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THE FRANZ EDELMAN AWARD
Achievement in Operations Research

Introduction: 2008 Franz Edelman Award for Achievement in Operations Research and the Management Sciences

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This special issue of *Interfaces* is devoted to the finalists of the 37th annual competition for the Franz Edelman Award for Achievement in Operations Research and the Management Sciences, the profession's prestigious award for the practice of operations research. Of the six entries, one demonstrates the benefits derived from OR/MS-based scheduling for the care of the elderly in Sweden. The second shows dramatic improvement in air traffic management with new weather-system-related policies in the United States. The third shows how to improve network configuration and routing of natural gas in Norway and neighboring countries. The fourth shows how to place contaminant sensors in water sources and its application in the United States. The fifth reflects productivity improvements in print shops and document manufacturing facilities, also in the United States. The final entry shows how OR/MS was used to construct a brand new timetable for the passenger railway system in The Netherlands to account for much higher demand on the system.

Key words: professional: comments on.

It was an honor for us to serve as chair and special editor, respectively, of the 37th annual international competition for the Franz Edelman Award for Achievement in Operations Research and the Management Sciences. This is the fourth decade of a competition that brings together the best in OR practice. Last year's competition was held on April 14, 2008, at the INFORMS Practice Conference in Baltimore, Maryland. The finalists represent a diverse and international group of entries including transportation logistics, supply chain management, environmental protection, air traffic control, and healthcare management.

The six entries cover a wide range of industries, functions, and even countries around the globe, with impacts that make OR/MS truly the "science of better." One entry demonstrates the benefits from OR/MS-based scheduling for the care of the elderly in Sweden. Another entry shows dramatic improvements in air traffic management with new weather-system-related policies in the United States. The third entry shows how to improve network configuration and routing of natural gas in Norway and neighboring countries. Yet another entry shows how to place contaminant sensors in water sources and its application in the United States. The fifth reflects productivity improvements in print shops and document manufacturing facilities, also in the United States. The final entry shows how OR/MS was used to construct a brand new timetable for the passenger railway system in The Netherlands to account for much higher demand on the system.

The common theme in these entries is not only the high-impact practical models the proponents have created, but also the remarkable and diverse ways these proponents have made OR modeling and analysis a part of their organization's strategic thinking and operational practice. Change management is a key component of OR/MS modeling in practice, and the papers in this issue additionally show how to bring about change to achieve the remarkable results these entries represent.

About the Edelman Award Competition

The Franz Edelman Award Competition is jointly sponsored by INFORMS and CPMS, The Practice Section of INFORMS. The purpose of the competition is to draw out and recognize outstanding examples of OR/MS practice. The award is named in honor of Franz Edelman, who established the operations research group at RCA, one of the earliest industrial OR/MS groups in North America. He worked for over 30 years at RCA and is counted among the fathers of innovation in operations research and management science.

The prizes are awarded for implemented work that has had significant, verifiable, and measurable impact. INFORMS presents trophies commemorating the prize to the client organizations that used the finalists' work and presents medals and cash awards to the finalist authors. This year, the prize money totaled $15,000 with $10,000 going to the first-place winner. More important, all finalists have the honor and satisfaction of knowing their work has been recognized by their peers as the best in the profession. In addition to having their efforts described in this special issue of *Interfaces*, all finalists will have their presentations documented in the Edelman DVD series produced by INFORMS and available for sale at http://www.informs.org/Edelman.

The Process

The Edelman Award process takes the better part of a year. It began with a call for abstracts in early September 2007. The number of people supporting the Edelman competition is large, with more than 40 people participating in the finalist selection committee. To name them all would be difficult, but we thank them for making the competition a success. We especially appreciate the hard work of the verifiers, coaches, judges, and the Edelman Award Gala Committee.

Verifiers work behind the scenes to validate the claims made by entrants that the Edelman committee has identified as potential finalists, and to convey this information to the rest of the selection committee. The verifier communicates directly with the entrant's OR team, the users of the work, and client management. Verification is a crucial element of the competition as 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 experienced verifiers. The verifiers this year were Sudhansu Baksi, Peter Bell, Srinivas Bollapragada, Tony Brigandi, Bruce Buckiet, Mary Crissey, Alfred Degbotse, Joe Discenza, Sid Hess, Yoshi Ikura, Chuck McCallum, John Milne, Patricia Neri, Graham Rand, John Raynard, Samik Raychaudhuri, Anne Robinson, Randy Robinson, Doug Samuelson, Leon Schwartz, Stuart Smith, Tom Spencer, Stephen Strauss, Bill Tarantino, and Jack Theurer.

Coaches work with the finalists to advise them throughout the process so that their papers and presentations convey the work in a manner that can be well understood by a general OR audience. This year's coaches did an outstanding job. They were Layek Abdel-Malek, Sudhansu Baksi, Peter Bell, Tony Brigandi, Bruce Buckiet, Sid Hess, Patricia Neri, Graham Rand, Samik Raychaudhuri, Randy Robinson, Doug Samuelson, and Tom Spencer.

Judges study the papers, listen to the presentations, and then discuss the finalists' accomplishments until reaching a decision on which of the finalists best exemplifies the ideals and standards of the Franz Edelman Award for Achievement in Operations Research and the Management Sciences. Relevant factors include the difficulty of the obstacles surmounted and the technical solution and its implementation, as well as impact and value. Srinivas Bollapragada, Jeff Camm, Mary Crissey, Alfred Degbotse, Brian Denton, Graham Rand, Anne Robinson, Bob Smith, and Mohan Sodhi made up the judging panel.

The Banquet

This was the third year that the Edelman finalists were honored at a gala banquet on the evening of the competition in Baltimore. The Edelman Gala Committee comprised Jeff Alden, Gary Bennett, Ann Bixby, Srinivas Bollapragada, Terry Cryan, Russ Labe, Barry List, John Milne, Ranga Nuggehalli, Randy Robinson, Bob Smith, and Steve Strauss. The banquet keynote address was given by Thomas Magnanti, an Edelman Award Laureate and professor of operations research at the Massachusetts Institute of Technology (MIT).

At the banquet, authors of Edelman finalist papers were designated as *Franz Edelman Laureates* and presented with medals in recognition of their achievement. Organizations making major contributions to the work—the organizations consuming and producing the OR—were inducted into the *Franz Edelman Academy*, and high-ranking representatives from these organizations were seated on stage. The culmination of the evening was the announcement of the 2008 first-place team.

The Finalists and the Papers in This Issue

Here is a brief summary of the finalist papers and of the winning paper from Netherlands Railways; please refer to the papers in this issue for details:

City of Stockholm, Sweden: *Operations Research Improves Quality and Efficiency in Home Care*

The elder care systems in many countries are facing increasing costs due to the changing age distribution of the population, with more elderly people in need of support. The system called Laps Care has been used in Swedish home care organizations since 2002. In mid-2007 more than 200 units used Laps Care each day to plan 4,000 staff members in operative staff scheduling and routing. The measured increase in efficiency (besides increased quality) in operations is 10–15 percent. This corresponds to an annual savings of US$30–45 million. It was adopted throughout the City of Stockholm in 2006 and will be rolled out further in 2008–2009. During 2008, the number of units will exceed 1,200 and the number of employees scheduled on a daily basis will be close to 20,000. A conservative estimate for annual savings in 2008 is US$75–105 million.

Federal Aviation Administration: *Reducing Flight Delays Through Better Traffic Management*

The Federal Aviation Administration, in its role of providing air traffic management services, is frequently presented with situations where a large-scale weather system reduces airspace capacity. In June 2006, the FAA deployed a tool known as Airspace Flow Programs. For the first time, this tool gave the FAA the ability to control activity in a congested airspace by issuing ground delays customized for each individual flight. The FAA used this tool 44 times during the summers of 2006 and 2007, and realized a total benefit of approximately $118 million.

StatoilHydro: *Optimizing the Norwegian Natural Gas Production and Transport*

Natural gas is the fastest growing energy source in Europe, and the gas flowing through the offshore pipeline network amounts to approximately 15 percent of European consumption. SINTEF has developed a decision support tool, GassOpt, based on a mathematical programming model, to optimize the network configuration and routing for the main Norwegian shipper of natural gas, StatoilHydro. StatoilHydro estimates the accumulated savings related to its use of GassOpt since its initial deployment to be in the order of US$1.8 billion as of 2008.

US Environmental Protection Agency: *US Environmental Protection Agency Uses Operations Research to Reduce Contamination Risks in Drinking Water*

The US Environmental Protection Agency (EPA) Threat Ensemble Vulnerability Assessment (TEVA) Research Program is developing contamination warning systems to counter contamination threats against water systems. One outcome of this effort is the TEVA Sensor Placement Optimization Tool (TEVA-SPOT), which has been used to design contamination warning systems throughout the United States that reduce potential public health consequences by thousands of lives and potential economic consequences by billions of dollars.

Xerox: *LDP Lean Document Production—O.R.-Enhanced Productivity Improvements for the Printing Industry*

Xerox has invented, tested, and implemented a novel class of productivity improvement offerings, trademarked LDP Lean Document Production® Solutions, for the $100 billion US printing industry. These

have created dramatic productivity and cost improvements for both print shops and document manufacturing facilities. In implementations to date, these offerings promise to improve the productivity of the industry by approximately 20–40 percent.

Netherlands Railways: *The New Dutch Timetable: The OR Revolution*

In December 2006, Netherlands Railways introduced a completely new timetable, designed to facilitate the growth of passenger and freight transport on a highly utilized railway network and to improve the robustness of the timetable to reduce the number of train delays in the operation. The construction of a railway timetable from scratch for about 5,500 daily trains was a complex puzzle. To support this process, operations research techniques were used to generate several timetables, one of which was finally selected and implemented. Furthermore, the costs of a railway operator are mainly determined by the rolling stock and crew schedules. Two innovative OR tools were used to come up with efficient schedules for these two resources. The more efficient resource schedules and the increased number of passengers have already resulted in an annual additional profit of 40 million Euros (US$60 million). It is expected that this will increase to 70 million Euros (US$105 million) in the coming years. However, the benefits of the new timetable for the Dutch society as a whole are much higher: More trains are transporting more passengers on the same railway infrastructure, and all these trains run more on time than ever before.

Conclusion

The Edelman finalists' papers make this special issue of *Interfaces* truly special for both practitioners and academics. Practitioners can benefit in three ways. First, they will find better ways of doing things using OR/MS models in a diverse group of organizations both in the private and in the public sectors. Second, they will find better ways to sell their ideas to others in the organization by pointing out the impact to the organizations adopting OR/MS modeling. Third, they will learn how to bring about change in an organization to the extent the organization conducts its business differently from before, and OR-based modeling, analysis, and results become an integral part of the "culture."

Academics will find validation of the "advanced" models they teach and will be able to demonstrate what can be achieved with OR/MS. They can also discuss with their students the specific change management issues that make all the difference between an application that is potentially useful and one that has realized benefits. The change management issues can include how an application (or a series of applications) was sold, how potential users were convinced, how the application(s) were deployed in multiple locations, and what is different between an IT application that is OR/MS-based and one that is not.

We are happy to report that next year's competition is well under way, and we will be back next year to report on the finalists. Meanwhile, the sky's the limit when it comes to OR/MS application!

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