

MGT 40750 – Quantitative Decision Modeling Spring 2017

Course Introduction

Professor Hong Guo

MGT 40750 – Quantitative Decision Modeling

What is *Quantitative Decision Modeling*?

- **Main Idea** of Quantitative Decision Modeling:
Applying advanced analytical methods to help make better decisions.
- Other related keywords
 - Operations Research
 - Management Sciences
 - Business Analytics
 - Business Intelligence
- [A New View of Analytics and Operations Research](#)
- Resources
 - <http://www.informs.org>
 - <http://www.scienceofbetter.org>

MGT 40750 – Quantitative Decision Modeling

INFORMS® Awards UPS Its 2016 Edelman Prize: The Leading Award in Analytics and Operations Research

ORLANDO, FL, April 11, 2016 – The Institute for Operations Research and the Management Sciences (INFORMS®), the leading association for analytics professionals, announced it has awarded UPS its 2016 Franz Edelman Award for Achievement in Operations Research and the Management Sciences. To win the award, UPS's On-Road Integrated Optimization and Navigation (ORION) project demonstrated how operations research (O.R.) can be used to realize hundreds of millions of dollars in cost savings.

UPS received its Edelman prize this evening at Analytics 2016, (the 2016 INFORMS Conference on Business Analytics & Operations Research), which was held at the Hyatt Regency Grand Cypress in Orlando, Florida. The annual event drew over 1,000 attendees comprised by the leading international professionals in analytics and operations research in the world.

“We are very proud to have won the Franz Edelman Award, which represents the highest levels of performance and sophistication in operations research,” said Mark Wallace, UPS senior vice president of global engineering and sustainability. “This honor recognizes many years, countless resources and teams of people dedicated to deployment of one of the largest operations research projects in the world. ORION will lead to hundreds of millions of dollars in cost savings, reduced fuel usage, and it supports our efforts to strive towards improved sustainability. We thank the judges, our coaches – Randall Robinson and Ananth Iyer - and everyone at INFORMS who have established a program that continues to encourage the analytics and operations research profession to strive for excellence.”

The Franz Edelman competition attests to the contributions of analytics and operations research (O.R.) in the for-profit and non-profit sectors. Since its inception in 1972, cumulative dollar benefits from Edelman finalist projects have reached \$240 billion.

ORION O.R. Project to Save UPS Hundreds of Millions Annually

UPS, the leading logistics provider in the world, and long known for its focus on efficiency improvement, in 2003 first instituted an ambitious effort to modernize its Pickup and Delivery Operations.

This commitment evolved into a suite of systems that are collectively known as Package Flow technologies (PFT), and an advanced optimization system known as On-Road Integrated Optimization and Navigation (ORION).

ORION uses the data foundation of PFT to provide an optimized manifest to its drivers to help them meet the complex demands of providing service with greater efficiency. This is accomplished by building more efficient routes, reducing the miles driven, and reducing vehicle fuel consumption.

More specifically, when fully deployed at the end of 2016 to 55,000 drivers, UPS estimates a reduction of 100 million miles driven annually and a savings of 10 million gallons of fuel per year. Since the circumference of the earth is 24,901 miles at the equator, that amounts to over 4,000 trips around the world per year eliminated.

ORION also contributes to UPS's sustainability efforts by reducing the CO2 emissions by 100,000 metric tons each year. The company expects ORION to save it \$300 to \$400 million annually when fully implemented.

The key for ORION is in use of analytics and operations research to identify and capitalize on the small efficiencies on the front lines, and to use the power of data and heuristics to constantly improve performance.

In day-to-day implementation, ORION takes the guesswork out of finding the most efficient and effective routes and schedules for delivery. Drivers face less pressure to make routing decisions and can instead focus on safety and serving customers. Customers also have greater control, since ORION allows them to use their own computers or smartphones

to postpone or redirect packages with UPS My Choice® to designated UPS Access Point™ locations, offering them greater convenience and security options.

The company considers ORION its foundation for a new generation of advanced planning systems. Because of its sheer size and scope, it has come to be regarded as one of the largest operations research projects in the world.

Franz Edelman Awards Finalists

This year's six finalist organizations for the Edelman Award were:

- 360i for "360is Digital Nervous System"
- BNY Mellon for "Transition State and End State Optimization Used in the BNY Mellon U.S. Tri-Party Repo Infrastructure Reform Program"
- Chilean Professional Soccer Association (ANFP) for "Operations Research Transforms Scheduling of Chilean Soccer Leagues and South American World Cup Qualifiers"
- New York City Police Department (NYPD) for "Domain Awareness System DAS)"
- UPS for "UPS On Road Integrated Optimization and Navigation (Orion) Project"
- U.S. Army Communications-Electronics Command (CECOM) for "Bayesian Networks for U.S. Army Electronics Equipment Diagnostic Applications: CECOM Equipment Diagnostic Analysis Tool, Virtual Logistics Assistance Representative"

Additional information about INFORMS' Franz Edelman Award and Competition can be found at:

<https://www.informs.org/About-INFORMS/News-Room/Press-Releases/2016-Edelman-Finalist-Announcement>

About the Franz Edelman Competition

Each year, INFORMS conducts the Franz Edelman competition, recognizing finalist teams that have improved organizational efficiency, increased profits, brought better products to consumers, helped foster peace negotiations, and saved lives. The purpose of the Franz Edelman competition is to bring forward, recognize and reward outstanding examples of operations research, management science, and advanced analytics in practice around the globe.

About INFORMS

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

More information about INFORMS, analytics, and operations research is available at www.informs.org or @informs.

Course Structure

MGT 40750 – Quantitative Decision Modeling

Simulation

- Process simulation (SimQuick)
- Spreadsheet simulation (@Risk)

Optimization (Solver)

- Linear programming
- Network models
- Integer programming
- Nonlinear programming

MGT 40750 – Quantitative Decision Modeling

A Diversified Set of Examples

- Managing waiting lines at banks, airports, call centers, hospitals
- Inventory management at grocery stores
- Advertising on popular TV shows
- Messaging through mobile network
- Crew scheduling
- Basketball lineup
- Rating college football teams
- Investing for retirement
- Betting strategies in roulette
- Comparing different strategies in hockey
- ...

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Recommended Study Strategies

- Be organized
 - Get a 3-ring binder to hold the color-coded course materials
 - Recommended tabs: course introduction; process simulation; linear programming; network models, integer and nonlinear programming; spreadsheet simulation; assignments; exercises and exams
- Come to classes
 - Actively participate in class activities
 - Target: understand _____ of the course materials through in-class activities

Recommended Study Strategies

- Work with classmates on assignments
 - Working on assignments helps you keep up with the pace of the class.
 - Discussions with classmates deepen understanding.
- Come to office hours
 - If you have specific problems, I can help solve your problems.
 - If you are not sure what the problem is, we can discuss and identify the problem.
 - You are always welcome to come talk to me, about pretty much anything.