Last Mile Workshop 2026
University of the Bundeswehr Munich
25-26 June 2026

Workshop Location

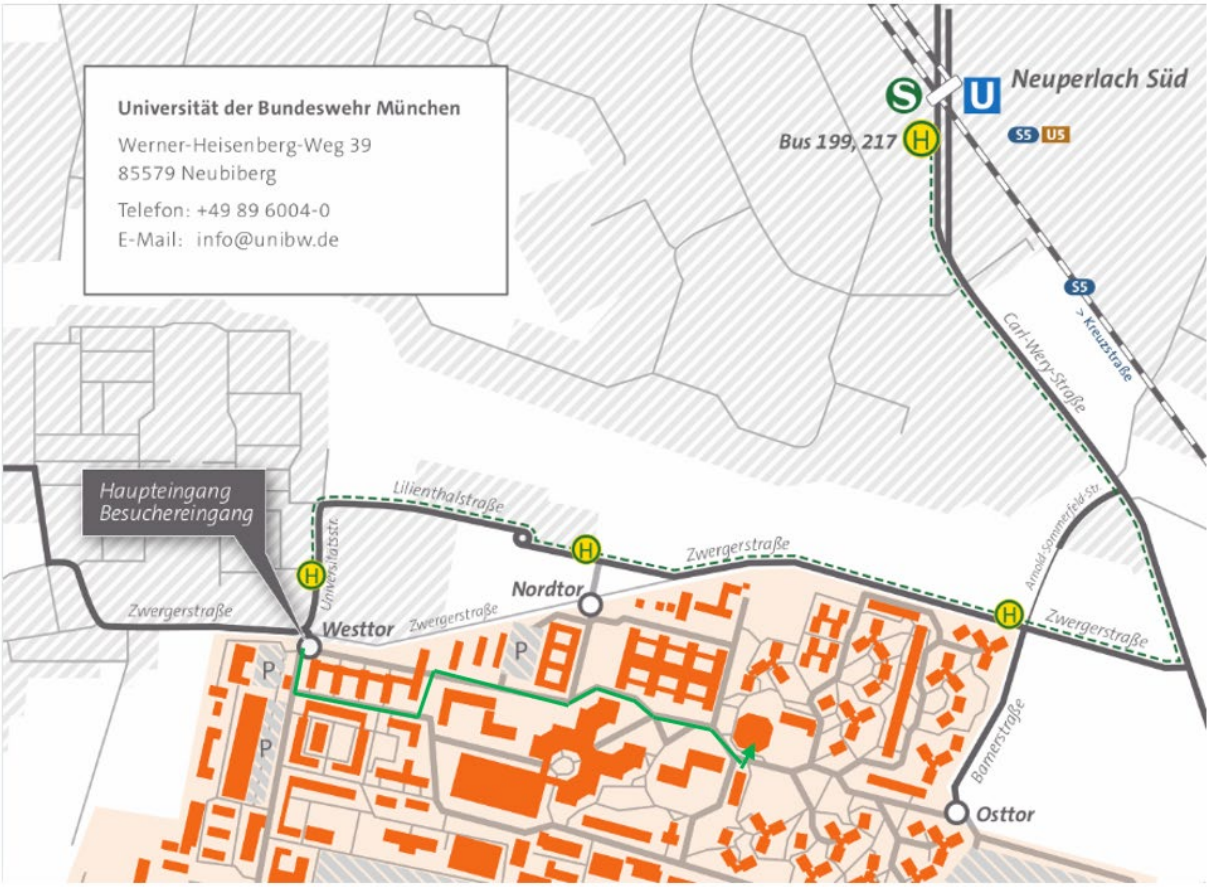
The workshop will take place on 25 and 26 June at the University of the Bundeswehr Munich.

All academic programme will take place at the “Founders Market” in Building 30. You will need to enter the campus via the main gate (“Westtor” on the map below). The way from the gate to the Founders Market is marked in green on the map. You can also see the bus stops of lines 199 and 217, both starting at the subway station Neuperlach Süd, bound for Unterhaching or Campeon. The stop closest to the main gate is called Universitätsstraße (3rd stop, approx. 6 minutes on the bus).

Please note that **you will be required to present a valid ID** at the main gate.

To travel to the social event on Thursday evening we will use public transportation, so you may want to consider purchasing a day ticket when planning your trip to campus or your hotel.

There will be enough time for you to check in at your hotel between the last presentation and the social event on Thursday.



Workshop Organisation

Presentations

Each speaker will be given a time window of 25 minutes in total. The speakers are asked to prepare a talk in English of about 20 minutes, leaving 5 minutes for short questions.

The corner discussions at the end of each session provide an opportunity for in-depth discussions of the session's talks in small groups. The speakers are encouraged to bring a selection of their slides in printed form for the corner discussions.

WiFi Access

WiFi access will be provided on campus.

Dinner Location

Der Andechser am Dom
Fauenplatz 7
80333 Müchen
Andechser am Dom - die himmlische Wirtschaft - Google Maps

Workshop Schedule

Thursday, 25 June

13:00 – 13:15	**Welcome and Introductions**
	Practice Session
13:15 – 14:00	**Oliver Klug** *(Lieferando Deutschland)*
14:00 – 14:10	**Group Picture**
14:10 – 14:25	**Coffee Break**
	Session 1
14:25 – 14:50	**Tom Bormann** *(University of Vienna)* Modeling Complex Customer Preferences in Routing and Scheduling Problems
14:50 – 15:15	**Jan Strackbein** *(University of Mannheim)* Capacity expansion in online grocery retail
15:15 – 15:40	**Gustavo Hurovich** *(Erasmus University Rotterdam)* Fast Approaches for Interactive Time Slotting
15:40 – 16:00	Corner Discussions
16:00 – 18:00	**Commute to City Centre**
18:00 – 19:30	**Guided Tour through Old Town Munich** Starting at Marienplatz
From 19:30	**Conference Dinner** Restaurant: Andechser am Dom

Friday, 26 June

	Session 2
08:45 – 09:10	**Kilian Hein** *(University of the Bundeswehr Munich)* Delivery Profiles in Attended Home Delivery: Integrating Demand Management and Vehicle Routing Problems with Delivery Options
09:10 – 09:35	**Daniela Sailer** *(University of Augsburg)* Dynamic Demand Management for Probabilistic Out-of-Home Delivery Options
09:35 – 10:00	**Phuc Nguyen** *(Otto von Guericke University of Magdeburg)* Demand management for attended home delivery with concurrent customer interactions
10:00 – 10:20	Corner Discussions
10:20 – 10:35	**Coffee Break**
	Session 3
10:35 – 11:00	**Alicia Hamann** *(WHU – Otto Beisheim School of Management)* Assortment optimization under dynamic switching and replenishment costs
11:00 – 11:25	**Katrin Waßmuth** *(University of the Bundeswehr Munich)* Time Window Assortment Design with Stochastic Demand: The Value of Overlapping Time Windows
11:25 – 11:45	Corner Discussions
11:45 – 12:00	**Workshop Debrief + Departure**

Abstracts

Modeling Complex Customer Preferences in Routing and Scheduling Problems

Speaker: **Tom Bormann** *(University of Vienna)*

Effective routing and scheduling in transportation logistics requires decision models that adequately reflect customer preferences. In the literature on Vehicle Routing Problems (VRPs), customer preferences are often reduced to hard or soft time windows, thereby oversimplifying real-world preferences for service start times. This study extends existing approaches by explicitly modeling complex customer preferences, which are subsequently translated into customer dissatisfaction via piecewise linear penalty functions. Customer preferences are captured through a three-stage, star-rating-based survey that allows customers to express time-related preferences in a natural language–based manner. To account for behavioral effects, loss aversion from prospect theory is incorporated, capturing the asymmetric progression of dissatisfaction around preferred service start times. To avoid solutions that disregard operational sustainability, driver workload is considered as a counterbalancing objective, modeled as a function of total working time, including waiting times and delayed tour starts. The problem is formulated as a Traveling Salesman Problem with General Time Windows (TSPGTW) and solved using a dynamic programming algorithm within a bi-objective optimization framework. Numerical experiments demonstrate that increasing the granularity of customer preference information substantially affects routing and scheduling decisions and exposes meaningful trade-offs between preference-driven service quality and driver workload.

Capacity expansion in online grocery retail

Speaker: **Jan Strackbein** *(University of Mannheim)*

Home grocery delivery faces persistent profitability challenges. Efficient scaling is critical, yet expanding into new service regions requires time to grow demand and achieve economies of scale. We develop a budget-constrained capacity expansion model for retailers navigating demand growth across multiple service regions, capturing strategic trade-offs in allocating investments within and between regions. Our numerical experiments assess the conditions for retailers to achieve profitability.

Fast Approaches for Interactive Time Slotting

Speaker: **Gustavo Hurovich** *(Erasmus University Rotterdam)*

In attended home delivery, customers usually select delivery time slots at ordering time. After demand is realized, routes are planned and carried out. However, there is often an opportunity window between route planning and delivery execution in which planners can interact with selected customers and offer alternative time slots (potentially with incentives) to improve routing efficiency. We formalize this as the Time Slot Adjustment Problem (TSAP). The challenge is to decide which customers to approach, when, and what alternative time slots to offer. A central difficulty is that the impact of adjustments is non-additive: benefits from a set of acceptances cannot be derived from individual ones, some adjustments reinforce each other, others become redundant, and the benefits can even cancel each other out. On top of that, uncertainty over customer acceptance leads to an exponential number of acceptance realizations to evaluate for each single decision.

We approach the TSAP from two complementary angles: a forward perspective and a reverse one. In the former, we analyze single-customer and pairwise adjustment benefits and interactions via time window relaxation and ML+OR approximations to guide offer selection. The second approach takes a route-first perspective, establishing target (currently infeasible) routes and considering the time slot adjustments that would make such routes feasible. In both cases, approximate algorithms are proposed to deal with the difficulty of the problem, in one case to generate candidate adjustments and in the other to generate target routes.

Delivery Profiles in Attended Home Delivery: Integrating Demand Management and Vehicle Routing Problems with Delivery Options

Speaker: **Kilian Hein** *(University of the Bundeswehr Munich)*

In attended home delivery, customers have to be present to receive their delivery in person. We analyze a setting where after all customers are known to the provider with their respective delivery location and time slot, the provider offers sets of delivery options to all customers for a discount. We call these sets delivery profiles. Customers choose profiles according to a discrete choice model. We introduce this delivery profile pricing problem as part of the integrated demand management and vehicle routing problem literature. Methodologically, we formulate a two-stage stochastic programming model for this problem. Our numerical study shows that our approach can reduce operational costs for the provider compared to classical attended home delivery without delivery profiles.

Dynamic Demand Management for Probabilistic Out-of-Home Delivery Options

Speaker: **Daniela Sailer** *(University of Augsburg)*

Out-of-home delivery networks are rapidly expanding, leading to a growing number of parcel lockers and parcel shops. While lockers provide 24/7 access, their capacity is strictly limited by the number of compartments. If all compatible compartments are occupied, providers typically redirect parcels to alternative facilities. In this work, we explicitly quantify this risk by framing lockers as probabilistic products. More specifically, we dynamically display delivery probabilities to each incoming request. Notably, the provider can either report truthful probabilities or manipulate the offer set to guide customers' choices and maximize customer welfare. To investigate both strategies, we design a novel choice model and formulate a recursive equation for the truthful probabilities. In our solution methodology, we tackle the curses of dimensionality by training an approximation of the latter with a modified deep Q-learning algorithm and embed it in dynamic assortment optimization problems.

Demand management for attended home delivery with concurrent customer interactions

Speaker: **Phuc Nguyen** *(Otto von Guericke University of Magdeburg)*

Attended home delivery (AHD) is a type of delivery in which a service provider and customers agree on when and where the services happen. The topic gains more attentions especially since COVID-19, and does not appear to subside. Demand management in AHD is the coordination between the order capture phase when the customers place their orders on an online platform and the order delivery phase when the delivery routes are planned so that the profit is maximized regarding the efficiency of the vehicle fleet. When customers enter a platform to order, it is highly probable that concurrency happen, which means that a customer arrives while another customer arriving before is placing an order and has not checked out. Few studies consider this concurrent customer interactions in the problem settings in literature, although they have an effect on the routing outcomes. Our research models the problem of demand management for AHD with concurrent customer interactions as a Markov Decision Process, which focuses on time slot offering decisions in order capture phase and solving the team orienteering problem with time windows (TOPTW) in the order delivery phase. The TOPTW solution, which is solved by Hexaly Solver, in the order delivery phase serves as the reward obtained as the result of the time slot offering decisions in the order capture phase. Value function approximation (VFA) are compared against two benchmark policies (greedy offering and area division offering). In greedy offering policy, all available time slots are offered to all customers regardless of their locations. In area division offering policy, predefined time slots associated with customers locations are offered. In VFA policy, an artificial neural network (ANN) is trained to learn the values of the post-decision states through input features, which include temporal, spatial, and concurrency information from decision state. The training process is conducted via offline simulation episodes following off-policy

Monte Carlo mechanism. The results show that VFA outperforms greedy offering and area division offering.

Assortment optimization under dynamic switching and replenishment costs

Speaker: **Alicia Hamann** *(WHU – Otto Beisheim School of Management)*

We study dynamic assortment optimization for retail formats where assortment changes and replenishment incur revenue losses from service downtime, motivated by emerging mobile retail formats such as store-hailing. Unlike existing models assuming frictionless adjustments, we explicitly capture time- and assortment-dependent switching costs in a MILP that jointly optimizes assortment selection, replenishment, and switch timing. A two-stage heuristic achieves near-optimal solutions at reduced computational cost. Simulations show that anticipating switching costs is critical — naïve dynamic policies ignoring downtime can underperform even static baselines — and that value stems from switching smarter, not more frequently.

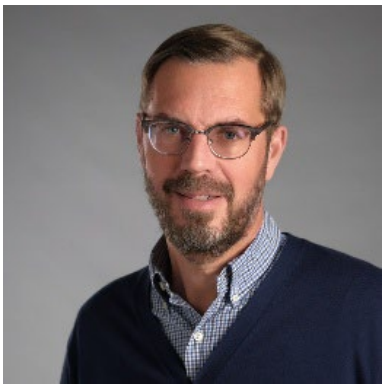
Time Window Assortment Design with Stochastic Demand: The Value of Overlapping Time Windows

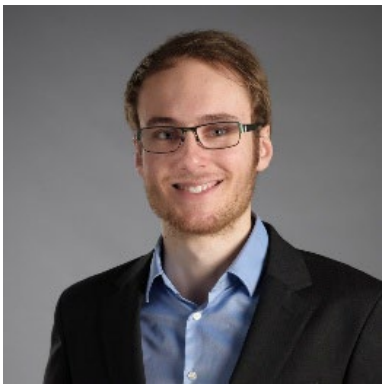
Speaker: **Katrin Waßmuth** *(University of the Bundeswehr Munich)*

Online grocery services require customers to be present at delivery, making the design of time window assortments, including choices between many or few, long or short, overlapping or non-overlapping options, an important task. Although interest in time window assortment design is growing, the value of overlapping windows remains insufficiently understood. Building on an established model that links time window assortments to demand and delivery efficiency, we extend the framework to capture demand variability across windows. Specifically, we examine how overlapping time windows can mitigate inefficiencies caused by demand peaks. We analytically derive ex-post necessary and sufficient conditions under which overlapping time windows reduce delivery costs relative to consecutive ones, and complement this with an ex-ante Monte Carlo simulation. Our findings advance understanding of how overlapping time windows influence delivery efficiency and identify the operational conditions and demand patterns under which their use is most beneficial.

Participants

University of Augsburg


Robert Klein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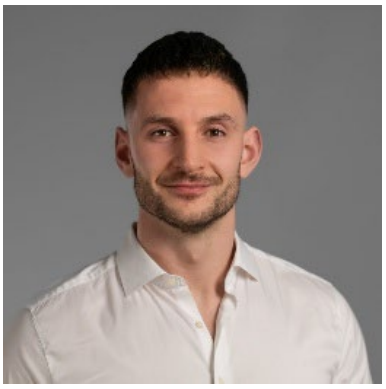
Daniela Sailer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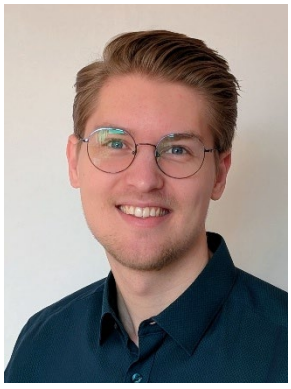
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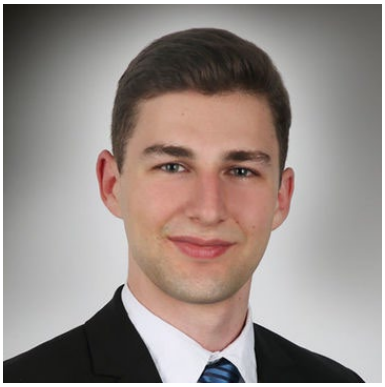
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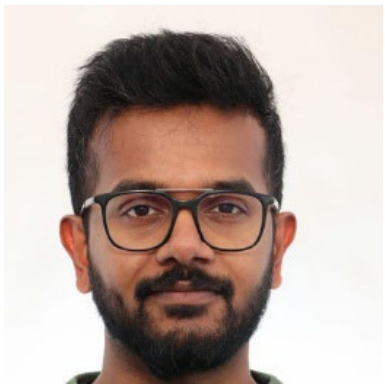
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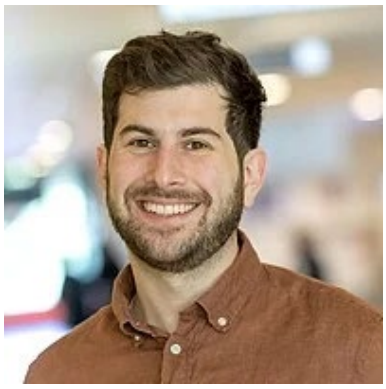
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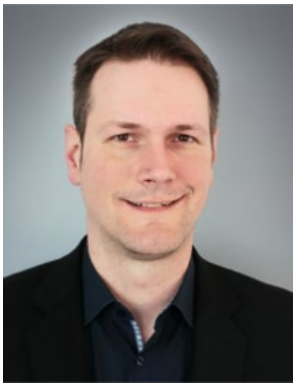
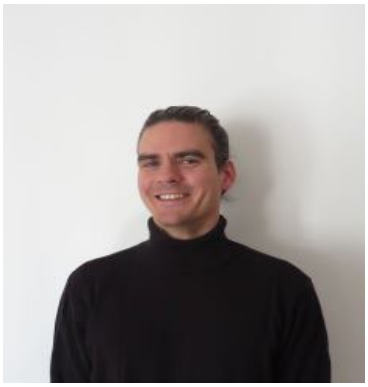

Jan Fabian Ehmke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Lisa Nechwatal