

OREM Case Studies

Students attracted to OREM programs typically possess a strong interest and/or background in mathematics and computer science, and yet do not want to spend their careers proving mathematical theorems or narrowing their options to strictly computer programming.

- They are passionate about understanding processes and how to make them more efficient with the power of technology.
- They have a desire and comfort at being the bridge between the 'techies' and business leaders.
- They have an inherent interest to develop their business understanding and use their technical skills to solve the tough problems that arise in the day-to-day operations as well as year-to-year strategic movements of companies.



OREM Senior Project Case Studies

Williams Technologies' Distribution Center Finds a New Home

Williams Technologies Incorporated (WTI) intended to increase customer satisfaction by decreasing cost and time-to-market of its products, namely re-manufactured transmissions. WTI believed this goal could be accomplished with a more efficient shipping system.

Students Erik Wikstrom and Jeff Cate evaluated whether or not to develop this new system in-house then built a transportation model including all primary markets, secondary markets, distribution centers, the production plant, and all combinations of connecting routes. The team determined that a single distribution center that serves all markets should be located in Charlotte, NC to maximize cost and efficiency.



Quest Stabilizes Natural Gas Cost for Non-Contract Employees

Quest guaranteed about 85% of its gas through monthly contracts, while selling the remaining product at the daily price. Quest decided to optimize the process and guarantee a monthly "per sale point." This would require analyzing past production and the historical relationship between Quest's contract prices and the corresponding monthly market prices.

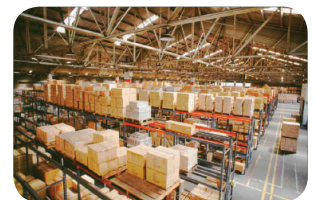
Students John Jarvis, Claudia Johnson, and Liana Vettermodel designed a model that maximized expected profit, enabling Quest to thrive in both rising and falling markets. If the proposed model had been implemented, in one quarter alone, Quest would have realized an additional \$20,400 in profits.



Frito-Lay, Inc. and Sam's Club: The Pick N' Pack Aggregate

Frito-Lay Supply Chain Department sought an improved inventory process to increase in-stock performance at Sam's Clubs, which demand a 99.8% in-stock performance. Challenges included inventory inconsistencies and communication shortfalls. One particular difficulty involved forecasting a new product line, Pick 'N Pack (PNP), with little or no sales data. In addition, PNP shares a UPC across multiple product lines.

Using various data from field studies, Frito-Lay's Order Management System, and Wal-Mart's Retail Link, students Christian Edison, Ashley Mills, and Stephen Rumpler created a forecasting model for PNP that proved to be more accurate than Frito-Lay's existing forecasting model. The results would improve the inventory replenishment process and in-stock performance.



Learn more here: smu.edu/srdesign/



OREM Graduate Student Case Studies

Start-Up Firms Can Maximize Profit with Mathematical Model

The use of optimization techniques in high-tech start-up companies is rarely used, particularly in the early high growth years. Rather than employ a spreadsheet planning method for a three-year business plan, could optimization expand the sales resources of an early-stage company to meet the company's growth requirements?

John Ryan, EMIS doctoral student and entrepreneur who built two startup companies into NASDAQ-traded firms—one grew from \$3 million to \$148 million in five years—determined that an optimized model met 100% of all constraints, where the Excel model missed the gross margin requirement in four quarters and failed achieving the 10% quarterly revenue growth in two quarters. Further, Ryan found that the optimized model could be easily modified to reflect new constraints and extended to a four-year planning horizon.



Fannie Mae Sold on New Graduate's Operations Research

To help evaluate the cost of using vendors vs. internal human resources, minimize credit losses and inventory timelines, and evaluate sales channels, Fannie Mae turned to its MIS business analyst supporting the Real Estate Owned (foreclosed properties) operations.

Desiree Brown, MSOR 2010, Senior Business Analyst/Analytics, drew upon her graduate experience in inventory allocation, process optimization, and consolidated reporting metrics to help her employer operate more efficiently and reduce the number of manual activities that a business user performs each day.



Systems Engineering Management Takes Off at Bell Helicopter

Bell Helicopter-Textron needed to track contracts through the life cycle and identify gaps using a systems approach that would produce metrics to measure cost, schedule, and performance as well as collect "percent completes" on task orders.

Lori Warren, Bell Helicopter-Textron, reports that instead of a rush-to-launch approach she may have employed without her specialized degree, she can now offer her employer high-level planning and communication as well as insight into managing projects with the Earned Value Management systems approach.



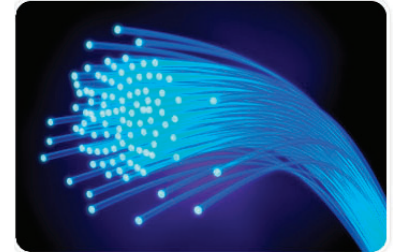
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OREM Faculty Research Case Studies

Survivable Network Design Critical to U.S. Communications

In January 1991, a single fiber-optic cable in the AT&T network was accidentally cut resulting in a 10-hour interruption of 60% of the telecommunications traffic to and from the New York City area on AT&T's long-distance network. In March 2002, a severed cable shut down 911 service in San Diego for over 4 hours. High-speed fiber-optic communications networks are vital to our national economy and defense. The loss of even a single network link can cause a severe service disruption. Fiber-optic networks are usually built so that small numbers of routes, and consequently individual cables, carry high volumes of traffic.



OREM professors Eli Olinick and Jeff Kennington play a leading role in applying state-of-the-art mathematical modeling and optimization techniques to design networks that are survivable, yet cost effective.

Optimized Staffing Levels and Travel Costs Reenergize Dallas Firm

A Dallas-based national energy conservation firm provides training, engineering, and consulting services to organizations in 48 states and schedules nearly 10,000 engagements per year. The firm must match consultant skills and availability with client organization demand in a manner that is cost-effective and minimizes travel time and cost.

Professor Andrew Yu and doctoral student Randy Hoff employed Operations Research techniques that reduced the firm's direct costs by 20% and dramatically cut staffing needs and administrative time required to support scheduling activities.



Smart-Grid Sensor Networks Empower City Planners

Smart meters are the foundation of a smarter energy grid. Similar in size to the standard energy meters in use today, they record real-time energy usage and wirelessly relay that information to the utility. Creating an optimized design for a city's residential network is beyond the capabilities of commercial software.

Professor Richard Barr and doctoral students developed a new method for modeling and quickly solving such large-scale problems. This new approach enables city planners to design smart-grid networks for medium and large municipalities.



Learn about more applications here: www.scienceofbetter.org

