



## Séminaire du CIRRELT Seminar

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### HANDS-ON CHOICE-BASED OPTIMIZATION - THE MERGER OF DISCRETE CHOICE ANALYSIS AND OPERATIONS RESEARCH

**Abstract:** Demand is an important quantity in many optimization problems, such as revenue management and supply chain management, for example. While some part of the literature considers demand as deterministic some reference assume demand to be stochastic. However, beyond stochasticity, demand usually depends on "supply" (price and availability of products, for example) which in turn is decided on in the optimization model. Hence, demand is endogenous to the optimization problem. Apart from revenue management and assortment optimization, most reference neglect demand endogeneity. Further, we often find aggregate demand models in optimization models. Choice-based optimization (CBO) is about to overcome these shortcomings. CBO merges discrete choice models with linear (mixed integer) programs. Discrete choice models (DCM) are matured in analyzing and predicting individual demand (i.e., disaggregate demand). These models are theoretically sound (based on utility maximization) and flexible. They are applied by both - practitioners and researchers - for more than four decades in various fields like transport, marketing and consumer research, energy, and health care, for example. At its heart, DCM describe the choice probabilities of individuals selecting an alternative from a set of available alternatives (smart phones, for example). CBO determines (i) the availability of the alternatives (alternative selection problem) and/or (ii) the attributes of the alternatives (attribute problem), i.e., the decision variables determine the availability of alternatives and/or the shape of the attributes. As such CBO decisions determine demand derived from choice probabilities. Unfortunately, DCM come at the cost of high non-linearity and sometimes even non-closed form of the choice probabilities. In this seminar, we discuss various approaches to deal with these issues (non-linearity and non-closed form). We present CBO applications to location planning, supply chain management, product portfolio planning, and revenue management. We provide an outlook for future research - and collaboration - to further develop the field of choice-based optimization.

**Bio:** Sven Müller holds the position of associate professor for Transport Business Economics in the Department of Transport Systems Management at University of Applied Sciences Karlsruhe, Germany. Prior he was assistant professor in the Hamburg Business School (Germany). He received his master's degree in Economic Geography from RWTH Aachen University (Germany) and a PhD in Transport Economics and Logistics from Dresden University of Technology, Germany. Dr. Müller's research interests cover data analysis / statistics and operations research / optimization. In particular, he works on the merger of discrete choice analysis, linear and integer programming, and simulation. His research is applied to transport, logistics, energy, retail, and health care.

MERCREDI / WEDNESDAY

21 juin 2017 /  
June 21st, 2017  
10h30

Salle / Room 5441  
Pavillon André-Aisenstadt  
Université de Montréal

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Organisateur / Organizer  
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