2016 Edelman Gala

For Distinction In Practice

THE FRANZ EDELMAN AWARD

Achievement in Operations Research

Emphasizing Beneficial Impact

THE INFORMS PRIZE

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Strengthening Ties Between Academia & Industry

Emphasizing Effective Academic Preparation

April 11, 2016

Orlando, Florida

The Edelman Gala

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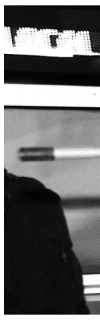
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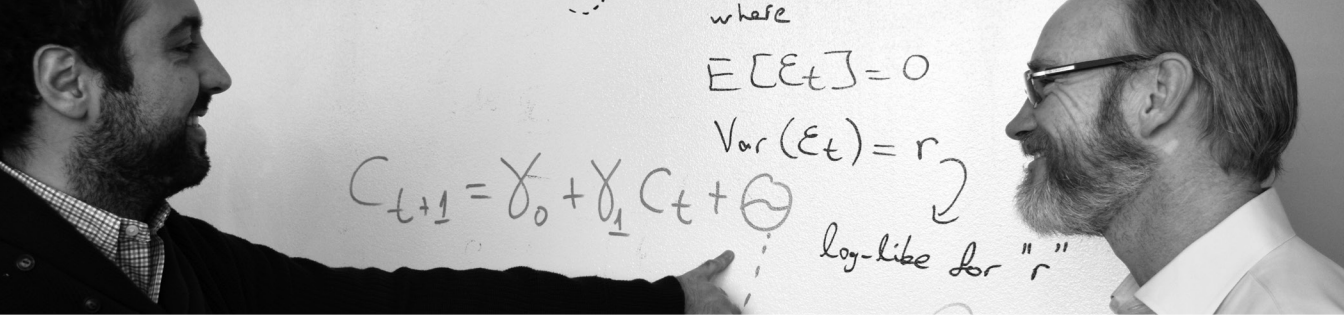
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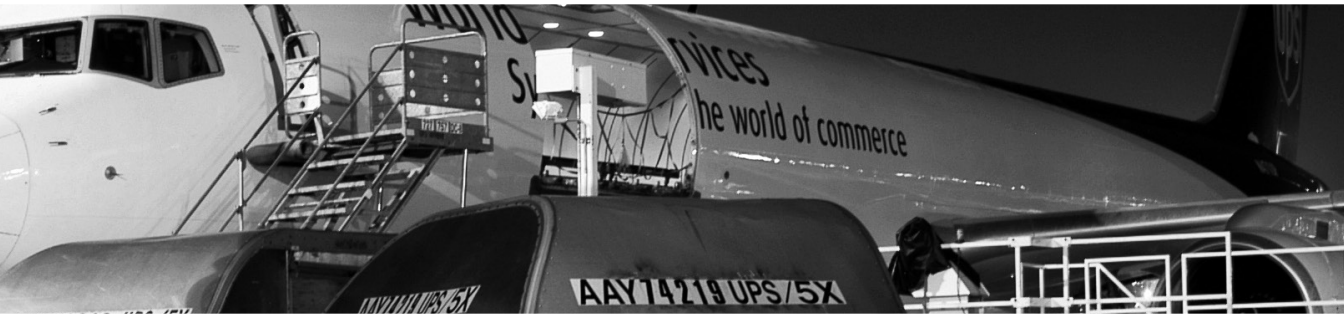




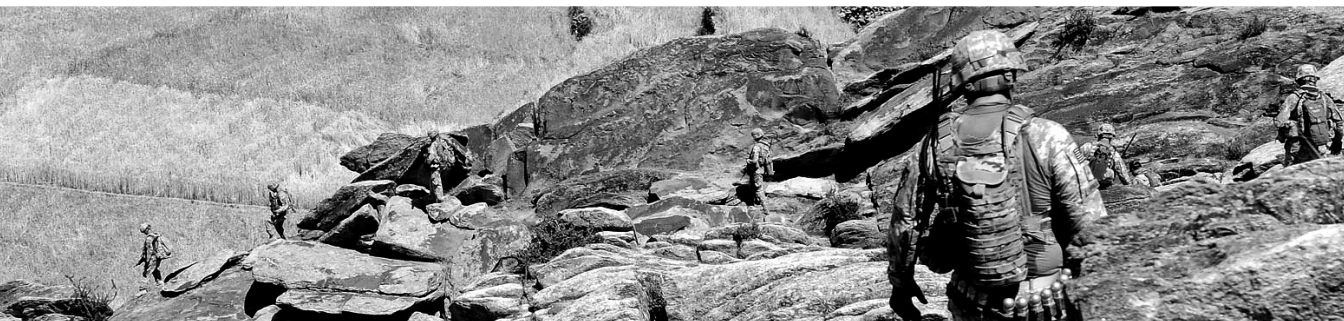

where
$E[\varepsilon_t] = 0$
$Var(\varepsilon_t) = r$
$C_{t+1} = \gamma_0 + \gamma_1 C_t + \varepsilon$
log-like for "r"


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The Edelman Gala



2016 Edelman Gala

Welcome, Acknowledgments, and Awards to be Presented

Anne G. Robinson, Master of Ceremonies

Summaries of 2016 Edelman Finalist Work

U.S. Army Communications-Electronics Command
UPS

Presentation of the Wagner Prize

C. Allen Butler, Chair, 2015 Wagner Prize

Summaries of 2016 Edelman Finalist Work

The New York City Police Department
BNY Mellon

Presentation of the UPS George D. Smith Prize

Robin Lougee, Chair, 2016 UPS George D. Smith Prize

Summaries of 2016 Edelman Finalist Work

Asociación Nacional de Fútbol Profesional
360i

Presentation of the INFORMS Prize

Julia Morrison, Chair, 2016 INFORMS Prize

Recognizing Members of the Franz Edelman Academy

Anne G. Robinson, Master of Ceremonies

Announcement of the 2016 Franz Edelman Award Winner

Edward H. Kaplan, President, INFORMS
Michael A. Trick, Chair, 2016 Edelman Award

Master of Ceremonies
Anne G. Robinson



The term of INFORMS' 19th president, Anne Robinson, cast a shining light on a youthful vault from a mathematics student in Newfoundland, to a PhD at Stanford to the leading voice in analytics at Cisco, Verizon Wireless, and INFORMS, all at an age when many in her field are still ingénues.

Dr. Robinson was INFORM'S youngest president when she took office in 2013.

As INFORM'S Vice President for Marketing, Communications, and Outreach, Dr. Robinson was a powerful force in shaping the strategic plan for INFORM'S pioneering decision to grow from operations research and management science to the related field of analytics. When she became president, she combined careful preparation on the INFORMS Board with public advocacy, becoming the top INFORMS spokeswoman on analytics. She traveled not only to INFORMS meetings but to far-flung business, analytics, and data science conferences, granting numerous interviews in different media to explain INFORMS' unique contribution to the exciting new field of analytics.

During Dr. Robinson's term, INFORMS unfolded the INFORMS certification, continuing education, information technology, and outreach programs that were adopted during her predecessors' terms. She was a major force in defining three crucial types of analytics – descriptive, predictive, and prescriptive – that help organizations understand their past performance and make important decisions about their future.

Dr. Robinson is the Executive Director of Supply Chain Strategy and Forward Operations for Verizon Wireless. Her team is responsible for demand planning and logistics for the forward supply chain, supporting Verizon's multiple retail locations as well as direct to customer. The team also leads all strategic efforts across the supply chain organization, leveraging advanced analytics to implement processes that lead to improved product life cycle management, working capital optimization, and cost reduction. Prior to joining Verizon Wireless, Robinson spent several years with Cisco Systems where her responsibilities included managing advanced analytics, business intelligence, and performance management teams across the supply chain. She and her team evaluated and improved the distribution inventory network and established a statistical forecasting capability for predicting demand. As the driving force for many foundational and cross-functional process innovations, she helped establish Cisco's presence and recognition as a leader in business intelligence and analytics. Her efforts led to induction in the Balanced Scorecard Hall of Fame. Dr. Robinson has served on several advisory boards including the SAS Analytical Customer Advisory Board. She was a topical editor for the *Encyclopedia of Operations Research and Management Science*.

Her service at INFORMS includes a role as judge in the Franz Edelman Competition, chairmanship of the Membership Committee, and a seat on the INFORMS Roundtable. Following her service on the INFORMS Board she became series editor of *Editor's Cut*, a comprehensive online multimedia collection examining important research areas in operations research and analytics.

2016 Edelman Gala

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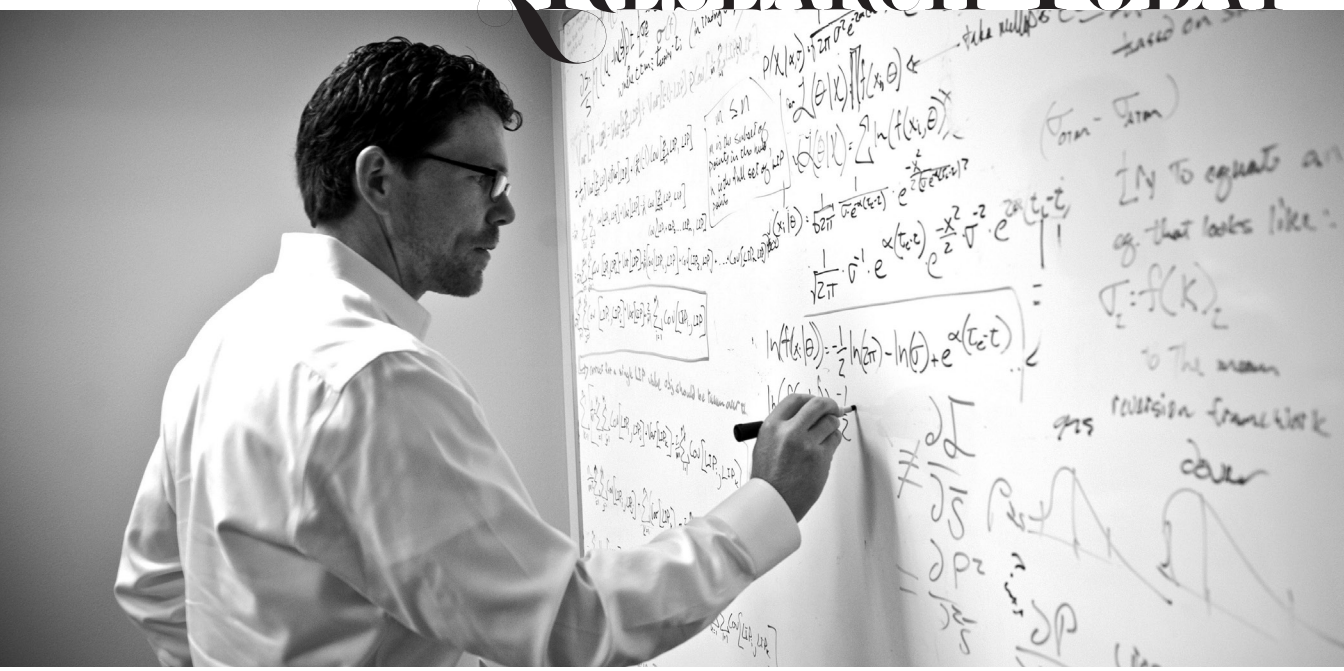
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Analytics and Operations Research Today



Edelman Program Notes from INFORMS Member-in-Chief Ed Kaplan

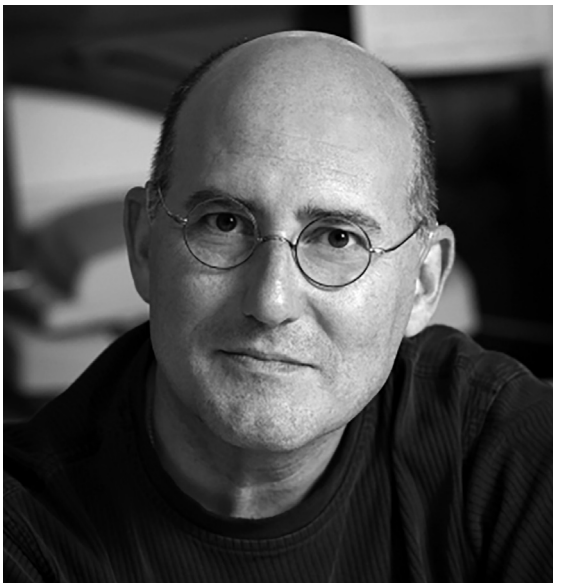
Operations Research Doing Stuff!

These are exciting times for operations research. Our field is characterized by research breakthroughs, creative applications of our methods to pressing problems across the public, private, and not-for-profit sectors, and fascinating excursions into science, public policy, services, healthcare…you name it.

Among the more joyful activities INFORMS inherited from its predecessors, the Operations Research Society of America (ORSA) and The Institute for Management Sciences (TIMS), is the recognition of exemplars that represent the best of our profession. Some of our awards date back decades to the founding of the operations research field, while others are more recent. For example, the Lanchester Prize, awarded annually for the best contribution to operations research and the management sciences, was first awarded by ORSA in 1954. The Franz Edelman Award for Achievement in Operations Research and the Management Sciences, which recognizes outstanding examples of operations research, management science, and advanced analytics in practice, began life as the TIMS Prize in 1972. The John von Neumann Theory Prize for fundamental, sustained contributions to theory originated with ORSA in 1975 (the first recipient was George Dantzig).

Tonight we gather to joyfully celebrate the accomplishments of our field's leading practitioners and applied problem solvers with the award of four major INFORMS awards for excellence in applications: the Edelman Award, the INFORMS Prize, the Daniel H. Wagner Prize, and the UPS George D. Smith Prize.

Hosting the Edelman competition in Orlando conjures exciting memories, for it was in Orlando in April 1992 that a team from the New Haven Health Department



won the Edelman for evaluating that city's needle exchange program. Said winning team included a younger and thinner version of your Member-in-Chief playing the role of OR Modeler-in-Chief. The other six finalists that year included Queues Enforth Development, Inc. (for improving New York City's Arrest-to-Arraignment System), the New Haven Fire Department, Bell Communications Research, The Gas Research Institute, Vilpac (a Mexican truck company), and the Merit Brass Company.

This year's six Edelman finalists compose a similarly eclectic group with applications in both the public and private sectors. New York City is again represented, this time by its famous police department that has developed and deployed a Domain Awareness System for information sharing with every officer on the force. The U.S. Army Communications-Electronics Command (CECOM) tackled the problem of diagnosing and optimizing electric power generators in Afghanistan bases. Better generator management in this environment

means less demand for fuel resupply convoys, which in turn lowers the exposure of U.S. troops to ambushes and attacks with improvised explosive devices. Reducing fuel consumption is also a benefit from the implementation of the On-Road Integrated Optimization and Navigation (ORION) system at UPS, where the main thrust of ongoing research and implementation resulted in route optimization models that have revolutionized their pick-up and delivery operations.

From moving packages to moving athletes, the Chilean National Professional Football Association employed optimization models to schedule soccer matches in their professional and youth leagues. Their model results were sufficient to convince the South American Football Confederation to use the new scheduling system to design the competition for the 2018 South American World Cup Qualifiers. Optimization figures again in a completely different setting, namely BNY Mellon's reform of its repurchase (repo) transactions infrastructure. The new modeling suite has improved Mellon's ability to act as an intermediary matching investors and dealers, enabling them to process $1.48 trillion per day while reducing client costs. Finally, in an application that could hardly have been imagined in 1992, 360i utilizes optimization models to enable advertisers to bid in the zillions of second price auctions for search page ad placements that occur each day (essentially, whenever someone Googles something). Talk about real-time modeling!

Since 1991, the INFORMS Prize has been awarded for effective integration of advanced analytics and operations research/management sciences (OR/MS) in an organization. We are proud to recognize General Motors with this year's award. Operations research has been a fact of life at GM as far back as the 1960s, and a GM team won the Edelman prize in 2005. We wish continued success to GM's Research and Development Operations Research team.

The Daniel H. Wagner Prize, first awarded in 1998, emphasizes the quality and coherence of analysis used in practice. Dr. Wagner strove for strong mathematics applied to practical problems, and the 2015 Wagner winners delivered. A team from the Centers for Disease Control and Prevention, Georgia Tech and Emory University led by Tech's Eva Lee developed a machine learning framework for predicting vaccine immunogenicity. This project demonstrated that a yellow fever vaccine's ability to immunize a patient could be successfully predicted with greater than 90% accuracy within a week after vaccination, and the researchers believe their work could contribute toward the design of a universal flu vaccine.

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. It is the youngest of the awards celebrated tonight, having been initially awarded in 2012. There are three finalists this year: H. John Heinz III College of Carnegie Mellon University, the Institute for Advanced Analytics at North Carolina State University, and the Operations Research Program of the United States Air Force Academy. All three of these academic programs are noteworthy for the connections they have forged to practice.

Congratulations to all of our finalists tonight. They teach us how operations research can have impact, and even make the world a better place. So here's to the doers among us. You make INFORMS proud.

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Franz Edelman Award Competition Finalists



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Enhancing Global Food Security Through Analytics

By Joseph Byrum, Syngenta, Global Head Soybean R&D

Reflections on Winning the 2015 Franz Edelman Award

Making it into the finals is a great honor, but we wanted to win. We believed we had a great story to tell; the challenge was how to do it. Nobody in the agriculture space had ever won the Franz Edelman Award, so we honestly were not sure what to expect. This was all new to the Syngenta Soybean R&D team, yet the amount of effort it took to achieve the goal paid off in unexpected ways.

It was not just a learning experience for us. Syngenta had a chance to reach out to the analytics community and encourage more interest in what we do. Likewise, the process of setting up the final presentation helped educate Syngenta employees at all levels about the benefits of analytics.

Syngenta's tagline is "bringing plant potential to life," which is not the sort of topic of conversation one would expect at an INFORMS Analytics Conference. We were determined to change that. We knew that we would have to explain our project to an audience—and more importantly to judges—who would not be familiar with the science of plant breeding.

So our primary goal was to come up with a presentation that conveyed the complexity of plant breeding in a way that would highlight the power of operations research in managing that complexity. The tools we created helped our breeders make better informed decisions that improved plant yields while conserving scarce resources.

Rather than describe this unfamiliar process, we came up with the idea of showing it. We sent a video crew to one of our top breeders, Craig Davis, to film him pollinating a soybean plant at one of our labs in Iowa. It turns out, nobody had thought to capture this process on film before. Craig then gave a testimonial about how he hated the idea of having a computer telling him what to do, but he was quickly won over once he realized what the tools could accomplish.

End-user support for a project like this is essential, but a company's corporate culture must support it as well. We wanted to demonstrate that the commitment to O.R. came from the top. That meant having Mike Mack, our then chief executive officer, record a video message about the value of operations research that we could use at the beginning of our talk. Jon Parr, the chief operating officer, would close the presentation by talking about how the culture of analytics has spread throughout the company.

Such things are easier said than done. With the deadline for the Edelman contest a matter of weeks away, getting time on the busy executives' schedules was not easy. Syngenta is headquartered in Basel, Switzerland, so our video editor in Ohio had to carefully coordinate with a crew in Europe to ensure that the final product would be consistent. All of the effort proved worthwhile.

The videos helped break up the presentation, so that it wouldn't just be our presentation team talking for 40 minutes straight. That team consisted of me, breeding scientist Bruce Luzzi, Kromite principal Jack Kloeber, and Dan Dyer, Syngenta's Head of Seeds Product Development. Each of us told a relevant slice of the full story of how analytics helped

us improve the yield or "genetic gain" in our Soybean portfolio by making breeding decisions based on science, not guesswork, as has traditionally been done in our industry.

Improving yields is more than just a good business move; it is an absolutely essential step toward meeting the global food security challenge. As our presentation graphically demonstrated, the world's population grows by 200,000 each and every day—and these people need to eat. To keep up with this growth, we must produce more food while at the same time preserving the environment and conserving scarce resources. Syngenta's approach to this is called The Good Growth Plan, and operations research is playing a key role in delivering on our commitments.

The Edelman judges picked up on the critical nature of this mission. We are grateful that they decided to honor us with the Franz Edelman Award. It recognizes the long hours and hard work put in by Syngenta's R&D team over the past few years.

Our sincere hope is that this will not be the last time Syngenta competes for this award, and that our colleagues and industry partners take up the challenge so that the hallways of future analytics summits are filled with representatives from agriculture. To further interest in the field, we've partnered with INFORMS to create the Syngenta Crop Challenge to bring focus on ways that analytics can address the problem of feeding millions of people throughout the world who face hunger every day.

More information is at:
www.ideaconnection.com/syngenta-crop-challenge/





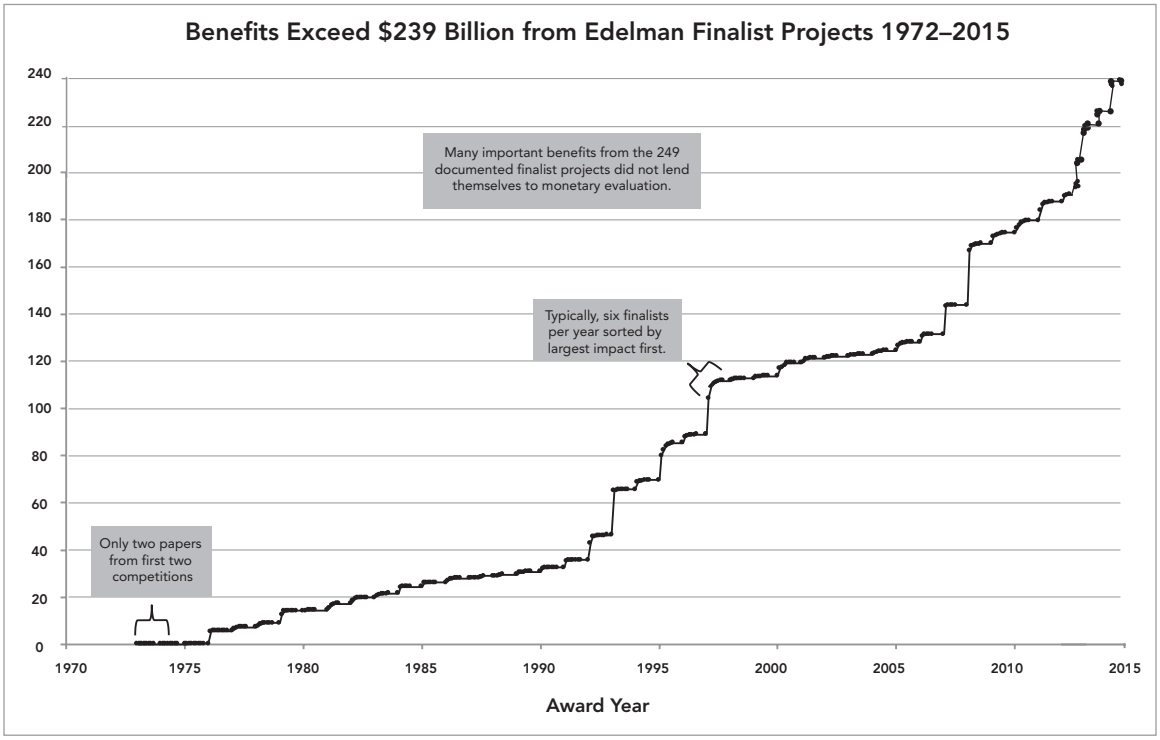






Operations Research: Billions and Billions of Benefits!

By Jeffrey M. Alden, Group Manager, General Motors
Technical Fellow, GM R&D Operations Research



Nearly 240 billion U.S. dollars of impact! That's impressive! How were they estimated? How broad is the impact? Is there more?

Since 1974, the Edelman finalists published their project accomplishments in the INFORMS journal *Interfaces*. Reviewing all 260 articles, their monetary impact was estimated under these guidelines:

- Be objective and conservative.
- Include reported impact and at most two more years of anticipated impact.
- Include only one year of enormous impact (tens of billions of dollars) to downplay the huge size and budget of some organizations.
- Ignore relative impacts even though saving $10 million for a small company may be more impressive than saving $100 million for a large company.

These conservative guidelines do not include many important yet difficult-to-quantify benefits like better legal dispute resolution, cancer treatments, airline security, hazardous material deposition, budget allocation, epidemic disease control, organizational structure, on-time railway performance,

Scan this QR code to view an interactive version of the Impact of Projects graph.

and space shuttle heat shielding performance. For example, there are more than 20 finalist papers with significant life and health benefits. Most are very difficult to quantify. However, a CDC project on (potential future) U.S. epidemics expects annual savings of 6,000 lives valued at $12 billion and another project on Hajj traffic should save an annual 350 lives valued at $700 million.[1] Furthermore, almost all finalist papers report nonmonetary 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. Great! Clearly, the reported monetary benefits greatly 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, canal operations, communications (broadband, broadcasting), consumer products, crowd control, express delivery, defense (Air Force, Army), education, financial (pension, investment, credit card, settlement), fire protection, forestry, healthcare (cancer, 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), social networks, tax collection, transportation (airline, highway, railway, space), treasure hunting, waste management, water (resources, quality, flow, flood), and weapons dismantlement. The list goes on and on! In fact, 636 organizations (business, government, academic, etc.) are recognized and honored as supporting or benefiting from finalist projects (some more than once).

Finally, the impact of O.R. 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 count of Edelman finalist authors (1142) represents about 10% of the current INFORMS membership.[2] Undoubtedly, there is a vast number of OR projects with significant impact that did not compete due to confidentiality, lack of internal support to compete, or the team was simply unaware of the competition.

The impact is immense. OR professionals should be proud of their profession – we can say "billions and billions" when asked about the value of O.R.!

[1]For CDC: 6000 lives / year ≈ 314M U.S. population ⋆ 5% epidemic penetration ⋆ 10% die under current practices ⋆ (1-80% fatality reduction under improved practices) ⋆ 1 epidemic per 200 years. Value of quality year of life in USD is $2M / average life ≈ $50K / year (a standard value) ⋆ 78 years life expectancy ⋆ 50% average life lived. Total expected annual impact is $12B = 6000 ⋆ $2M. See "Advancing Public Health and Medical Preparedness with Operations Research," *Interfaces*, Vol. 43, No. 1, pp. 79--98 (note Figure 6).

Numbers are reasonable values offered by the author.

[2]It is interesting how the average number of authors per paper has grown from 1.8 over the first 10 award years (1972–1981) to 7.4 over the last 10 award years (2006–2015). That's four times more! In particular, the annual growth in average authors per paper is 0.155 based on the least squares fit $y(x) = 0.155x + 0.849$ $R^2 = 0.77$, where x = award year – 1972 and y(x) = average authors per paper in award year = x + 1972.

Franz Edelman Award





Recognizing and Rewarding Real Achievement

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

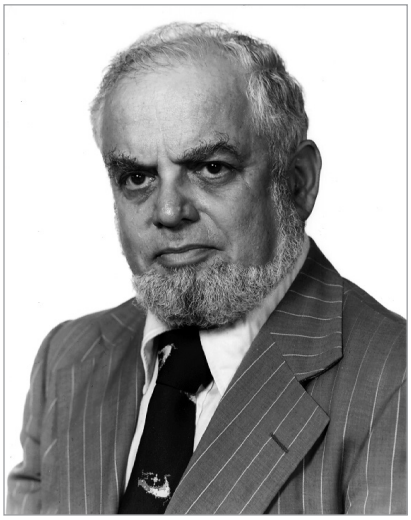
The purpose of the international Franz Edelman competition is to bring forward, recognize, and reward outstanding real-world applications of operations research, management science, and analytics.

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 of past competition presentations—suitable for teaching, marketing, or publicizing OR 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. 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



Franz Edelman

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 was well known in the OR 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 OR consulting firm. Throughout his career, Franz's OR 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.

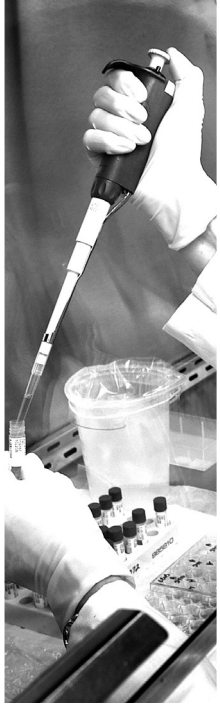




Congratulation to all award finalists and winners for their achievements

Boeing, for over half a century has been advancing and applying data science and analytics to aerospace and continues to be committed to expanding the frontiers of aerospace data science into the far future.

BOEING





Edelman First-Place Award Recipients

2015 Syngenta
"Good Growth through Advanced Analytics"

2014 U.S. Centers for Disease Control
"Eradicating Polio Using Better Decision Models"

2013 Delta Programme Commissioner
"Economically Efficient Flood Standards to Protect the Netherlands Against Flooding"

2012 TNT Express
"Supply Chain–Wide Optimization at TNT Express"

2011 MISO
"Midwest Independent Transmission System Operator Applies Operations Research to Energy and Ancillary Services Markets, Unlocking Billions in Savings"

2010 Indeval
"Mexican Financial Markets Benefit from Novel Application of Operations Research"

2009 Hewlett-Packard
"HP Transforms Product Portfolio Management with Operations Research"

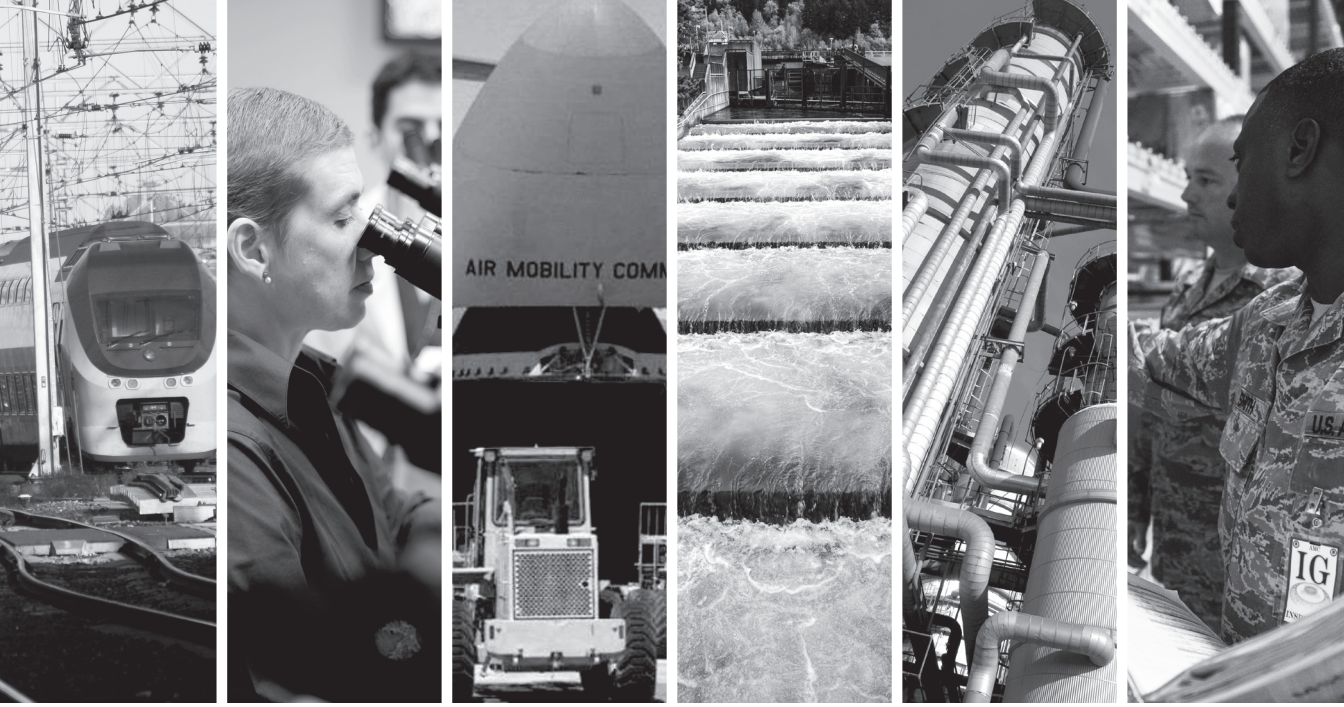
2008 Netherlands Railways
"The New Dutch Timetable: The O.R. Revolution"

2007 Memorial Sloan-Kettering Cancer Center
"Operations Research Advances Cancer Therapeutics"

2006 Warner Robins Air Logistics Center
"Warner Robins Air Logistics Center Streamlines Aircraft Repair and Overhaul"

2005 General Motors
"Increasing Production Throughput at General Motors"

2004 Motorola, Inc.
"Reinventing the Supplier Negotiation Process at Motorola"



This is a listing of the first place Edelman projects. Scan this QR code to learn more about these projects and other award-winning OR/MS and analytics projects.

2003 Canadian Pacific Railway
"Perfecting the Scheduled Railroad: Mode Driven Operating Plan Development"

2002 Continental Airlines
"A New Era for Crew Recovery at Continental Airlines"

2001 Merrill Lynch, Inc.
"Pricing Analysis for Merrill Lynch Integrated Choice"

2000 Jeppesen Sanderson, Inc.
"Flexible Planning and Technology Management at Jeppesen Sanderson, Inc."

1999 IBM
"Extended Enterprise Supply Chain Management at IBM Personal Systems Group and Other Divisions"

1998 Bosques Arauco, S.A.
"Use of OR Systems in the Chilean Forest Industries"

1997 Societé Nationale des Chemins de Fer Français (SNCF) and Sabre Decision Technologies
"Schedule Optimization at SNCF: From Conception to Day of Departure"

1996 South African National Defense Force (SANDF)
"Guns or Butter: Decision Support for Determining the Size and Shape of the South African National Defense Force"

1995 Harris Corporation/Semiconductor Sector IMPReSS
"IMPReSS: An Automated Production-Planning and Delivery-Quotation System at Harris Corporation—Semiconductor Sector"

1994 Tata Iron & Steel Company, Ltd.
"Strategic and Operational Management with Optimization at Tata Steel"



Edelman First-Place Award Recipients

(Continued)

1993 AT&T
"AT&T's Telemarketing Site Selection System Offers Customer Support"

1992 New Haven Health Department
"Let the Needles Do the Talking! Evaluating the New Haven Needle Exchange"

1991 American Airlines
"Yield Management at American Airlines"

1990 Health Care Financing Administration
"Diagnosis Related Groups: Understanding Hospital Performance"

1989 ABB Electric, Inc.
"A Choice-Modeling Market Information System That Enabled ABB Electric to Expand Its Market Share"

1988 City of San Francisco Police Department
"A Break from Tradition for the San Francisco Police: Patrol Officer Scheduling Using an Optimization-Based Decision Support System"

1987 Syntex Laboratories, Inc.
"Sales Force Sizing and Deployment Using a Decision Calculus Model at Syntex Laboratories"

1986 Southland Corporation (CITGO Petroleum Corporation Subsidiary)
"The Successful Deployment of Management Science throughout CITGO Petroleum Corportation"

1985 Weyerhaeuser Company
"Weyerhaeuser Decision Simulator Improves Timber Profits"

1984 (dual) Blue Bell, Inc.
"Blue Bell Trims its Inventory"

1984 (dual) The Netherlands Rijkswaterstaat and the RAND Corporation
"Planning the Netherlands' Water Resources"

1983 Air Products and Chemicals, Inc.
"Improving the Distribution of Industrial Gases with an On-Line Computerized Routing and Scheduling Optimizer"



1982 Arizona Department of Transportation
"A Statewide Pavement Management System"

1981 ANR Freight System
"From Freight Flow and Cost Patterns to Greater Profitability and Better Service for a Motor Carrier"

1980 Kelly-Springfield Tire Company
"Coordinating Decisions for Increased Profits"

1979 The Greater New York Blood Program
"The Long Island Blood Distribution System as a Prototype for Regional Blood Management"

1978 Cahill May Roberts, Ltd.
"A Planning System for Facilities and Resources in Distribution Networks"

1977 Syncrude Canada, Ltd.
"Simulation of Tar Sands Mining Operations"

1976 American Telephone & Telegraph
"The Use of Management Science in Making a Corporate Policy Decision–Charging for Directory Assistance Service"

1975 Xerox Corporation
"Management Science's Impact on Service Strategy"

1974 Canadian National Energy Board
"Management Science in Energy Policy: The Trans Canada-Great Lakes Transmission Case"

1973 The Babcock & Wilcox Company
"Planning Nuclear Equipment Manufacturing"

1972 The Pillsbury Corporation



The Finest Step Forward: The Franz Edelman Award Competition Process

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 (OR) 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 three dozen experienced OR practitioners and academics from organizations such as BNSF Railway, General Electric, HP, Intel, IBM, McDonalds, MIT, Purdue University, SAS, Schneider National, Southwest Airlines, Turner Broadcasting, 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. Each of the semifinalists is assigned a team of verifiers who work with the relevant stakeholders to validate the details and the claims made by their assigned entry.

The verifiers' role is to thoroughly examine the OR work presented in the assigned entry summary, as well as its potential impact, and convey this information to the rest of the selection committee. The verifiers communicate directly with the entrant's OR 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 OR 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 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 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 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 can be improved.

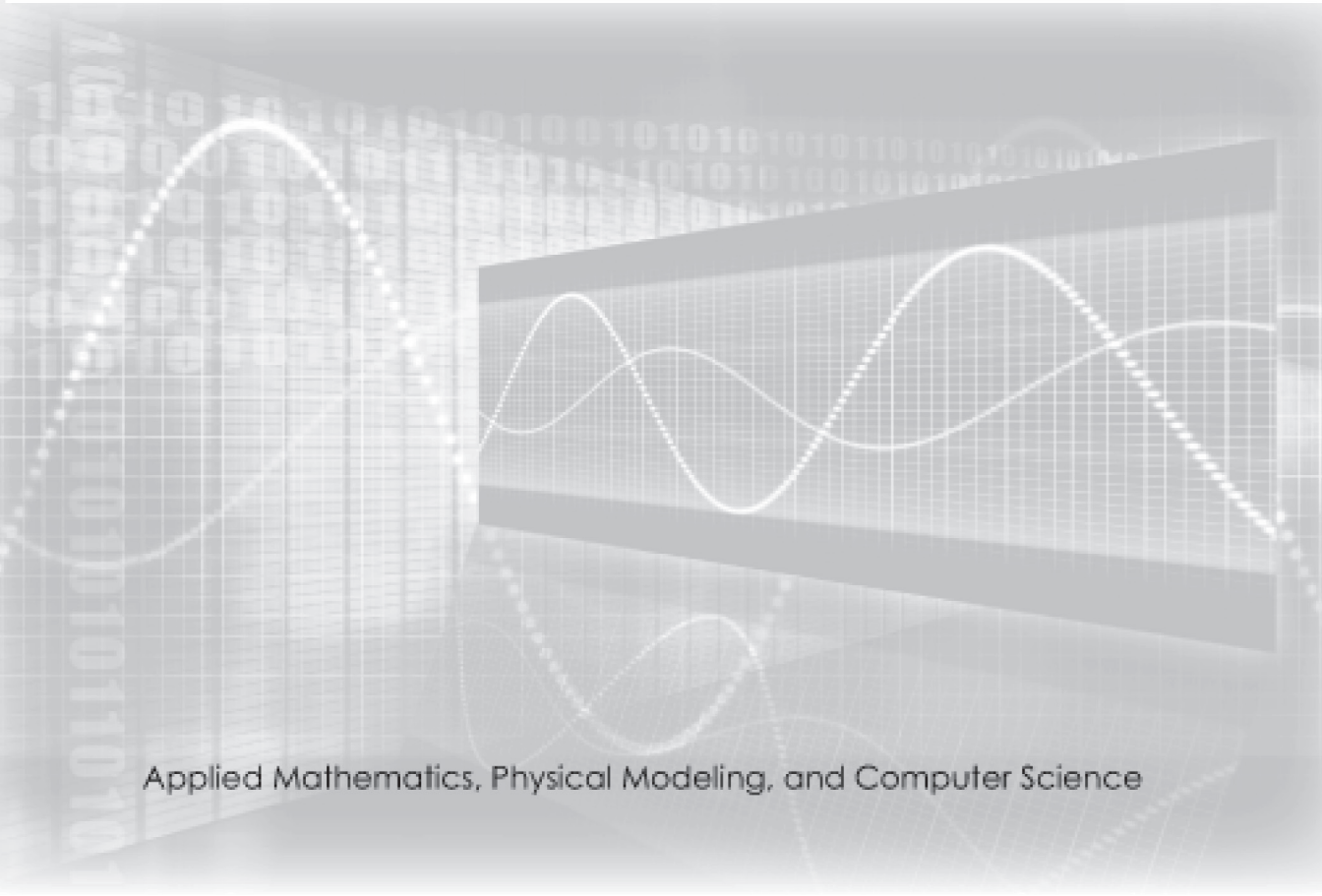
On the day of the competition, each team gives a 40-minute presentation, followed by a 10-minute period of questioning by the judges. After the presentations are complete, the judges sequester themselves until they reach a decision on which of the finalists best exemplifies the ideals and standards of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

Following the competition, the finalists 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 through streaming video soon after the competition.

Congratulations to the 2016 Franz Edelman Finalists

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The 2016 Selection Process & Verifiers

We wish to thank the following individuals for their dedication and service as Selection Committee members and as verifiers for this year's Edelman Award.

The Selection Committee, a group of seasoned O.R. professionals, reviews the applications. 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 OR 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.

Selection Committee

- Susan Albin, Rutgers University, *v*
- Layek Abdel-Malek, NJ Institute of Technology, *v*
- Carrie Beam, Carrie Beam Consulting, *v*
- Peter C. Bell, Ivey Business School at Western University
- Sudip Bhattacharjee, University of Connecticut, *v*
- John R. Birge, University of Chicago, *v*
- Srinivas Bollapragada, GE Global Research Center
- Bruce Bukiet, NJ Institute of Technology
- J. Antonio Carbajal, CAP, Turner Broadcasting, *v*
- Alice Chen
- Pooja Dewan, BNSF Railway
- Howard Finkelberg, Magic LLC
- Ken Fordyce, Arkieva
- Chris Fry, Strategic Management Solutions
- Ted Gifford, Schneider National Incorporated
- Stephen Graves, MIT
- Arnold Greenland, CAP, University of Maryland, *v*
- Mingguo Hong, Case Western Reserve University, *v*
- Sydney Hess, ICI Amer & Drexel
- Yoshiro Ikura, SAITECH, *v*
- Ananth Iyer, Purdue University
- Ruth Kaufman
- Russell P. Labe, CAP, RPL Analytics Consulting
- Yingdong Lu, IBM, *v*
- Marco Lübbecke, Aachen University
- Irvin Lustig, CAP, Princeton Consulting, *v*
- Charles McCallum
- Laura Albert McLay, University of Wisconsin-Madison
- R. John Milne, Clarkson University
- Sven Müller, University of Applied Sciences Karlsruhe, *v*
- Patricia Neri, SAS Institute, Inc.
- Anna Olecka, PricewaterhouseCoopers, *v*
- Ioannis Papadakis, Dun & Bradstreet, *v*
- Pelin Pekgun, University of South Carolina, *v*
- Graham Rand, Lancaster University, *v*
- John Ranyard, Lancaster University
- Anne G. Robinson, Verizon Wireless, *v*
- Randall S. Robinson, *v*
- Amir Sadrian, DeVry University
- Leon Schwartz, Informed Decisions Group
- Jack Theurer, G Theurer Associates, Inc., *v*
- Michael Trick, Carnegie Mellon University, *v*
- Rajesh Tyagi, GE Global Research, *v*
- Carol Vazirani, McDonald's Corporation
- Peiling Wu-Smith, General Motors, *v*

"v" Indicates Verifiers

The Coaching and Judging Process & The 2016 Coaches and Judges

We wish 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

- Carrie Beam, Carrie Beam Consulting
- John R. Birge, University of Chicago
- J. Antonio Carbajal, CAP, Turner Broadcasting
- Arnold Greenland, CAP, University of Maryland
- Yoshiro Ikura, SAITECH
- Ananth Iyer, Purdue University
- Russell P. Labe, CAP, RPL Analytics Consulting
- Sven Müller, University of Applied Sciences Karlsruhe
- Anna Olecka, PricewaterhouseCoopers
- Ioannis Papadkis, Dun & Bradstreet
- Pelin Pekgun, University of South Carolina
- Randall S. Robinson
- Jack Theurer, G. Theurer Associates, Inc.

Judges

- Michael A. Trick, Chair, Carnegie Mellon University
- Susan Albin, Rutgers University
- Peter C. Bell, Ivey Business School at Western University
- Srinivas Bollapragada, GE Global Research Center
- David Hunt, Oliver Wyman
- Irvin Lustig, CAP, Princeton Consulting
- Laura Albert McLay, University of Wisconsin-Madison
- R. John Milne, Clarkson University
- Jonathan Owen, CAP, GM

The Edelman Laureates

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

Authors of finalist papers to be published in *Interfaces* 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 45 years of extraordinary contributions to society through the innovative application of operations research.



syngenta®

Syngenta congratulates the 2016 Franz Edelman Award finalists!

Syngenta understands the importance of operations research and analytics. Past and current finalists have improved organizational efficiency, increased profits, brought better products to consumers, helped foster peace negotiations, and even saved lives. Syngenta was honored to be named the 2015 Franz Edelman award winner and is pleased to support the mission of INFORMS to highlight the importance of both operations research and analytics.

This year during the 2016 INFORMS Conference on Business Analytics & Operations Research, Syngenta, in cooperation with INFORMS, is supporting the inaugural Syngenta Crop Challenge, a contest challenging entrants to apply analytics in new, novel ways to improve farm productivity. Syngenta is proud to honor the importance of operations research and analytics as well as those who are implementing these practices.

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Introduced in the pages that follow are the six finalists for the 2016 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 2016 Franz Edelman Award.

Each finalist's work is described here in a shortened summary. Full papers will be published in the January/February 2017 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 2016 Franz Edelman Award are:

360i

Asociación Nacional de Fútbol Profesional

BNY Mellon

The New York City Police Department

UPS

U.S. Army Communications-Electronics Command

360i

360i's Pulse
Generates $1B in Revenue for Paid Search Clients

When you search online, a search engine will deliver two types of results. To the left and toward the bottom, the organic search results represent the search engine's best guess at what you are looking for. To the right, and sometimes across the top, there are sponsored ads from advertisers who pay to be there. Often, clients will hire an agency to place bids for them, rather than contract directly with the search engine. To decide the placement of sponsored ads, the search engine conducts a second-price auction based on advertiser's bids for a click-through to their site. 360i is an agency that manages client budgets across millions of keywords, seasonality, geographies, device types, and audience segments. To ensure its staff buys the right click for their clients, 360i has built a technology suite that is unique in the industry and includes the following:

- **Natural language processing** that puts keywords together with the right ad copy and landing pages to maximize relevance to the consumer.
- **Advanced forecasting and optimization** to make sure budgets are allocated where and when they are needed.
- **Predictive bidding** that uses linguistic similarity as a proxy for performance correlation between keywords to calculate accurate bids for keywords with sparse data.
- **Performance monitoring** that unscrambles the opaque second-price auction to tackle campaign performance issues before they occur.

parallella



Application of advanced OR techniques has generated $1 billion in incremental revenue for 360i's paid search clients. The system has been central to 360i winning multiple awards, including Google's Marketing Machine Award and "Search Agency of the Year" from *OMMA Magazine*. Forrester recognized 360i as the number one digital search agency driven by Domain Name System (DNS) technologies.

(http://www.360i.com/about/press/360i-named-leader-search-marketing-agencies-report/)

Organization

360i

360i is an award-winning agency that drives results for Fortune 500 marketers by making brands culturally relevant amid the rapid pace of consumer behavior change. 360i is a highly strategic creative and media partner for clients that brings together digital specialization – in insights, strategy, social-influencer marketing, search, analytic's and media – with a deep understanding of how people discover brands



and share stories across all channels. 360i has been named to Advertising Age's Agency A-List four years in a row, and recognized as MediaPost's OMMA Agency of the Year three years straight. The agency's clients include Coca-Cola, Mondel z, Pernod Ricard USA, Toyota, and HBO. For more information, visit blog.360i.com or the Twitter handle @360i.

CubeSmart

CubeSmart (NYSE: CUBE) is a self-administered and self-managed real estate investment trust focused on the ownership, operation, acquisition and development of self-storage facilities in the United States. CubeSmart owns or manages more than 700 self-storage facilities nationwide and is the fourth largest owner and operator of self-storage facilities in the U.S.

Asociación Nacional de Fútbol Profesional

Operations Research Transforms Scheduling of Chilean Soccer Leagues and South American World Cup Qualifiers

Soccer is the most popular sport in the world. Practiced by 200 million active players, it is a central element in the cultural identity of many countries. In Chile, all professional soccer teams come under the Asociación Nacional de Fútbol Profesional (ANFP), which manages Chile's three professional leagues (the First, Second, and Third divisions), as well as the national soccer team, which represents the country in international competitions such as the FIFA World Cup. The Chilean league games are broadcast by the ANFP-owned "Canal del Fútbol" (CDF), which currently reaches an audience of about 12 million out of a national population of 18 million.

Late in 2004, prompted by a decline in match attendance and general public interest, ANFP's management set out to improve the attractiveness of the First Division tournaments. Driving this effort was the need to schedule matches in such a way that the tournaments were attractive to fans while being fair to all teams, both in sporting and economic terms. As this task proved too difficult using traditional methods, ANFP teamed up with the operations research (OR) group at the University of Chile to design a new scheduling methodology.

The guiding principles of this new approach had to balance the interests of various stakeholders (teams, CDF, ANFP, the fans), which meant that measurements of sporting fairness and attractiveness to fans needed to be devised. Developing and implementing the resulting criteria was difficult due to the problem's complex combinatorial nature.



To meet this challenge the group assembled an array of OR techniques such as integer programming, constraint programming, and heuristics. The methodology they created has been used to schedule every First Division tournament since 2005.

A salient feature of this OR-based approach is its portability. After obtaining promising results scheduling the Chilean First Division, the methodology was adopted to schedule ANFP's Second, Third, and Youth divisions. Although each of these leagues has its particularities, the approach has proved capable of scheduling a broad range of tournaments, including different schedule formats and league sizes. Furthermore, outside the realm of soccer, the approach has been applied to schedule Argentina's professional basketball and volleyball leagues.

In 2015 the group once again employed the methodology, this time to design a schedule proposal for the 2018 FIFA World Cup South American Qualifiers. The proposal was unanimously accepted by the 10 members of the South American Football Confederation (CONMEBOL) and is being used in what is, to the best of our knowledge, the first international application of O.R. to soccer scheduling.

Over the last 11 years, ANFP has scheduled about 50 soccer tournaments using OR techniques. The overall direct economic impact is estimated to be around USD 59 million, 50% of which comes from CDF in reductions of operational costs and mostly in increments of subscriptions; 41% is attributed to growth in ticket revenue; and 9% to lower travel costs for the teams.

The potential for indirect economic impact is huge. In countries like Chile, society as a whole is the ultimate beneficiary of better-scheduled soccer tournaments. The impact on the culture is also enormous: improvements in transparency, fairness, attractiveness, public order, and credibility all contribute to changing the way a country experiences sports. Meanwhile, improvements in club operations and favorable schedules for teams that are playing international tournaments have the potential to strengthen their performance in these tournaments, which actually happened after OR implementation. The new methodology has also turned out to be a fantastic tool for promoting O.R. Various components of the project have been used in educational programs across four countries (Chile, Argentina, Norway, and the United States), reaching thousands of high school and university students in addition to millions of TV viewers and Internet users.





Organizations

Asociación Nacional de Fútbol Profesional (ANFP)
The Chilean Professional Football Association (in Spanish, *Asociación Nacional de Fútbol Profesional de Chile*, or ANFP) is the governing body for professional soccer in Chile. In legal terms, it is a private entity distinct and separate from its member teams and constitutes a part of the *Federación de Fútbol de Chile* (FFC), which is responsible for overseeing both professional and amateur soccer in the country. Through the FFC, the Association is also connected with the Chilean Olympic Committee (COCh), the South American Football Confederation (CONMEBOL), and the International Federation of Association Football (FIFA), implementing the statutes, regulations, and rules of the game laid down by the International Football Association Board.

Canal del Fútbol (CDF)
The *Canal del Fútbol*, Chile's pay TV sports channel better known as CDF, was created in April 2003. Operated by *Servicios de Televisión Canal del Fútbol Ltda.*, it owns the television and radio broadcasting rights for all professional soccer games organized by the Chilean Professional Football Association (ANFP). In addition to its strictly commercial objectives, the channel's mission includes promoting the economic, social, and cultural welfare of Chilean soccer.

Department of Industrial Engineering, University of Chile
The Department of Industrial Engineering (DII) is part of the Faculty of Physical and Mathematical Sciences at the University of Chile, the largest and most important science and engineering center in the country. Founded in the 1950s, the DII is the biggest department in the Faculty and Chile's main training institution for industrial engineers. Every year approximately 150 industrial engineers graduate from its six-year program. It also offers seven master's programs, including one in operations management that each year graduates about 10 students, and a PhD in System Engineering that covers Operations Management, Transportation, Energy and Economy. The Department conducts research at the highest level in both theoretical as well as applied areas, and contributes to frontier developments through the support it provides to both public and private companies. It also assists public sector entities in developing and executing frontier high-impact projects involving large-scale and complex methodological challenges. DII faculty belonged to the team that received the 1998 Franz Edelman Award.





BNY Mellon

Transition State and End State Optimization Used in the BNY Mellon U.S. Tri-Party Repo Infrastructure Reform Program

The financial crisis revealed that the market could experience systemic problems: dealer defaults could leave investor counterparties or a tri-party agent holding increasingly illiquid collateral, leading to the seizing of the financial markets. As a tri-party agent, BNY Mellon worked with the Federal Reserve and the industry to identify and implement ways to take risk out of market operations. The U.S. Tri-Party Repo Infrastructure Reform Program strategy was executed as a series of operational and technological enhancements.

A repurchase (repo) transaction is an agreement between two parties—an investor and a dealer—where the investor (cash lender) purchases securities from a dealer (cash borrower) and the dealer agrees to repurchase the securities at a future date with interest. In a tri-party repo transaction, a third party custodial bank, such as BNY Mellon, acts as an agent and intermediary between the two parties, facilitating settlement between dealers and investors. The tri-party agent maintains custody of the collateral securities, processes payment and delivery between the dealer and the investor, and provides other services, including settlement of cash and securities, valuation of collateral, and optimization tools to allocate collateral.

New collateral allocation products, Rebalancing, Continuous Portfolio Optimization (CPO), and the CPO Settlement were developed to improve dealer workflow, improve quality of allocations, enhance credit usage enforcement, automate settlement, and help ensure settlement fairness should insufficient dealer liquidity be available. The Transition and End State


Time





Optimization algorithms are used by the collateral allocation products to continuously factor the dynamic market conditions such as daily deal modifications, investors' collateral rules, dealers' daily collateral changes, dealers' available liquidity, and enhanced credit usage enforcement. Due to the resulting problem size of up to tens of millions of variables, quality needs, and time-sensitive performance requirements, the Transition and End State Optimization algorithms use mixed-integer linear programming (MILP) with column generation and decision analysis techniques.

Rebalancing, Continuous Portfolio Optimization (CPO), and the CPO Settlement Algorithm process $1.8 trillion in daily client collateral for the domestic and global tri-party repo markets. These products and other operational and technological enhancements helped to reduce 97% intraday credit risk in BNY Mellon's U.S Tri-Party Repo market.

BNY Mellon is a leader in the tri-party repo market with approximately $2.2 trillion serviced globally including $1.3 trillion or 85% of the U.S. tri-party repo market. In response to the 2008 financial crisis, BNY Mellon worked closely with its clients, their investors, and other market participants to meet the recommendations of the U.S. Tri-Party Repo Infrastructure Reform Task Force[1] sponsored by the Federal Reserve Bank of New York.

Rebalancing, Continuous Portfolio Optimization, and Continuous Portfolio Optimization Settlement Algorithm (CPO SA) are the new products that use Transition State Optimization (TSO) and End State Optimization (ESO). TSO was solved with a decision analysis algorithm that allows the Rebalancing and CPO SA processes to incrementally move collateral among dealer trades using sets of collateral position movements so that defined constraints such as dealer's liquidity usage are maintained. ESO was solved with a MILP with tens of millions of variables from defined constraints such as eligibility criteria of collateral to deals and objective functions such as minimizing cost of carry.

Since its implementation in 2013, Rebalancing has contributed $130–$150 billion daily reduction of BNY Mellon's intraday credit risk by allowing elimination of bulk cash substitutions. CPO SA is used at the 3:30pm settlement time and uses ESO to maximize settlement of maturing and principle decrease trades while also minimizing movement of collateral. Settlement occurs incrementally as liquidity becomes available.[2] CPO is a fully automated process used when the dealer wants to efficiently allocate the existing collateral portfolio. First, ESO is used to find the collateral usage in the target portfolio then TSO is used to transition the portfolio incrementally from start to target state. CPO reduces clients' cost of funding, reduces intraday cash substitution usage, and leaves higher quality collateral in the dealers' box. CPO has been used since April 2014 and is now used daily to process typically $1.19 trillion collateral. Last year, as part of the on-boarding of a large dealer to CPO, an operational comparison showed that the dealer would have realized more than $5 billion of added Net Free Equity value with CPO. CPO is used by global and domestic tri-party clients. CPO SA has been an important component in





meeting BNY Mellon's U.S. Tri-Party Repo Reform objectives and it processes typically $1.48 trillion daily. CPO SA reduces dealers' liquidity usage during the settlement cycle through use of the funding from new trades and the return of substitution cash from existing trades to offset the dealer's liquidity required for maturing trade settlement.

This was a challenging program requiring business processes and technology changes while keeping the market running at its normal pace. BNY Mellon often held roundtable discussions with clients about proposed solutions to help ensure that everyone was aligned via 'day in the life' operating model presentations. Operational analytical monitors, client reports, and Digital Pulse operational dashboards provide insights of the complex processing.

Organization

BNY Mellon
BNY Mellon is a worldwide banking and financial services corporation. It includes a global investment company dedicated to helping its clients manage and service their financial assets throughout the investment lifecycle.

Whether providing financial services for institutions, corporations or individual investors, BNY Mellon delivers informed investment management and investment services in 35 countries and more than 100 markets. As of December 31, 2015, BNY Mellon had $28.9 trillion in assets under custody and/or administration, and $1.6 trillion in assets under management. BNY Mellon can act as a single point of contact for clients looking to create, trade, hold, manage, service, distribute or restructure investments.
Given its global presence and role in servicing a significant portion of the world's financial assets, BNY Mellon's scale and access to data provide rich analytics that help the company and the financial markets make evidence-based decisions, effectively manage risk and alleviate many client challenges.

Helping BNY Mellon do this is its Digital Pulse big data and analytics solution. Digital Pulse enables a culture of evidence-based management at BNY Mellon in order to increase efficiency, drive profitability and improve our client experience. It is a powerful engine that can rapidly distill insights from the information that is fed into it, digitizing existing services with a "heartbeat" of their current state. Digital Pulse captures, stores and analyzes data points from transactions, processes and sensors, business events and more, triggering meaningful actions and predictions. Capable of tracking, analyzing and modelling data at an incredible pace, Digital Pulse is an engine that can be leveraged for various use cases, focusing on increasing efficiency, reducing risk, improving client experience and driving profitability. Digital Pulse is one of the core components of BNY Mellon's NEXEN digital ecosystem, being rolled out to clients throughout 2016.

[1]The Task Force on Tri-Party Repo Infrastructure was formed by the Payments Risk Committee, a private sector body sponsored by the Federal Reserve Bank of New York. For additional background, please see the following: http://www.newyorkfed.org/tripartyrepo/pdf/report_120215.pdf.

[2]No Assurances Regarding Collateral Allocations - BNYM gives no assurances that use of the Settlement Algorithm will result in the optimal allocation of collateral to transactions for any particular collateral provider or receiver under any particular circumstance.

The New York City Police Department

Domain Awareness System (DAS)

The New York City Police Department (NYPD) is the largest police department in the United States, with a uniformed force of 36,000 officers. The NYPD protects a city of 8.5 million residents, 56 million annual tourists, and many iconic sites, such as Times Square, from terrorism and crime. The Domain Awareness System (DAS) allows the NYPD to use its data to inform officer decision making with analytics and operations research.

The DAS is a network of sensors, databases, devices, software, and infrastructure that delivers tailored information and analytics to mobile devices and precinct desktops. Originally designed for counterterrorism purposes, the DAS has been modified for general policing and is now deployed across every police precinct in the City and on the smartphone of every officer. No other police department in the world shares information and delivers analysis to its officers as effectively.

The DAS informs a variety of tactical and strategic decisions that officers make every day. The analytics and operations research methods built into DAS enable better situational awareness by monitoring and issuing alerts on sensor feeds, such as license plate readers and radiation sensors. When an officer responds to a 911 call, the DAS allows that officer to read records that indicate a propensity for violence at that address. Commanding officers use the predictive analytics built into DAS to help make decisions about where to place their patrols. NYPD executives use the data visualization in DAS to inform structured conversations about crime trends and patterns.


NYPD
COUNTER TERRORISM

The DAS has had a variety of benefits for the NYPD, including saving at least $50 million per year through more efficient use of staff. The DAS software has also been purchased by several other law enforcement agencies around the world and used to secure high profile events like the World Cup and the upcoming Summer Olympics; these purchases have delivered additional funds to the City via a first-of-its-kind revenue sharing agreement with NYPD's software developer.

Most importantly, Police Commissioner William J. Bratton says that "the DAS is essential in keeping New York City safe from crime and terrorism." The NYPD uses DAS every day to save lives, arrest criminals, and better serve the public.

Organization

The New York City Police Department
The NYPD is responsible for the safety and security of the people of the five boroughs of New York City. Founded in 1845, the NYPD has a long history of serving the City. Today's NYPD employs roughly 36,000 uniformed officers, colloquially known as "New York's Finest," including specialized mounted, aviation, harbor, intelligence, bomb disposal, narcotics, and canine units.

Between 1993 and 2015, the City's crime rate fell by roughly 75%; part of this decline can be attributed to changes in police tactics and improvements in law enforcement. Concurrent



with this decline in crime, the City suffered a devastating act of terrorism on September 11, 2001. The NYPD again responded by innovating; the Department created a Counterterrorism Bureau, the first of its kind at a U.S. municipal police department.

NYPD has long been an innovator in analytics and operations research. For example, the NYPD's structured process for examining crime statistics, known as CompStat, was developed in 1993 by Commissioner William J. Bratton. The purpose of CompStat is to ensure the accountability of precinct commanding officers, improve performance, and share information. Since its development, CompStat has been the foremost example of law enforcement analytics, winning the Harvard Kennedy School's Innovations in American Government Award and being adopted by other police and governmental agencies around the world.





UPS

UPS On-Road Integrated Optimization and Navigation (ORION) Project

The UPS On-Road Integrated Optimization and Navigation (ORION) is revolutionizing the pickup and delivery (P&D) operations at UPS. More than 10 years in the making, ORION has become a critical component of UPS Small Package Operations. In its current phase, every morning ORION provides UPS drivers with an optimized sequence in which the (pre)assigned packages are delivered. As of December 2015, ORION is being used by more than 35,000 of 55,000 U.S. drivers. At full deployment in 2016, 55,000 UPS drivers will be relying upon ORION to serve an average of 160 customers per day.

ORION sits atop the innovative Package Flow Technology (PFT) foundation that UPS developed to streamline and modernize its P&D operations. Launched in 2003, PFT enabled UPS to become more flexible and introduce a host of customized services. PFT combines data from multiple sources, public as well as proprietary, and advanced analytical tools to provide UPS with unparalleled flexibility and efficiency that were necessary to meet today's complex needs. PFT alone (excluding ORION savings) is credited with saving 8.5 million gallons of fuel, and reducing the CO_2 emissions by 85,000 metric tons annually. A decade after it was deployed, *InformationWeek* named PFT as one of the "20 Great Ideas to Steal in 2013." PFT combines data from multiple sources.

PFT was explicitly built to support the use of advanced optimization in planning and execution of its P&D operations. The initial route optimization algorithms that were developed by the UPS Operations Research group, though successful in laboratory settings,


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were not easy to implement in practice. UPS went back to the drawing board and had to rethink and relearn everything it had known about creating effective and efficient routes. It had to blend its 108-year-old practices with 21st century technology. ORION was subjected to intensive field testing with increasing number of users for about three years before a decision was made for complete deployment.



The ORION Project at full deployment is estimated to cost $250 million. As of December 2015, ORION has already saved UPS more than $320 million. At full deployment, ORION is expected to save $300–$400 million annually. By reducing the total miles driven it is also supporting the green initiatives of UPS. It is estimated to reduce the fuel consumption annually by 10 million gallons, and CO_2 production by 100,000 metric tons. It should be noted that the cost and fuel savings are in addition to those already achieved by PFT. ORION savings have significantly exceeded the original estimates leading UPS to accelerate its deployment.

Plans are underway to add additional advanced optimization capabilities to other facets of its P&D operations.

Because of its sheer size and scope, Tom Davenport, author of the seminal "Competing on Analytics," considers ORION to be



"… arguably the world's largest operations research project."[1] Its success has attracted widespread attention. It has won a number of industry awards, and has been reported on by the *Wall Street Journal* and several TV shows including NOVA and Bloomberg TV. ORION has become a showcase for what operations research can do.

Organization

UPS

Founded by Jim Casey with a borrowed $100 as a messenger service company in Seattle, Washington, today UPS is a global leader in logistics. It offers a broad portfolio of services that are far different from its messenger service days. Its service portfolio includes everything from manufacturing to warehousing to distribution to repair services. In 2014, its total revenue was $58.2 billion. With 435,000 employees globally, it operates in more than 220 countries and territories. On a typical day, it delivers 18 million packages and documents to its 8.2 million customers and collects packages from 1.6 million customers. Using a fleet of 237 of its own aircrafts and another 302 chartered, it also operates one of the world's largest airlines, serving 728 airports throughout the world.

Today, its activities are wide ranging and international in scope. One may never know that their last set of custom golf clubs were produced by UPS, their laptop was repaired by UPS, and that UPS actually fulfilled the order for their Valentine's Day roses. It is a full service logistics provider that is enabling the global commerce. Jim Casey would probably not recognize UPS today.

[1] Tom Davenport, Analytics 3.0, *Harvard Business Review* December 2013.

U.S. Army Communications-Electronics Command

Bayesian Networks for U.S. Army Electronics Equipment Diagnostic Applications: CECOM Equipment Diagnostic Analysis Tool, Virtual Logistics Assistance Representative

The U.S. Army soldiers faced with conducting combat operations in Afghanistan have numerous logistics challenges. One major challenge is maintaining complex electronic weapons systems and equipment used to conduct operations against the enemy and provide critical life-support functions. On-site technical assistance for power grid optimization and system diagnostics is costly as representatives require transport via helicopter or vehicle convoy and their availability is subject to weather, terrain, altitude, and threat constraints. Another major challenge is reducing fuel consumption and the corresponding need for resupply convoys.

The U.S. Army Communications-Electronics Central Command (CECOM) Training Support Division (TSD) developed CEDAT VLAR (CECOM Equipment Diagnostic Analysis Tool, Virtual Logistics Assistance Representative) to address the on-site needs of soldiers in theater by mitigating knowledge gaps in the operating environment.

CEDAT VLAR has proven to reduce troubleshooting time and increase accuracy. This directly translates into higher equipment availability and significantly reduces the risk for soldiers in combat. CEDAT VLAR helps keep the systems running on which soldiers' lives depend.



Causal Bayesian networks serve as the expert knowledge layer of CEDAT VLAR, which reside within a self-educating and self-optimizing application. CEDAT VLAR has harnessed the power of operations research to develop a suite of expert systems – for probabilistic diagnostics and optimization – and in so doing has breathed new life into Army sustainment processes.

The CEDAT VLAR team developed a set of networks designed to assist in troubleshooting tactical power generators. The greatest initial challenges in this application area was a lack of hard diagnostic data. CECOM does have access to a very robust cadre of experts with years of experience working with soldiers and equipment in combat. The VLAR team developed a formal expert-based knowledge engineering process. The process, characterized by a cyclical implementation of four steps - Define, Structure, Elicit, Verify (DSEV) - has proved a robust and comprehensive framework for building networks from expert knowledge. CEDAT VLAR identified faults in minimum time with near 100% accuracy. It was clear to CECOM that this methodology would have utility for a number of other applications. Demonstrating knowledge-capture across multiple domains with consistent results was critical to the success of future VLAR applications. The total cost savings from personnel reductions alone since 2013 are $20 million per system VLAR, with projected future annual savings of $10 million per system.

The Headquarters Power Optimization pairs loads to generators and turns off unneeded generators, reducing fuel consumption costs and saving lives. CECOM conservatively estimates cost savings in battalion headquarters at $3 million per year across the Army, a 17% reduction in generator fuel consumption. As CECOM implements the optimization at brigade headquarters scale, the team anticipates increased savings as a percentage of fuel consumption due to an exponentially increased solution space. In combat operations, reductions in fuel consumption will reduce the requirement for fuel resupply convoys. This reduction will ultimately save soldiers' lives as the frequency of exposure to ambushes and improvised explosive devices (IEDs) decreases.

CEDAT VLAR is changing the Army's sustainment paradigm by applying knowledge engineering to equipment diagnostics and using advanced optimization techniques on electrical power grids in combat environments via virtualized application of expert knowledge. CEDAT VLAR enables cost savings and avoidance by reducing the Army's logistics footprint: leaner sustainment personnel strategies, optimized fuel consumption, and better repair and supply decisions, all made possible by reducing uncertainty at the tactical edge.





Organizations

CECOM

CECOM is The Critical Link that ensures the global readiness of the complex, networked C4ISR systems and capabilities that provide American joint forces with the advanced information and technology they need to communicate on today's battlefield. CECOM adapts, strengthens, and sustains the critical C4ISR systems that joint warfighters rely on—allowing them to operate, fight, and win anywhere, against any foe, at any moment.

Headquartered at Aberdeen Proving Ground, Md., CECOM is comprised of a dedicated and highly-skilled workforce of approximately 13,000 military, civilian, and contract personnel across five subordinate organizations. The joint expertise of these organizations makes CECOM the 'one-stop shop' for all of the warfighter's C4ISR needs.

Designated a life cycle management command, subordinate to the U.S. Army Materiel Command (AMC), CECOM provides The Critical Link to sustaining C4ISR systems, equipment, and capabilities across the C4ISR domain through providing training; field support for software modifications and software upgrades; logistics expertise; information assurance; joint network capabilities; and interoperability certification functions to ensure the right equipment is in the right place at the right time.

As part of AMC, CECOM is dedicated to providing joint forces with the decisive edge in combat by integrating and sustaining a cutting-edge, global, Army Network that ensures unprecedented levels of visibility and communications-creating a common operating environment across our entire force.

American Trade School

At American Trade School, "the employer is our customer and the student is our product." The company's obligation to industry is to produce a quality product. It is employer-centered and fully committed to giving full attention and effort to the development of students' skills. American Trade School continually seeks educational partnerships with industry and believes that communication between schools and employers is essential for success.





The Wagner Prize



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 1957 in the *Transactions of the American Mathematical Society*. 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 the 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.

2015 Wagner Prize Committee

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

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

2015 Finalists

The final component of the 2015 Wagner Prize competition took place at the INFORMS Annual Meeting in Philadelphia, PA. There, five 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 four finalists:

Integrated Planning of Multitype Locomotive Service Facilities under Location, Routing, and Inventory Considerations

Jing Huang and Kamalesh Somani, CSX Transportation Inc.

Xi Chen, Yanfeng Ouyang, Zhaodong Wang, and Siyang Xie, University of Illinois at Urbana-Champaign

Using Analytics to Enhance Shelf Space Management in a Food Retailer

Teresa Bianchi-Aguiar, Maria Antónia Carravilla, Luis Guimarães, José F. Oliveira, and Else Silva
University of Porto and LTPlabs, INESC TEC & Faculty of Engineering

João Günther Amaral, Sérgio Lapela, and Jorge Liz, Sonae MC

Scheduling Crash Tests at Ford Motor Company

Ellen Barnes, Daniel Reich, and Erica Klampfl, Ford Motor Company

Amy Cohn, Marina Epelman, and Yuhui Shi, University of Michigan

Strategic Redesign of Urban Mail and Parcel Networks at La Poste

Stefan Spinler, WHU–Otto Beisheim School of Management

Alain Roset, La Poste

Matthias Winkenbach, Massachusetts Institute of Technology



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

2015 Winner

The first place winners are Eva Lee and Fan Yuan, Georgia Institute of Technology; Helder Nakaya, Bali Pulendran, and Troy Quere, Emory University; and Bernard Benecke, Greg Burel, and Ferdinand Pietz, Centers for Disease Control and Prevention.

Their paper, "Machine Learning Framework for Predicting Vaccine Immunogenicity," is outstanding work in the development and implementation of a general-purpose machine learning framework, DAMIP, for discovering gene signatures that can predict vaccine immunity and efficacy. The ability to better predict how different individuals will respond to vaccination and to understand what best protects them from infections marks an important advance in developing next-generation vaccines. It facilitates the rapid design and evaluation of new emerging vaccines. It also identifies individuals unlikely to benefit from the vaccine. The project guides the rapid development of better vaccines to fight emerging infections, and improve monitoring for poor responses in the elderly, infants, and those with weakened immune systems. The project's work is expected to help with the design of a universal flu vaccine.

Research.
Discovery.
And insights that transform lives.

We salute 45 years of Edelman Award winners, who continually raise the bar for all of us.

Congratulations to this year's finalists:

360i
360i's Digital Nervous System

BNY Mellon
Transition State and End State Optimization used in the BNY Mellon U.S. Tri-Party Repo Infrastructure Reform Program

Chilean Professional Soccer Association (ANFP)
Operations Research Transforms Scheduling of Chilean Soccer Leagues and South American World Cup Qualifiers

The New York City Police Department (NYPD)
Domain Awareness System (DAS)

UPS
UPS On Road Integrated Optimization and Navigation (Orion) Project

U.S. Army Communications-Electronics Command (CECOM)
Bayesian Networks for U.S. Army Electronics Equipment Diagnostic Applications: CECOM Equipment Diagnostic Analysis Tool, Virtual Logistics Assistance Representative

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Put analytic insights to work for your business

Most enterprises rely on analytic experts to solve their toughest challenges. But to get ahead of the competition, you need to put powerful optimization capabilities in the hands of your business users — so they can deliver value with no friction or delays.



Learn how FICO optimization software can help businesses transform their most complex challenges into smarter, faster, more profitable customer decisions.

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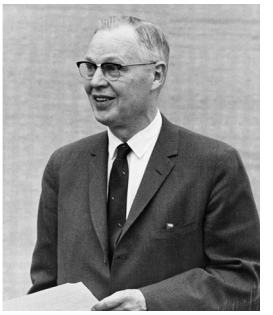
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The UPS George D. Smith Prize



The UPS George D. Smith Prize

A History



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 2016

- H. John Heinz III College, Carnegie Mellon University
- Institute for Advanced Analytics, North Carolina State University
- Operations Research Program, United States Air Force Academy

The UPS George D. Smith Prize is an exciting 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 & 2016 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

2015
Sauder School of Business, University of British Columbia - Center for Operations Excellence

2014
MIT, Leaders for Global Operations

2013
Naval Postgraduate School

2012
University of Michigan, Tauber Institute for Global Operations

2016 UPS George D. Smith Prize Committee

Robin Lougee, Chair, IBM
Terry Harrison, CAP, Penn State University
Stefan Karisch, Boeing Company
Don Kleinmuntz, University of Notre Dame
Ranganath Nuggehalli, CAP, UPS
Georgia Perakis, MIT
Olga Raskina, XPO Logistics
Lawrence Seiford, University of Michigan

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? 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

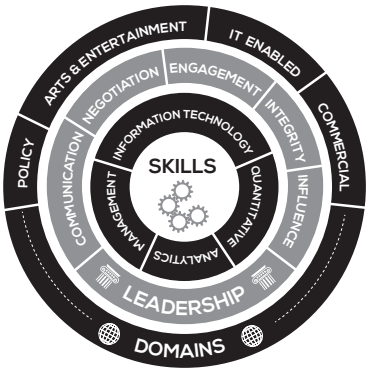
The Heinz College is home to the graduate School of Information Systems and Management and graduate School of Public Policy and Management, a deliberate structure that exists only at Carnegie Mellon University (CMU). This gives us great natural advantages in incorporating cutting-edge technologies and 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 Information Systems and Management and have pursued careers in all sectors of the global economy. Every one of these graduates completed our core curriculum that has always included management science, statistics, economics, data analytics, and information technology coursework. Additionally, these graduates have 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 U.S. Army War College. Experiential learning through required internships and capstone projects with startups, global firms, and government agencies is an important component of the Heinz College experience.

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

Curriculum and meta-curriculum at the Heinz College



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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
IBM
A.T. Kearney
Deloitte
RAND
Motion Picture Assoc. of America
PNC Bank
Symantec



Institute for ADVANCED ANALYTICS

Since 2007 Institute for Advanced Analytics has been preparing data-savvy professionals for leadership in a digital world. Its mission is to produce the world's finest practitioners of analytics—individuals who have mastered complex methods and tools for large-scale data modeling, have a passion for solving challenging problems through teamwork, are guided by intellectual curiosity, honesty, and integrity, and who strive to attain the highest level of professionalism through continuous self-improvement.



Founded at North Carolina State University, the Institute serves as the focal point for interdisciplinary collaboration among faculty from several departments. The Institute's flagship program is the nation's first Master of Science in Analytics (MSA) degree. The MSA is an intensive, full-time, 10-month learning experience with an innovative curriculum developed exclusively for students in the program. Today it is NC State's leading master's degree measured in terms of student outcomes, and its graduates are among the University's most sought-after and highly compensated. The success of the MSA has made it the archetype for scores of other programs across the country.



The MSA prepares students for the challenging task of deriving insights from vast quantities of structured and unstructured data. At the core of the MSA curriculum is the Practicum: a team-based learning experience that gives students the opportunity to conduct real-world analytics projects using data from sponsoring organizations. Past projects now total 110 in number more than with sponsors spanning virtually every industry segment—aerospace, advertising, agriculture, apparel, banking, chemicals, computers, consumer goods, entertainment, energy, financial services, government, healthcare, heavy machinery, information technology, insurance, Internet, lodging, pharmaceuticals, professional sports, publishing, retail merchandising, telecommunications, and transportation—and include some of the world's leading organizations and best known brands.

U. S. AIR FORCE ACADEMY

OPERATIONS RESEARCH PROGRAM

"To educate, train and inspire men and women to become officers of character motivated to lead the United States Air Force in service to our Nation."
- U.S. Air Force Academy Mission

The United States Air Force Academy offers a four-year Bachelor of Science degree in Operations Research (O.R.). Our interdisciplinary O.R. program is jointly administered by four academic departments to leverage the combined strengths of Computer Science, Economics, Management, and Mathematics.

BY THE NUMBERS

Total enrollment of **4,000** cadets

4-year B.S. with **146** total semester hours

50% of all cadets take at least one O.R. course

42 semester hours in the O.R. major

4-5% of all cadets major in O.R.

8:1 student-to-faculty ratio in O.R. major

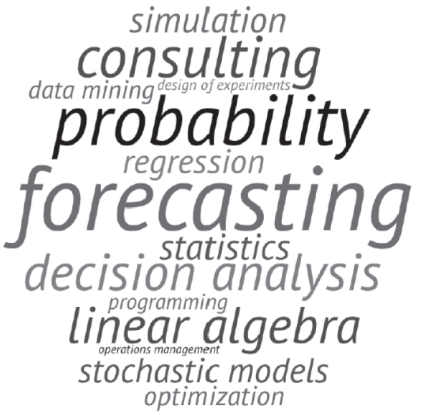
25% of O.R. students are Division I athletes

WORLD CLASS FACULTY

With more than 30 members, our faculty consists of civilian professors, senior military members, and junior military instructors. Civilian military members bring many years of expertise in their respective fields, while nearly all of our military faculty members are operations research analysts who bring recent operational experience to the classroom.

THE LONG BLUE LINE

Our admission standards are among the highest in the nation. Our cadets are challenged with a packed schedule of military training, athletic, and academic obligations. Only the best are able to join our Long Blue Line of graduates, many of which become frontline O.R. practitioners as Air Force analysts.



APPLIED OPERATIONS RESEARCH EXCELLENCE

The secret to the success of our program is an applied senior capstone, where teams of cadets consult for military, corporate, local government, and nonprofit organizations in a year-long analysis project that addresses a real-world problem. The results of these projects have been overwhelmingly positive. Cadets routinely garner awards in competitions at student conferences, the client sponsors rave about the results (and seek to sponsor projects the following year), and the academic outcomes are met.

SELECTION OF RECENT PARTNERS

Military	Corporate	Gov't / Nonprofits
DARPA	Hotel Eleganté	AlloSource
Headquarters Air Force	Lockheed Martin	Colorado Springs Airport
Missile Defense Agency	Sports Authority	Healing Warriors Program
U.S. Northern Command	Walmart	Sandia National Lab

"We are awed by the intelligence and hard work of the Cadets who are placed into a completely new situation while they develop positive outcomes to our business issues. Your students have helped us become a better organization that is able to meet our mission of saving and enhancing lives across the nation."
Thomas Cycyota
President & CEO
AlloSource

For more information: www.usafa.edu/df/dfor
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HAIL TO THE VICTORS

The Tauber Institute for Global Operations congratulates the 2016 UPS George D. Smith Prize finalists.

And we recognize INFORMS and UPS for their unwavering support of innovations in operations research, management science, and analytics.

As an inaugural recipient of the UPS George D. Smith Prize, we proudly welcome this year's winner.



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OH THE THINGS THEY CAN DO!

Isn't it time for **your** Tauber Team?

Learn how our graduate-level engineering and business team projects can benefit your organization with high-impact, high ROI projects.

Submission Deadline
Project proposals are due December 1, 2016 for projects starting in summer 2017. Contact Jon Grice at gricej@umich.edu or (734) 647-2220.

- Lean process design and implementation
- Manufacturing rationalization plan
- Strategic site assessment
- Supply chain implementation plan
- Strategic sourcing plan
- New product/process development strategy
- Product complexity analysis
- Plant floor layout

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The INFORMS Prize



The INFORMS Prize

A History

This is the eighth 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 OR 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

2016 General Motors
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

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.

2016 INFORMS Prize Committee

Julia Morrison, Chair, Marriott International
Hande Benson, Drexel University
Peter Buczkowski, Disney
Bill McDaniel, Johns Hopkins Labs
Doug Meiser, Kroger
Dave Morton, Northwestern University
Tarun Mohan Lal, Mayo Clinic



2016 INFORMS Prize Winner

General Motors

The 2016 INFORMS Prize is awarded to General Motors for reliably using big data and advanced analytics to predict failure of certain automotive components and systems before customers are affected. GM has hundreds of OR/MS practitioners worldwide who play a vital role in driving data-driven decisions in everything from designing, building, selling, and servicing vehicles to purchasing, logistics, and quality. The team is constantly developing new business models and vetting emerging opportunities.

"Over the last seven decades, OR/MS techniques have been used to improve our understanding of everything from prognostics to traffic science and supply chain logistics to manufacturing productivity, product development and vehicle telematics and prognostics," said Gary Smyth, executive director of GM Global R&D Laboratories. "These approaches to problem solving permeate almost everything we do."

For example, industry-first Proactive Alert messages sent to customers through GM's OnStar system cover potential issues with a vehicle's battery, fuel pump, or starter, transforming an emergency repair into planned maintenance. It is a recent case of applying operations research and management science to the most complex issues the company faces.

Another example of management science positively impacting the business is helping GM understand what products and features customers most want to create and price features and option packages that would sell best. That work extends to OR applications that help Chevrolet, Buick, GMC, and Cadillac dealers know how many and which vehicles to stock, and steps they can take to achieve GM's goal of creating customers for life.

The impact OR/MS is now having on the business accelerated in 2007 when GM created a center of expertise for operations research to promote best practices and transfer new technologies. It has since expanded to include partner teams in product development, supply chain, finance, information technology, and others.

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. OR 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 OR 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 OR applications that were used in 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.

INFORMS





About INFORMS

The Institute for Operations Research and the Management Sciences

The Age of Analytics. It's a fascinating moniker that has gained widespread traction to describe this day and age. Indeed, it's an exciting time for the fields of analytics and operations research.

As organizations of all sizes expand their use of analytics and operations research, the demand for well-educated professionals is likewise rapidly increasing. As these professionals grow in their careers, so too do their needs for networking, development, and other services.

With nearly 12,000 members, INFORMS is the leading international association for professionals in analytics and operations research. INFORMS advances research and promotes successful practice in analytics and operations research through an array of highly-cited publications, conferences, competitions, networking communities, and professional development services.

The 2016 Conference on Business Analytics and Operations Research is just one example of the ways that management can engage with analytics by 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 the Analytics Career Fair.

Analytics professionals can turn to INFORMS to obtain the Certified Analytics Professional (CAP®) – the premier global professional certification for analytics practitioners. They can take unique professional development

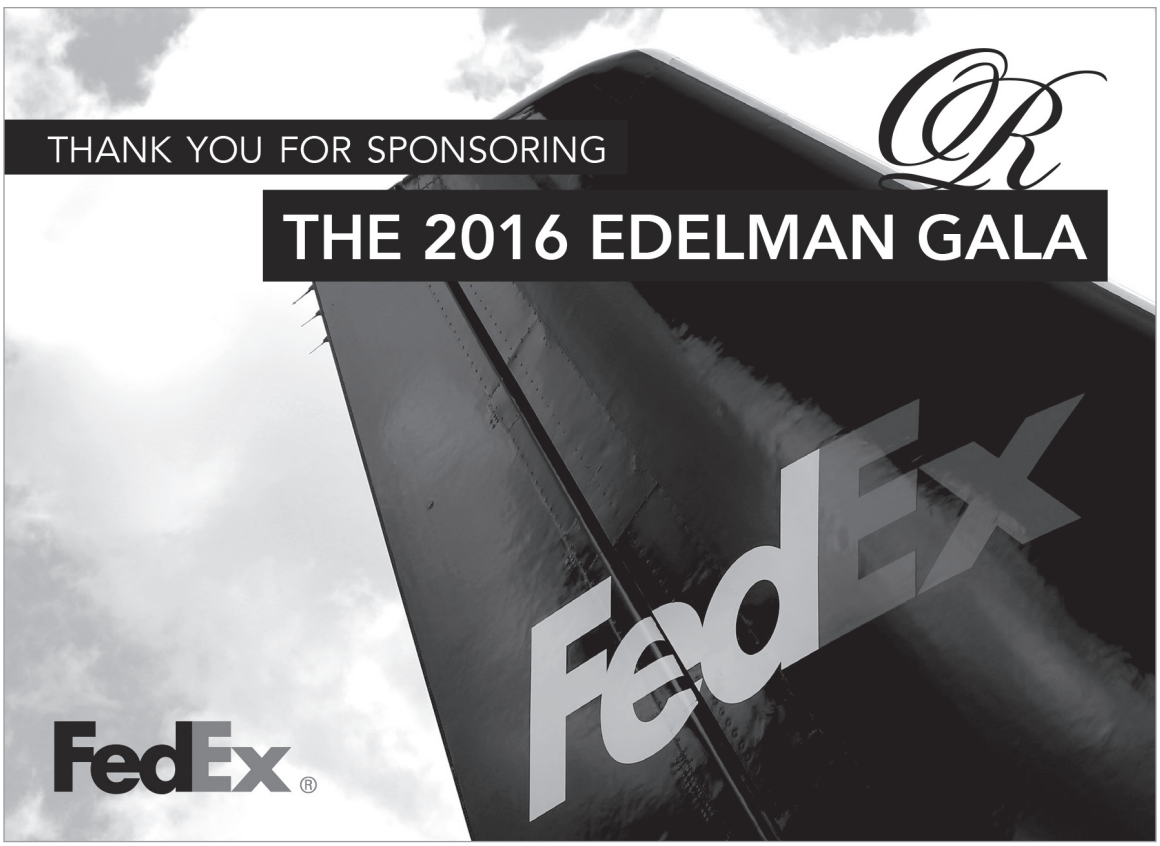
classes, ranging from the technical to soft skills. They can attend a multitude of conferences, join networking communities, and access a number of highly regarded peer-reviewed journals.

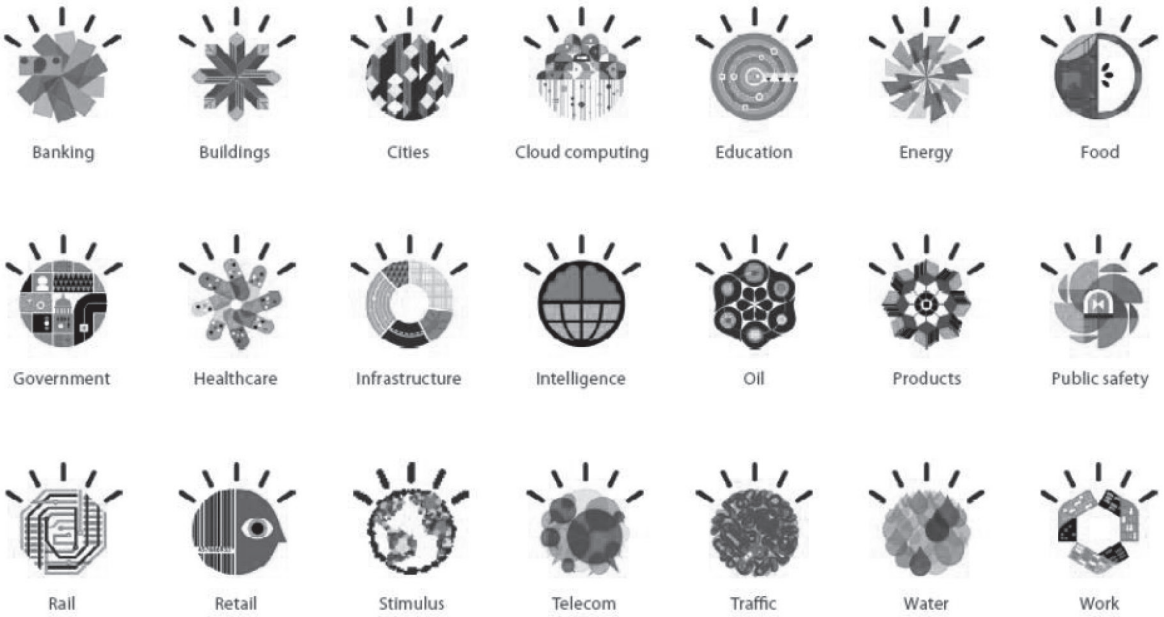
They can leverage a new, comprehensive INFORMS Education Resource Library that shows the best way to cooperate with the many new analytics programs opening in universities. They can access *Analytics* magazine, an online publication geared specifically for analytics professionals and business leaders. And they can join the new Pro Bono Analytics initiative that matches analytics professional volunteers with non-profit organizations that would benefit from advanced analytics and operations research training and techniques.

Importantly, INFORMS offers unparalleled opportunities for practitioners and academics to join together in one organization in ways that foster collaboration across disciplines, specialties, and geographic borders.

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 numerous 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 salutes this year's prize honorees as well as all those who help make operations research, the management sciences, and analytics integral parts of our society and economy.





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Volunteering to Advance the Operations Research Profession through the INFORMS Section on Practice

By R. John Milne, Chair, CPMS: The Practice Section of INFORMS

Tonight we celebrate outstanding achievements in operations research practice. This gala and the competitions for the Edelman Award, the Wagner Prize, and the UPS George D. Smith Prize are all conducted by volunteers of CPMS, the practice section of INFORMS. Details on these competitions are described in this program book.

To better reflect our mission, we are in the process of changing our section's name from CPMS to the INFORMS Section on Practice. Depending on context and usage, our new name may be shortened to the Practice section. Whereas stewardship of the best practices competitions and gala are highlights of our section's work, we also organize a set of presentations at the INFORMS Annual Meeting in the fall and prepare and send bi-annual newsletters to section members.

You may be interested in helping us. Volunteering is a good way to work with like-minded colleagues to advance the practice of operations research, management science, and analytics. I have found these activities to be mind-opening and stimulating. I have repeatedly applied insights from this volunteer work at my paid positions—first for years at IBM and more recently at Clarkson University. The volunteers of our section are an enjoyable set of people with whom to collaborate. Because we work in so many organizations—in industry and academia—we have different perspectives to share and learn from. It is satisfying to contribute to the advancement of our profession by helping to promote and celebrate the best applied work of our profession.

If you are interested in volunteering, please send an email to me at: jmilne@clarkson.edu

Call for 2016 Nominations

THE FRANZ EDELMAN AWARD
Achievement in Operations Research

The purpose of the competition is to recognize and reward outstanding examples of O.R. in practice.

Deeadline to Submit a Paper: Wednesday, October 19, 2016

THE INFORMS PRIZE
Sustained Integration of Operations Research

The INFORMS Prize is awarded for effective integration of advanced analytics and operations research/management sciences (OR/MS) in an organization. The award is given to an organization that has repeatedly applied the principles of advanced analytics and OR/MS in pioneering, varied, novel, and lasting ways.

Deeadline to Submit a Paper: Thursday, December 1, 2016

THE DANIEL H. WAGNER PRIZE
Excellence in Operations Research Practice

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 OR advances.

Deeadline to Submit a Paper: Sunday, May 1, 2016

UPS George D. Smith Prize
Strengthening Ties Between Academia & Industry

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.

Deeadline to Submit a Paper: Monday, October 31, 2016

These prizes will be awarded at the 2017 INFORMS Conference on Business Analytics and Operations Research in Las Vegas

April 2–4, 2017

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