**Speaker:**  Professor Martijn Mes, University of Twente, The Netherlands

**Date:**  Friday, November 1, 2013

**Time:**  10:30 am - 11:30 am

**Location:**  Room 1505

**Title:** Dynamic routing of police helicopters, waste trucks, and container vessels.

**Abstract:** We present three real-life dynamic routing problems, which we solve using a variety of operations research techniques, such as mathematical programming, simulation optimization, and multi-agent technology. We describe the implemented systems and the benefits they have brought.

With respect to the policy helicopters, we describe a decision support application for routing the police helicopters in anticipation of future incidents. These incidents are not known in advance, yet do require a swift response. We propose the use of a forecasting technique, followed by a routing heuristic to maximize the number of incidents where a helicopter provides a successful assist. Through numerical experiments, we show that our application has the potential to improve the success rate of the policy helicopters with a factor nine. With respect to waste trucks, we consider the collection of waste from sensor equipped underground containers. These sensors enable the use of a dynamic collection policy. The problem, which is known as a reverse inventory routing problem, involves decisions regarding routing and container selection. We propose a relatively simple heuristic, consisting of several day dependent parameters, which we tune using simulation optimization. With respect to container vessels, we consider the alignment of barge and terminal operations in the Port of Rotterdam. We propose a distributed multi-agent and service-oriented system architecture, which solves the barge handling problem through information exchange and a decision support system based on intelligent alignment of proposals. To validate...
this solution, we implement it by means of both a system and a management game.

**Bio:** Martijn Mes is an assistant professor within the department Industrial Engineering and Business Information Systems at the University of Twente (Enschede). He holds a master’s degree in Applied Mathematics (2002) and did his PhD at the School of Management and Governance, University of Twente (2008). After finishing his PhD, Martijn visited Princeton University, Department of Operations Research and Financial Engineering, where he did research on the topics of Ranking and Selection (R&S), Bayesian Global Optimization (BGO), and Optimal Learning. In general, Martijn's research involves healthcare logistics, multi-agent systems (MAS), pricing and auctions in freight transport, dynamic vehicle routing problems (VRP & DVRP), ranking and selection problems (R&S), optimal learning, approximate dynamic programming (ADP), simulation optimization, discrete-event simulation, and simulation of logistics and healthcare systems. Martijn participated in various research and implementation projects (national as well as European) on the topics of sustainable logistics, city distribution, healthcare logistics, port logistics, and intermodal transport.

**Papers related to this seminar:**
