Last-Mile Delivery Workshop 2018

June 14-15

Erasmus University Rotterdam

General information

Location:

The workshop takes place at the Erasmus University Rotterdam, Campus Woudestein, see also https://www.eur.nl/en/campus. A map of the campus is provided on the next page. The visiting address is:

> Campus Woudestein
> Burgemeester Oudlaan 50
> 3062 PA, Rotterdam, the Netherlands

All sessions take place in:

> **The Tinbergen building, floor 10, room 27 (the linear motel)**.

Presentations:

All presentations are scheduled for 40 minutes, with the exception of one talk. The speakers are asked to prepare a talk of roughly 25 minutes, leaving ample room for questions and discussion. The only exception is the talk by Joydeep Paul in session 4, which is scheduled for 30 minutes, i.e., a talk of 20 minutes and 10 minutes of questions and discussion. The language is English.

A computer and beamer are present, as well as a pointer. Powerpoint and adobe acrobat reader are available on this computer, as well as internet access. Please bring your presentation with you on a USB drive. If desired, it is also possible to use your own laptop.

Dinner:

Dinner will take place at restaurant "De Tuin van de Vier Windstreken". The address is

> Restaurant "De tuin van de Vier Windstreken"
> Plaszoom 354
> 3062 CL Rotterdam

The restaurant is located at the lake "Kralingse plas" in the park "Kralinsge bos". It is a 2 kilometre walk from the university.

Phone numbers:

Secretaries office Econometric Institute
> (+31)10-4081264

University emergency number
> (+31)10-4081100

General Emergency number
> 112

Map campus Woudestein

N
1 minute

| | A | B | C | D | E | F | G |

Metro

Tennis courts

Collegelaan

G Building

F Building

Theil Building

Library

Mr. Dr. K.P. van der Mandeleplein

Tinbergen Building

Q Building

Erasmus Building

P Building

Sports Centre

N Building

Bicycle parking

E Building

Erasmus Pavilion

Hatta Building

Plaza →

← Plaza
(Opens April 15 2016)

Erasmus Plaza

Erasmus Plaza

Polak Building

Food plaza

Sanders Building

W Building

Bus

V Building

Tinbergen Plaza

Mandeville

Bayle Building

Hogeschoollaan

Van der Goot Building

Mandeville Building

Thomas Morelaan

Hogeschool Rotterdam

Mandeville

Institutenlaan

Sportlaan

Kralingse Zoom

Legend

Bus	Pay station	Tennis courts	Graduates
Metro	Bicycle parking	Library	Road
Tram	Information	Food & drinks	Buildings
Parking	Sports Centre	Shops	Footpaths

Water

Under construction

Main entrance

Emergency: +31 10 408 11 00

Erasmus University Rotterdam
Make it happen.

Program

Thursday June 14:

12:00-13:00 **Walk-in**
Lunch available

13:00-13:20 **Welcome**

13:20-14:40 **Session 1:**

Tino Henke
An analysis of innovative urban delivery approaches

Thomas Visser
A Priori Routing for Time Slot Management in Online Grocery Retailing

15:00-16:20 **Session 2:**

Alp Arslan
Splitting pickup and delivery tasks in a same-day personal shopper service

Artur Ansmann
Same-Day Delivery for Online Grocery Shopping

16:40-18:00 **Session 3:**

Marlin Ulmer
Dynamic Pricing for Same-Day Delivery

Magdalena Lang
Anticipative Dynamic Slotting for Attended Deliveries

19:00 **Dinner**

Friday June 15:

8:30-10:20 **Session 4:**

Joydeep Paul
The future of online grocery – an operational perspective

Sebastian Koch
Incentive Optimization in Urban Logistics

Mathijs van Zon
Cost allocation in Collaborative Vehicle Routing

10:20-11:00 **Campus tour**
Group photo

11:00-12:00 **Discussion session:**

Last-mile delivery in practice
By representatives of AH.nl

12:00-13:00 **Walk-out**
Lunch available

Abstracts

Session 1:

Tino Henke
An analysis of innovative urban delivery approaches

Especially during the last two decades, increasing urbanization and e-commerce have resulted in a substantially growing amount of urban freight transportation. Simultaneously, customers have become more demanding with respect to cost, fulfillment speed, and delivery tracking, while municipalities have introduced stricter environmental regulations. As a consequence and supported by an increasing data availability, many innovative delivery approaches have been proposed in recent years in order to handle these new developments and requirements. Examples include pick-up stations, delivery drones, crowdshipping, and the usage of existing mobility infrastructure.
This talk gives an overview of innovative delivery approaches and evaluates them according to efficiency, customer friendliness, coordination effort, sustainability, and reliability. The aim of this analysis is to identify promising approaches and research gaps, especially with respect to optimization of last-mile deliveries.

Thomas Visser
A Priori Routing for Time Slot Management in Online Grocery Retailing

We consider an emerging strategy for offering and managing time slots for home grocery delivery: a set of routes is generated a priori and customers are assigned a time slot based on their home location and these routes. In such an environments, customers may only be offered a few time slot choices per week, but it greatly simplifies operations for the retailer (time slot management and routing). We develop a two-stage stochastic programming approach for designing a set of a priori routes and time slot assignments to be used in such an environment. Also, we investigate some simple heuristic approaches for obtaining time slot assignments for given a priori routes.

Session 2:

Alp Arslan
Splitting pickup and delivery tasks in a same-day personal shopper service

We consider a same-day personal shopper service that receives customer delivery requests that require pickups at one or more stores. All requests that can be served in their requested time window are accepted. We study the benefits of splitting a single customer request into various delivery tasks served by different shoppers to improve the percentage of customers served throughout the day.

<u>Artur Ansmann</u>
Same-Day Delivery for Online Grocery Shopping

In this talk, we present a model and a heuristic solution method for the problem imposed by providing Same-Day Delivery services for online grocery shopping. The groceries for each order are picked in conventional brick-and-mortar stores (in-store picking) serving as depots and are delivered to the customers by a fleet of vehicles. Due to timeliness of orders and the small workforce capacities of the depots, not only routing of the vehicle fleet but also scheduling the personnel for picking the groceries affects the service fulfillment process. Thus, we consider the integrated problem of scheduling of picking and routing of deliveries. We evaluate our proposed approach on the basis of a simulation study.

Session 3:

<u>Marlin Ulmer</u>
Dynamic Pricing for Same-Day Delivery

In this talk, we present dynamic pricing and routing heuristics for dynamic same-day delivery. In our problem, customers request same-day delivery during the day and can choose between different delivery deadlines. These deadlines have different (dynamic) prices. We model the corresponding dynamic pricing and routing problem as Markov decision process. We present an anticipatory pricing and routing heuristic based on approximated opportunity costs. To approximate the opportunity costs for every state and delivery option, we develop a value function approximation based on state space aggregation. Our policy substantially outperforms conventional temporal, geographical, or fixed pricing policies and allows a higher revenue as well as an increase in same-day services.

<u>Magdalena Lang</u>
Anticipative Dynamic Slotting for Attended Deliveries

Attended home delivery services face challenges like high delivery cost and heterogeneous demand for delivery time slots. They can apply dynamic slotting, which is controlling the time slots offered to individual order requests in order to maximize overall profit under limited delivery resources. An effective control decision on customer arrival requires to anticipate an order's impact on future acceptable demand and final delivery routes. To allow fast decision making, we present a new dynamic slotting approach that prepares comprehensive information for the dynamic decision in advance of the actual ordering process. A computational study demonstrates its effectiveness on various problem scenarios.

Session 4:

Joydeep Paul
The future of online grocery – an operational perspective

Although the online grocery market has grown substantially over the last decade, it is still unclear if the home delivery of groceries will be profitable in the long run. While customers demand short service lead-times and narrow delivery time windows, they also expect low delivery fees. In this study, we model the competition between online grocery and traditional store-based grocery. We focus on determining the optimal prices for both channels taking into account the impact on the market shares and the economies of scale in the operational costs.

Sebastian Koch
Incentive Optimization in Urban Logistics

In this talk, I give an overview of my (current and future) research on incentive optimization in urban logistics. First, I consider attended home delivery, that is, the delivery of goods or services to customers in appointed service time windows. In this context, I present a route-based approximate dynamic programming approach for dynamic pricing in order to influence the customers' choice behavior regarding their time window selection. Then, the focus is on crowdsourced delivery where private suppliers are hired on a job basis instead of using professional workers to ship goods. In this context, I give an outlook on possible approaches for incentivizing the private suppliers' choice behavior regarding possible delivery options.

Mathijs van Zon
Cost allocation in Collaborative Vehicle Routing

We consider cost allocation in Collaborative Vehicle Routing. To this end we define a new Vehicle Routing Game in which each player is allowed to have multiple customers. The aim of our game is to determine a solution (allocation) in the core of the game. Determining such an allocation can be computationally intensive as in general an exponential amount of Vehicle Routing Problems have to be solved. We propose a constraint generation algorithm to efficiently determine a solution in the core.

Participants

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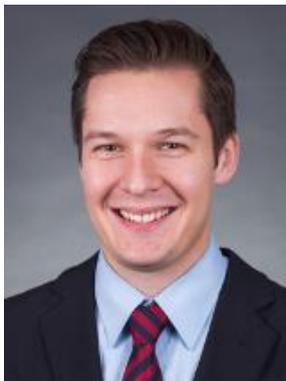
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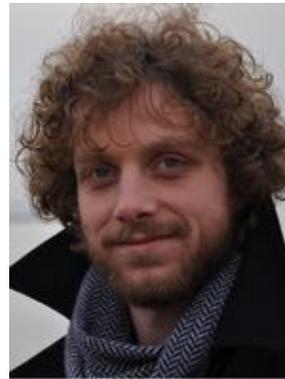
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