order):

- Carnegie Mellon University, School of Information Systems and Management, and School of Public Policy and Management at H. John Heinz III College
- Lehigh University, Enterprise System Center and Department of Industrial and Systems Engineering
- University of British Columbia, Centre for Operations Excellence and the Master of Management in Operations Research program at the Sauder School of Business

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.

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.

George Smith recognized O.R. as an engineering approach to making decisions, and started advocating the use of operations research concepts at UPS. Quantitative analysis became the bedrock on which UPS 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 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.

The UPS George D. Smith Prize

About this year's competition & 2015 Finalists

Since the first days of operations research there have been highly divergent opinions about how effectively our universities are preparing students to be effective practitioners. From the perspective of the committee charged with administering the UPS George D. Smith Prize this year, there is strong evidence that overall our universities are doing very well in this area.

The Prize Committee members feel confident that there will be a truly outstanding winner this year and for many years to come. It was hard but rewarding work to choose the finalists. Selecting the winner from the finalists will also be very difficult.

Seeing the diversity, quality, and innovation of these entries has given the committee a unique and encouraging picture of how well we, as a profession, are preparing future practitioners. Please look at the following pages for additional information about the finalists. We will announce the winner tonight. Plan to attend the special presentation at the conference on Tuesday in which the winning team members will describe their program in more detail. All of us will undoubtedly learn something about how to better prepare practitioners, and also experience a taste of the many reasons that the committee is so excited about the overall state of academic practitioner training.

UPS George D. Smith Prize Winners

2014
MIT, Leaders for Global Operations

2013
Naval Postgraduate School

2012
University of Michigan, Tauber Institute for Global Operations

The 2015 UPS George D. Smith Prize Committee:

Ranganath Nuggehalli, CAP, UPS, Chair
Donald R. (Bob) Smith, Monmouth University
Susan Albin, Rutgers University
Lawrence Seiford, University of Michigan
Don Kleinmuntz, Kleinmuntz Associates
Stefan Karisch, Jeppesen
Robin Lougee, IBM

Carnegie Mellon University Heinz College

"Educating Men and Women for Intelligent Action."

- Founding Dean, William W. Cooper

ANALYTICS FOR IMPACT

Carnegie Mellon University's H. John Heinz III College has an approach to analytics education that resides on the bedrock principle that analytic thinking and methods only matter if they can be used to solve real problems. Our formula is simple:

ANALYTICS + IT + DEPLOYMENT = REAL-WORLD IMPACT

Why is this approach important? We believe it's important for three reasons. First, analytic thinking and decision making require the ability to make sense of data to give structure to previously unstructured problems. Second, information technology training must be part of good analytics training because in the real world, data is often incomplete, resident in disparate systems, and subject to poor input processes. Furthermore, existing data often have to be supplemented with data from partners or the Internet. Technology training helps our graduates solve for these problems. Finally, organizations are subject to biases, politics, and path dependencies that can make it difficult to digest new information or manage change. Our emphasis on deployment skills helps our graduates solve for these problems as well.

UNIQUE STRUCTURE

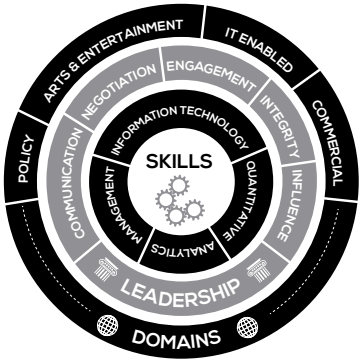
The Heinz College is home to the graduate School of Information Systems and Management and graduate School of Public Policy and Management, a deliberate structure that exists only at Carnegie Mellon University (CMU). This gives us great natural advantages in incorporating cutting edge technologies and methods into our curriculum that were, in many cases, invented or perfected here at CMU. It also means that we naturally embrace large societal-scale problems and bring analytics to bear on problems of global importance.

A HERITAGE OF ANALYTICS

Analytics is not a new idea at Heinz College. The College's roots date back to 1968, when William Cooper, a noted operations researcher, founded the School of Urban and Public Affairs with the mission to educate "men and women for intelligent action." Since our founding, more than 10,000 students have graduated from our programs in Public Policy and Management and in Information Systems and Management and have pursued careers in all sectors of the global economy. Each one of these graduates was steeped in our core curriculum that has always included management science, statistics, economics, data analytics, and information technology coursework. Additionally, these graduates have each learned leadership and deployment skills through our mandatory training in professional speaking and writing, organizational behavior, and meta-curricular leadership training activities with partners such as the Army War College. Experiential learning through required internships and capstone projects with startups, global firms, and government agencies are an important component of the Heinz College experience.

For more information: http://hnz.cm/analyticsforimpact

Curriculum and meta-curriculum at the Heinz College



RECENT PARTNERS

eBay
PwC
Sony Pictures
Warner Bros
Dell
Intel
Google
Department of VA
U..S Census Bureau
3M
U.S. Dept of Housing & Urban Development
Amtrak
Bank of Tokyo
UPMC
Highmark
TMA Associates
McKinsey
Goldman Sachs
General Motors
City of Pittsburgh
Port Authority of Allegheny County
PennDOT
Salesforce
Google
IBM
A.T. Kearney
Deloitte
RAND
Motion Picture Assoc. of America
PNC Bank
Symantec



Lehigh University
Enterprise System Center (ESC) & Dept. of Industrial & Systems Engineering (ISE)

The Department of Industrial and Systems Engineering (ISE) in close partnership with the Enterprise Systems Center (ESC) at Lehigh University created a vibrant educational ecosystem that prepares students at all degree levels to become effective practitioners of operations research, management science, and analytics. The key components of the ecosystem are: (1) quantitative foundation courses, beginning with an analytics case study during sophomore year, and including a wide variety of advanced OR offerings; (2) a network of company partnerships that support real-world student learning experiences linked to funded industry projects structured as internships or industry-based capstone projects; and (3) an innovative "layered mentoring" system that integrates relationship managers, consultants, and senior fellows from the ESC, as well as faculty, to guide teams of undergraduate and graduate students as they work to achieve defined project deliverables.

ISE has substantially renewed its undergraduate program and all of its eight graduate programs during the recent years. The majority of these offerings have a strong operations research focus with most graduates entering the field as practitioners and some as researchers. Lehigh has developed and launched new practice-oriented degrees including healthcare systems engineering and a new online program in management science and engineering. More than a dozen new courses have been created over the past six years. For fall 2014, the reported undergraduate enrollment level was 181 students. The current total enrollment at the graduate level is 264 students, including 43 PhDs.

The practitioner development-focused programs have been enhanced by state-of-the-art facilities, including a large modern computer lab to support analytics and related courses; the renewed Computational Optimization Research @ Lehigh Laboratory (COR@L) that enables high-end computational data-driven research; and a SAS-sponsored Advanced Analytics Laboratory (AAL) established in 2013 in the Enterprise Systems Center. AAL incorporates an open concept analytics research and industry project work area where all levels of participants interact freely (undergraduates, graduate students, mentors, faculty, and industry partners). A project work station and instructional development area is used to design and rapidly pilot new educational content. Since 2014, a third area, the redesigned Collaboratory, supports practitioner development for a range of student group sizes. In the Collaboratory and associated Enterprise Systems Center facilities, mentors provide well-rounded practical and rigorous theoretical guidance in the application of operations research techniques during project work. Areas such as sustainability and operational efficiency are frequently incorporated. The ESC has partnered with more than 425 companies on more than 1,100 projects, engaging an estimated 3,000 students.

Lehigh's program contains a number of additional innovations nurturing young practitioners. Mohler Laboratory, the home of ISE and ESC, includes teleconferencing and online learning facilities that enable students to interact with industrial partners, as well as observe, evaluate, and participate in project team presentations given remotely. The Lehigh ecosystem also includes a focus on communication and leadership skills, with an optional minor in engineering leadership, along with several courses on leadership development. In addition, programs to integrate the education of students who have prior work experience with young practitioner preparation are being piloted. An industry roundtable and advisory boards provide guidance and feedback on recent graduates' work performance and help identify new content and innovative program enhancements.

COE CENTRE FOR OPERATIONS EXCELLENCE

SAUDER School of Business
UNIVERSITY OF BRITISH COLUMBIA

Founded in 1998, the Centre for Operations Excellence (COE) at the Sauder School of Business, University of British Columbia, administers the Master of Management in Operations Research (MMOR) program, which provides rigorous practical training in the quantitative analysis of business problems. The goal of this 16 month professional master's program is competency in operations research practice. After eight months of coursework, providing students with a strong background in operations research and analytics, students are immersed in full time work on a 5-month industry project, in which they act as consultants to a sponsoring company facing a significant operational challenge, one which they would otherwise rely on a leading consulting company to address. Students are paired and assigned to a project team and are supported by the extended team: one-on-one mentorship is provided by a COE staff project advisor, guidance is provided by a Sauder faculty advisor, technical support is available from a pool of summer students, and oversight is provided by the COE's directorship. The team as a whole puts in over 2,300 work hours on each project.

At the start of the projects, students follow the lead of their project advisor. Over the course of the project students are expected to develop their skills, eventually evolving and taking a leadership role in their project. Depending on their experience prior to the program and their inherent abilities, each student's trajectory is different. The project provides each student with an opportunity to build on strengths and develop weak areas, as well as to demonstrate their ability to creatively solve challenging and open-ended problems.

Each project's trajectory is also different, depending on the nature of the problem at hand and the industry partner's needs. All projects, however, involve a discovery phase, which includes gathering data and better defining the problem, a model-building and analysis phase, and finally the delivery phase, where a tool or report are handed over to the partner. The close working relationship with the partner is reinforced through multiple milestone meetings, where students present their progress to the partner's senior management.

In the final semester, students round out their program with elective courses. They also present their project at the annual COE Roundtable, which showcases the students' work to representatives of the local business community. Students often receive employment offers prior to graduation, often from the industry partner that they worked with. Indeed, some of our long-term industry partners (e.g. Fraser Health and AeroInfo - Boeing Canada) have been able to set up operations research groups that are largely made up of MMOR graduates.

Call for 2016

UPS Smith Prize Applications

Call for 2016 Applications

THE GEORGE D. SMITH PRIZE

Strengthing Ties Between Academia and Industry

Deadline for Applications is Friday, October 30, 2015

The UPS George D. Smith Prize was 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 UPS George D. Smith Prize winner will be announced at the 2016 INFORMS 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 program success, and a commitment, if selected as a finalist, to give a 30-minute oral presentation at the spring Analytics Conference in Orlando, Florida, and, if selected as a winner, to reprise the presentation at the INFORMS Annual Meeting in Nashville, Tennessee. The finalist papers are published in a special issue of *Interfaces*.

Submissions can be made to rlougee@us.ibm.com. For more details on the application process, please visit **www.informs.org/smithprize**.

See you at the 2016 INFORMS Conference on Business Analytics and Operations Research!

www.informs.org/smithprize

The INFORMS Prize:

Sustained Integration of Operations Research





2015 Winner

The 2015 INFORMS Prize is awarded to Chevron Corporation for its long and innovative history in applying advanced analytics and operations research across the company.

Chevron, dedicated to providing the energy that drives human progress, for decades has leveraged a variety of operations research and advanced analytics techniques in its business, creating significant value. The company pioneered applying operations research to refinery planning in the 1970s, it adopted decision analysis in 1991, and it has been employing artificial intelligence techniques to improve asset performance for more than 10 years.

From building and running reservoir models with seismic data to managing its crude-to-customer value chain to forecasting resources that fuel its major capital projects, Chevron utilizes operations research and advanced analytics technologies to make data-driven decisions. The results enable Chevron to operate more safely, reliably, and efficiently; reduce material costs; deliver higher value products; effectively recover resources; and better understand and manage risks and uncertainties.

Chevron has more than 700 operations research and advanced analytics practitioners around the world, both in centralized groups and in business units. The company offers extensive training programs and frequent opportunities for practitioners to share lessons learned. Career paths support operations research and advanced analytics from entry level positions to experienced professionals.

Leadership at Chevron recognizes that the strategic decision to employ advanced analytics across the enterprise has delivered significant returns along its value chain. The results enable Chevron to develop the energy that people and businesses depend on—helping spur economic growth and improve the quality of life for communities worldwide.

"At Chevron, operations research and advanced analytics are not an exception; they are important pieces of the fabric upon which we differentiate our performance," said Louie Ehrlich, Chevron's chief information officer and president of their Information Technology Company.

The INFORMS Prize

A History

This is the seventh year in which the INFORMS Prize has been honored during the Edelman Gala. While the Edelman Award and the Wagner Prize recognize single projects that demonstrate outstanding accomplishments in O.R. practice, the INFORMS Prize complements them by recognizing long-term, multiproject achievements.

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

2015 Chevron
2014 Mayo Clinic
2013 Ford Motor Company
2012 Memorial Sloan-Kettering Cancer Center
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

2015 INFORMS Prize Committee

Pete Buczkowski, Disney, Chair
Qingwei Li, Eastman Chemical Company
Doug Meiser, Kroger
Julia Morrison, Marriott International
Maciek Nowak, Loyola University
Stephen M. Pollock, University of Michigan
Jeff Winters, UPS, Past Chair

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. adoption 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 adoption 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 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 2016

INFORMS Prize Nominations

Call for 2016 Nominations



Applications for the 2016 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 (one 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, 2015.

See you at the 2016 INFORMS Conference on Business Analytics and Operations Research! April 10–12, Orlando, Florida

INFORMS

About INFORMS, a Pioneer in Analytics

The Institute for Operations Research and the Management Sciences is the leading professional society for advanced analytics professionals.



With the tremendous growth in recent years of analytics, Big Data, business intelligence, and operations research—*U.S. News & World Report* ranked "operations research analyst" as number four this year in its annual listing of best business jobs, #8 in STEM jobs, and one of six hot jobs for MBAs—INFORMS has risen to become the leading professional association for professionals in these fields, a place where business executives gain assistance, professionals obtain credentials and recognition, and academics publish new, influential research.

This conference, with a special component for executives, is just one example of the ways that management can engage with analytics: attending sessions on using analytics at their firms, watching presentations by the best analytical teams at the Edelman competition, comparing notes at an executive forum, and interviewing potential employees at Analytics Career Fair. Professionals turn to INFORMS to obtain credentials—witness the Certified Analytics Professional (CAP®) exam being given at this conference. They compare notes at conferences and through publications written for them. They join an analytics community, a special interest group for people like them. They take continuing education classes that bring degreed professionals up-to-date. And they gain a new tool just developed by INFORMS: an analytics maturity model that will help them assess the state of analytics at their organization, how their organization compares to others, and how they should approach strengthening their current assets and improving, moving their analytics efforts to a new, more beneficial level.

INFORMS has expanded its offering to the business world through *Analytics* magazine, an online publication for those who analyze data in the marketplace and those who work with them and

direct their departments. The magazine's webpage, www.analytics-magazine.org, offers breaking news, feature articles, and an Executive Edge column written by guest writers like Andrew Jennings, the chief analytics officer at FICO, and Chuck Holland, vice president of industrial engineering at UPS.

Academics share their research in INFORMS journals like *Interfaces*, the INFORMS Journal on the Practice of Operations Research, which shows how business and government execute important, successful analytics projects. Indeed, INFORMS publishes 14 journals with the most important research in all the specialized subjects that have brought scientific contributions from the related disciplines of math modeling, O.R., management science, and, of course, 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 has over 11,000 members, is dedicated to applying scientific methods to help improve decision making, management, and operations. Members of INFORMS represent industries as diverse as airlines, healthcare, the military, finance, and telecommunications.

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—and earning—billions of dollars annually, model-based support solutions developed by INFORMS members are now relied upon in diverse industries. Research pioneers in O.R. disciplines represented by INFORMS have contributed significantly to the development of algorithms and methodologies now widely employed in engineering, science, and business.

INFORMS is often a leader in identifying the world's foremost researchers—for example, Lloyd Shapley, who would win the 2012 Nobel Prize in Economic Sciences, was recognized with the INFORMS John von Neumann Theory Prize 31 years earlier, in 1981.

The society serves the scientific and professional needs of OR educators, investigators, scientists, students, managers, and consultants, as well as the organizations they serve. INFORMS 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. and analytics professionals, allowing 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. Committed to the practice of the field across the globe, INFORMS is a member of the International Federation of Operational Research Societies (IFORS).

INFORMS dominates a special place at the intersection of industry and research. Its leaders salute this year's Edelman finalists and all those who have made advanced analytics an important contributor to business, government, healthcare, and higher education.

AIMMS

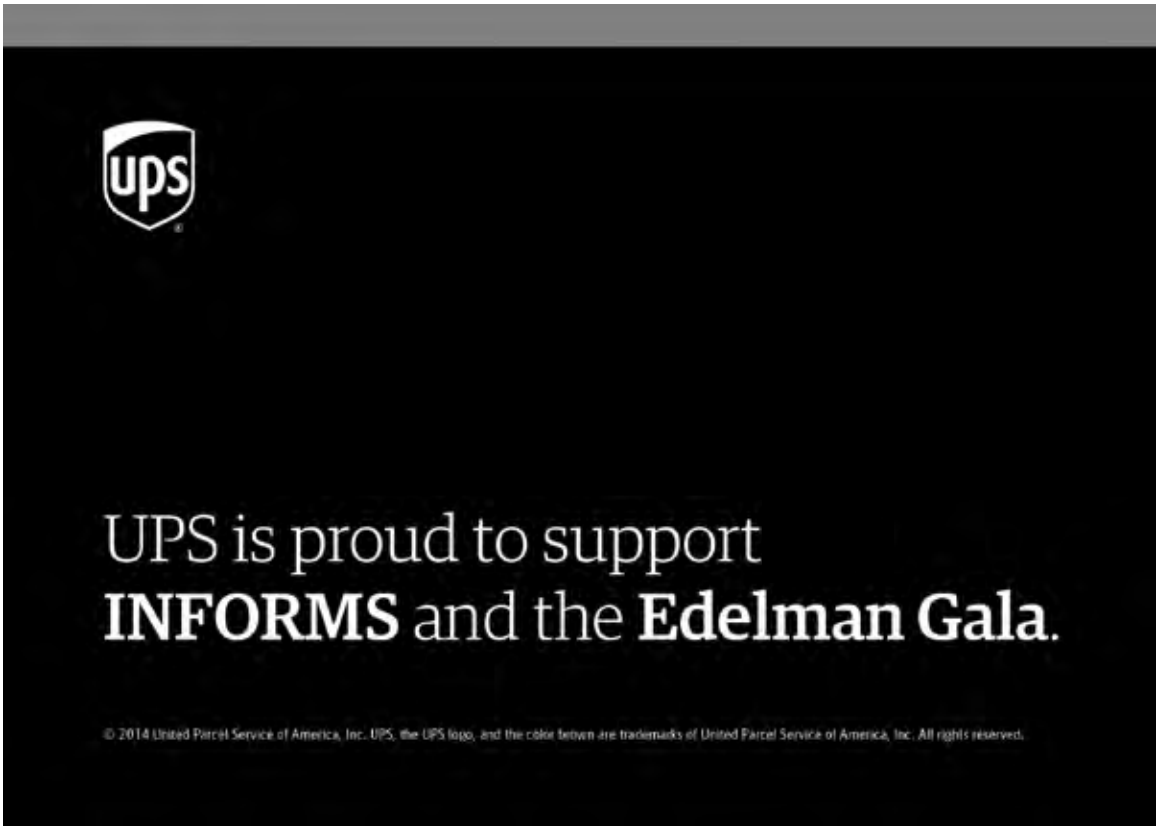
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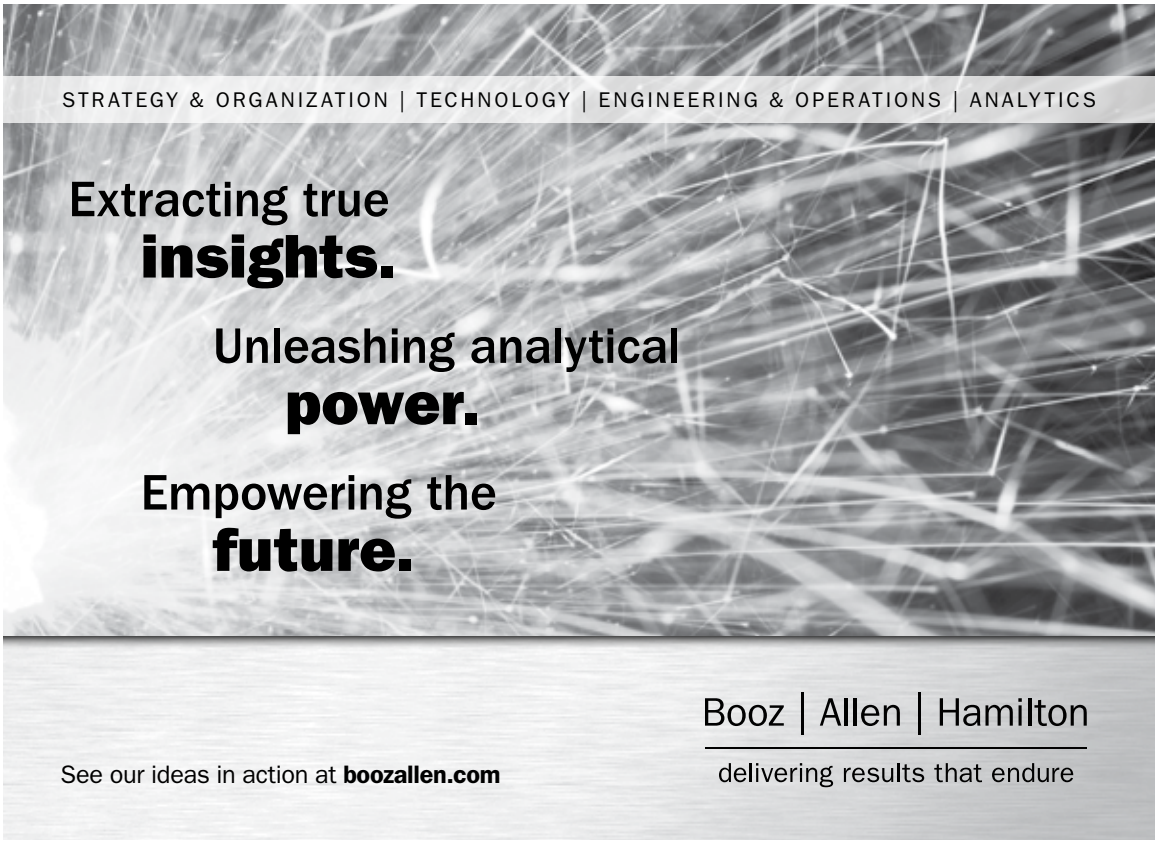
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Bringing You a Crown Jewel of the Operations Research Profession

By Russell P. Labe, CAP, Past Chair, CPMS

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) 20 years ago 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.

One of the most important activities 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 and officiated in 1972 as the CPMS Prize, the award was renamed to honor Franz Edelman shortly after his death in 1982.



Franz was the founder of one of the first industrial operations research groups in the United States, at RCA, circa 1950. Today, becoming an Edelman finalist is widely viewed to be rigorous certification that an organization has benefited from the application of state-of-the-art, highly impactful operations research. The finalists' 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 35–45 OR/MS professionals, most of whom are CPMS members. The committee's chair, typically serving a two-year term, is assisted by 8–10 judges, 10–15 coaches and associate coaches, 20–25 verifiers and associate verifiers, and 35–40 reviewers (some volunteers take multiple roles).





The competition would not be possible without an effective support-and-evaluation infrastructure. We are always looking for new members to get involved in the prize committee. 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 UPS George D. Smith Prize (both recognized during the Edelman Gala), cluster sessions at INFORMS meetings, isolated practitioner workshops, and a newsletter.

If you are not a member of INFORMS or of CPMS within INFORMS, please join us and pitch in as we serve all full- and part-time practitioners and researchers interested in practice. If you are already a member but not actively involved, contact us (pbell@ivey.uwo.ca) 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 and analytics practice!

Recognizing the Leaders and Best

The Tauber Institute for Global Operations salutes the honorees of the 2015 UPS George D. Smith Prize. And we applaud INFORMS and UPS for understanding the value of innovations in operations research, management science, and analytics.

As an inaugural recipient of the UPS George D. Smith Prize, we proudly congratulate all winners.

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UNIVERSITY OF MICHIGAN
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academia strengthening ties industry
ups george d smith prize



April 10-12
informs CONFERENCE ON
BUSINESS ANALYTICS &
OPERATIONS RESEARCH

Acknowledgments

The Edelman Laureates

2014

Ross Anderson
Itai Ashlagi
Hany Atallah
Kristen Baker
Abel Chan
Stephen Cochi★
Radboud Duintjer Tebbens★
Peter Ferris
Chris Forbes
Joseph Forbes
Michael Forbes
David Gamarnik
Ashish Goel
Pankaj Gupta
Siva Gurumurthy
Leon Haley
John Haupert
Zengjian Hu
Paul Kennedy
Eva K. Lee
Joshua Morrison
Edmond Mount
Mark Pallansch★
Eleanor Post
John Putz
Michael Rees
Alvin Roth
Aneesh Sharma
John Sirois
Tayfun Sönmez
Yohan Sutjandra
Calvin Thomas
Kimberly Thompson★
Utku Ünver
Dong Wang
Steven Wassilak★
Michael Wright
Daniel Wu

2013

Carlijin Bak★
Tejinder Kaur Bimbraw
Brett Bonner
Ruud Brekelmans★
Graeme Case
K. Chandrasekhar
Lijun Chen
Zhi-Long Chen
Parag Chitalia
Pawan Chowdhary
Margery Connor, CAP
Robert Creek
Mark Davis
Youssef Drissi
Dick den Hertog★
Matthijs Duits★
Carel Eijgenraam★
Bob Gooby
Randhir Hebbar
Ganesh Hegde
Mary Helander
Guofen Hu
Matt Johnson
James Kalina
Kaan Katircioglu
Nick Kenaston
Jarl Kind★
Mahesh Krishnan
Wim Kuijken★
Rahul Kumar
Ted Kutz
Lin Li
Lebin Lin
Jiyin Liu
Yan Liu
Sudeep Maity
Karl Martin
Doug Meiser
Ying Meng
Nathan Mott
Murugan Pugalenthi
K. Raghava Rau
Kees Roos★
Rohit Saksena
Howard Smith
Karthik Sourirajan
Craig Stenstrom
Karthik Subbian
Sumathi Subramanian
Lixin Tang
Pieter Vermeer★
David Wagnon
Gongshu Wang
Takashi Yonezawa
Bo Zhang
Xinhui Zhang

2012

Ahmar Abdullah
Suresh Acharya
Sofia Archontaki
Bernard A. Benecke
Greg Burel
Arnab Chakraborty
Kyle Christianson
Frederic Deschamps
John Dimotikalis
Prasanna Dhore
Feryal Erhun
Phillip Finch
Hein Fleuren★
James Fuller
Chris Goossens★
Marco Hendriks★
Erik F. Hertzler
David W. Hill
Karl G. Kempf
Iraklis Lazakis
Eva K. Lee
Marie-Christine Lombard★
Kathleen Mallery
Jacquelyn Mason
Ronald P. Menich
Ineke Meuffels★
Pelin Pekgün
Chen Peng
Ferdinand H. Pietz
John Poppelaars, CAP★
Timothy R. Rosenberg
Bharathan R. Shamasundar
Manav Shroff
Ritwik Sinha
Girish Srinivasan
Suresh Subramanian
Rohit Tandon
Osman Turan
James Van Sistine
Orestis Varelas
Takis Varelas

2011

Naoki Abe
Fernando Alarcon
Gary F Anderson
Gustavo Angulo
Alex Beiza
James J. Bennett
Cristian Berner
Brian Carlson★
Jaime Catalan
Yonghong Chen★
Brent R. Cooley
Kenneth Cooper
Jin Dong
Xing Dong Zhang
Craig Eister
Rafael Epstein
Timothy Gardinier
Edward Godlewski
Cristian Gonzalez
Guillermo Gonzalez
Jon A. Higbie
Mingguo Hong★
Sergio Hurtado
Florencio Infante
David L. Jensen
Roy Jones★
Dev Koushik
Kevin Larson★
Gregory Lee
Guo Li Jie
Xingwang Ma★
Prem Melville
Gerard Miller
Mauricio Naveas
Andres Neely
Peter Nieuwesteeg★
Cezar Pendus
Xi Quan Wang
Chandan K Reddy
Haili Song★
Kimberly Sperry★
Matthew Tackett★
Doug Taylor★
Li Thomas
Vince P. Thomas
Fernado Valenzuela
Jie Wan
Melissa Weatherwax
Andres Weintraub
Liu Xiao Hu
Ming Xie
Jun Yin Wen★
Daniel Yung
Eugene Zak★
Bin Zhang

2010

Gerkotze Bonthuys
Ebert Cawood
Jay Cunningham
Esmi Dreyer
Ingrid Farasyn
Andrea Feunekes
Ugo Feunekes
Marc Fischer
Michele Fisher, CAP
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, CAP★
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, CAP
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

★ *Indicates member of winning team*

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
Stéphane Dauzère-Pérès
John Elieson
Christoper A. Forgie
Dirk Guenther
Kjetil Haugen
Ulrich Koester
William H. Lee
Per Olav Myrstad
John J. Nestor
Atle Nordli
Asmund Olstad
Robert M. Peterson
Douglas Popken
B.V. Rao
Alf Reistad
Barry C. Smith
Mandyam Srinivasan★
Geir Teistklub
Russell Wooten
Faker Zouaoui

2005

Jeffrey Alden★
Dennis Begg
D.A. Beis
Ann Bixby
Lawrence Burns★
Michael Concordia
Theodore Costy★
Brian Downs
Toshiharu Hasegawa
Rick Hughes
Richard Hutton★
Craig Jackson★
Jim Jacobs
David Kim★
Kevin Kohls★
David Levine
P. Loucopoulos
Paul Martyn
Jonathan Owen, CAP★
Y. Pyrgiotis
Tuomas Sandholm
Mihiro Sasaki
Katsushige Sawaki
Mike Self
Atsuo Suzuki
Mark Turnquist★
David Vander Veen★
K.G. Zografos

2004

Martin Barkman
John C. Butler
Alexander Chebeskov
Herman Chiu
Mathieu Clerkx
Ton de Kok
Jacques Desrosiers
Yvan Dumas
James Dyer
Thomas A. Edmunds
Rob Harlan★
Richard Hicks
Fred Janssen
Jianmin Jia
Mike Kanaley
Joshua Kanner★
Alev Kaya, CAP
Byung-In Kim
Seongbae Kim
Bob Kraas
Benoit Lacroix
Kam-Keung Lai
Edmond Leung
Yong Liu
Jiyin Liu
Richard Madrid
Sean Marshall
Theresa Metty★
Chris Milligan
Tom Moore★
Thomas Morris★
Katta Murty
Alexander Oussanov
Winfried Peeters
Alexander Popov
Kevin Potts★
Robert Pruneau
Olga Raskina★
Jeffrey Robbins★
Surya Sahoo
Quentin Samelson★
Avner Schneur★
Rina Schneur★
James Smith
Ron Sorensen
François Soumis
Sridhar Tayur
Loren Troyer
Mitchell Tseng
Jan van Doremalen
Erik van Wachem
Yat-Wah Wan
Elan Yaniv

2003

Kirk Abbott
Surain Adyanthaya
Vedat Akgun
Andrew P. Armacost
Mordecai Avriel
Cynthia Barnhart
Corey Billington
Chris Born
E. Andrew Boyd
Gianpaolo Callioni
Monica Carbajal
Rod Case★
Barrett Crane
John Fallis★
Edward Feitzinger
Chyi-Fu Hong
Phil Ireland★
Curtis Keller
Jason Kuehn★
Jin Liu
Ronit Meiri
Marc Meketon★
Wayne New
Avi Peretz
Robert Prior
Hanna Pri-Zan
Julie Unruh Rapp
Tom Rieger
John Ruark
Robert Slavens
Pat Smith
Jerry Trimarco
Carl Van Dyke★
Mark Wallace
Keith A. Ware
Trace White
Sean P. Willems
Alysia M. Wilson
Bert Winemiller
Ron Woestemeyer

2002

Chae An
Michael Argüello★
Fred Blakeley
Burçin Bozkaya
Buyang Cao
Andrew Davenport
Ralf Elsner
Wolfang Hall
Gail Hohner
Arnd Huchzermeier
Philip Jones
Jayant Kalagnanam
Greg Kegler
Gilles Kern
Jospeh Knolmajer
Manfred Krafft
Ho Soo Lee
Thierry Lemoine
Timothy Lowe
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
Robert Fancher
Marc Garbiras
Tim Gibbs
Gregory Hoscheit
Chet Huber
Mark Humphresville
Jeenyoung Kang
James Knowles
Russel Labe, CAP★
Robert Leachman
Bonnie Liao★
Vincent Lin
Kevin Lyman
Raj Nigam★
Je Oh★
Mark Paich
Greg Parlier
Mary Phillips
Nick Pudar
Surya Sahoo
Michael Scholes
Jim Smith
Jan Maarten van Swaay-Neto

2000

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
Ken Howard
Doug Johnson
Elena Katok★
Jeffrey Lockledge
Peter Lyon
Jeff A. Meyer
Demetrios Mihailidis
Stephen Miller
R. John Milne
Rick Oiesen
Robert Orzell
Alex Przebienda
Robert Rice
David Ryan
Amanda Scott
Laura Shisler
John Sidelko
Midori Tanino
William Tarantino★
Ralph Tiedeman★
Chris Wallace
Michael Wambsganss

1999

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★

1998

Henry Alden
Dean P. Angelides
Franz Behlau
Dimitris Bertsimas
Buyang Cao
James Causby
Christopher Darnell
Rafael Epstein★
Matthew J. Etzenhouser
L. Russell Fletcher
Corrie Heynen
Scott P. Holmen
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 Weintrau★
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

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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

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Dennis Dargon★
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Paul Katz
Terry Kent
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Sally Sleeper
Thomas Spencer★
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Kouji Wantanabe
D. Steve Wiper
William Ziemba

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Michael F. Cahn
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E. William Moore
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C.K. Yin

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Anthony Brigandi
Angel Chiarri
Morris Cohen
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Richard Grimes
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Bell Beckert★
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Gerald Brown
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R. Jaikumar★
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Alvin Silk
Glen Urban
William Westerman

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John Little
W.L. McMahan
Alvin Silk
Bruce Smith
George Way★

1981
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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★
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William Swart
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Robert Love★
Shmuel Oren
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James White

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Eric Brodheim★
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Carl Hamilton
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Andrew Kalotay
David Karney
John Mote
Greg Prastacos★
Miles Vogel

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Deepak Bammi
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Adel Gaballa
Harry Harrison★
William Jahnke
Ronald Lanstein
Jean Noël Lavier
Carolyn Loflin
Richard Thomson
Charles Tiplitz

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Stephen Chen
Dwight Crane
Martin Edelstein
William Fudge
Ronald Hudson
Robert G. Johnston
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Peter Kolesar
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Steve Seabury
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