



# Séminaire conjoint CIRRELT, MobilOpt et La section étudiante de la SCRO

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## Dynamic Stochastic Parcel Locker assignment with uncertain pick-up times



Faculty of Business Administration  
MobilOpt: Mobility Optimization



CORS-SCRO  
Canadian Operational Research Society  
Société canadienne de recherche opérationnelle

**Abstract:** Automated parcel lockers are used by logistics providers to increase the efficiency of last-mile delivery operations in urban areas. Since locker capacity is a scarce resource, demand management and order allocation are crucial to the smooth functioning of the locker-based delivery system. The decision problem becomes even more complex because customers' pick-up times are uncertain, which affects the capacity available on the following days. To effectively solve this problem, an ML-based approach is proposed. It uses a decision-focused IP-based classification model that learns from oracle solutions derived from historical data or from simulated scenarios, and predicts whether an order should be accepted or rejected. The results show excellent performance of the proposed framework, which outperforms state-of-the-art methods, including decision trees, smart-predict-then-optimize (SPO+), look-up tables, scenario sampling, and deterministic policies. Additionally, we investigate the case of decision-dependent pick-up times, in which pick-up times are influenced by the order allocation (the farther the locker, the higher the probability that pick-up time would be high). We discuss how ML classification approaches can be exploited in this context and present a combined ML and scenario sampling technique that obtained excellent results. We will discuss a case study based on real instances from Amazon.

**Short biography:** Simona Mancini is Associate Professor of Operations Research at the University of Palermo since 2022 and external lecturer in Operations Management and Logistics at the University of Klagenfurt since 2021. Since 2022, she serves as Associate Editor of Expert Systems with Applications. She is a member of the scientific committee of the conferences TRISTAN 2022 and TRISTAN 2025. She is the author of more than 40 papers on scientific journals and more than 50 presentations at international conferences. Her research includes optimization of logistics systems with a particular focus on last-mile delivery, combinatorial optimization and matheuristics.

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Meeting ID: 665 8855 5393

Passcode: 759596

MARDI / TUESDAY  
5 MAI / MAY 5TH  
10h30

Université Laval  
Pavillon Palasis-Prince  
Salle / Room 1307

Ouvert à tous / Open to all  
Café et viennoiseries

Responsable / Organizer:  
Maryam Darvish