

NordForsk project

**Management, design and evaluation sustainable freight and
logistics systems**

Academic Conference

**Arranged by CORAL (Cluster for Operations Research Applications
in Logistics) at School of Business and Social Science, Aarhus
University, May 20, 2014**

Venue: Room 514, S Building (see map)



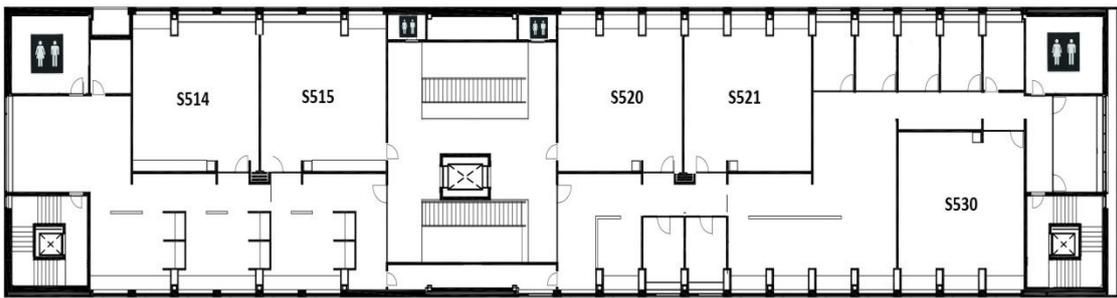
Program

Time	Event
9.30 - 10.00	Coffee
10.00 - 10.10	Short welcome by Johan Marklund and Christian Larsen
10.10 - 10.55	Rob Zuidwijk: New business models for sustainable container transport
11.00 - 11.45	Sanne Wøhlk: Collection of recyclables from cubes – a case study
11.45 - 13.00	Lunch Break
13.00 - 13.45	Stefan Minner: A one-warehouse, multi-newsvendor distribution systems with resupply and vehicle routing
13.50 - 14.35	Tolga Bektas: Ye'll tak' the high road, and I'll tak' the low: Reducing emissions in freight transportation
14.35 - 15.15	Coffee
15.15 - 16.00	Fredrik Olsson: Quantifying Sustainable Control of Inventory Systems with Demand Time Window Constraints
16.05 - 16.50	Tarkan Tan: Making Transport Mode Choices to Meet Voluntary Carbon Emission Targets
16.50 -	Closing the conference

19.00: Dinner at Nordisk Spisehus, M.P. Brunsgade 31, www.nordiskspisehus.dk

Place of venue

Fuglesangs Allé 4 – Building 2610 (S), room no. S514 and S515 (5th floor)



Addresses

The venue takes place at:

The Department of Economics and Business
School of Business and Social Sciences, Aarhus University
Fuglesangs Allé 4, DK-8210 Aarhus V, Denmark
Telephone: +45 87165372

Link: <http://econ.au.dk/>

The address of the Best Western Hotel Ritz:

Banegårdspladsen 12, 8000 Aarhus C.
Telephone: +45 8613 4444
<http://www.hotelritz.dk/>

The central train station is across the road from the Hotel Ritz. So are the city bus stops.

How to get here

Travelling by bus

The city busses in Aarhus run frequently. You can use the website <http://www.rejseplanen.dk/> to help you find the right bus. The city bus routes 3A and 19 will take you directly from the city center to the Business School at Fuglesangs Allé.

Please note that payment for the ride has to be done immediately after getting on the bus. The price for a single ride is 20 DKK. Tickets must be purchased from the ticket machine located in the middle of the bus - please note that the machine only takes cash (coins).

Travelling by taxi

The phone number for Aarhus taxa is: +45 89 48 48 48. If you are on your way to the Business School, make sure when you tell the driver where to go to, to point out that the address is Fuglesangs Allé – not just Aarhus University.

How to get here: see [map](#)

Travel Information

Aarhus Airport (Tirstrup) is located about 50 minutes from the city center. In connection with the majority of flights, an airport bus service between Aarhus City and Aarhus Airport is provided. The bus stops in front of Aarhus central train station. Tickets are sold on the bus at DKK 100 (one way). Please note that the bus leaves the airport approx. 10-15 minutes after the plane has landed.

For more information about Aarhus Airport and the airport bus schedule:

<http://www.aar.dk/lufthavnsbus>

Billund Airport is about 1.5 hours away from Aarhus. There is an X Bus route between Billund Airport and Aarhus (Midttrafik, 912x and 913x). The journey takes approximately 1.5 hours. In Aarhus the bus arrives at/departs from stops in front of the central bus station (Aarhus Rutebilstation) and the central train station (Aarhus Banegårdsplads). Tickets are sold on the bus at around DKK 155 (one way). Payment: only cash, DKK.

For more information on Billund Airport and the airport bus schedule see

http://www.bl.dk/?sc_lang=en

Copenhagen Airport (Kastrup) has a domestic flight connection to Aarhus with several daily departures (approx. 35 minutes).

There are also direct hourly **train services between Copenhagen Airport/Kastrup and Aarhus**. The journey takes approx. 3.5 hours and tickets are around DKK 388 (standard ticket). Tickets can be purchased from the DSB ticket office in Terminal 3 above the railway station or online via DSB journey planner: <http://www.rejseplanen.dk/bin/query.exe/en>

For more on DSB see <http://www.dsb.dk/om-dsb/in-english/>

How to take the train to and from Copenhagen Airport:

There are lifts and travolators between the platforms and Terminal 3. You can take the free terminal bus between Terminal 1 (Domestic) and Terminal 3, where the train station is located. This bus journey lasts about 5 minutes.

Abstracts

Rob Zuidwijk, Erasmus University, Rotterdam, The Netherlands
New business models for sustainable container transport

The shift of containerized transport toward modes other than truck has been a policy objective for many years. More recently, individual firms and supply chains have started to establish new business models to allow for such a modal shift paired with attractive business propositions. Example cases in (the hinterland of) the Port of Rotterdam are the development of the European Gateway Services by Europe Combined Terminals, and horizontal collaboration among inland container terminals such as Brabant Intermodal. This presentation will detail such new business models, and it will also touch upon quantitative modeling used to support the design of these solutions.

**Sanne Wøhlk, CORAL – Cluster for Operations Research and Logistics,
Department of Economics and Business, School of Business and Social sciences,
Aarhus University, Denmark**
Collection of recyclables from cubes – a case study

Collection of recyclable material is major part of reverse logistics and an important issue in sustainable logistics. In this paper we consider a case study where paper and glass are collected from recycling cubes and transported to a treatment facility and processed for reuse. We show how outsourcing the planning and transportation of this service may result in conflicts of interest and unsustainable solutions. Finally we suggest an alternative payment structure which can lead to a common goal, overall financial sustainability, and an improved financial situation for both the public company and logistics provider.

**Stefan Minner, Technische Universität München, TUM School of Management,
Germany**
**A one-warehouse, multi-newsvendor distribution systems with resupply and
vehicle routing**

Driven by a real-world problem in perishable food distribution of a retailer, we develop a stochastic inventory routing problem. Single-period problems like milk, bread, meat pose the challenge of best balancing the costs of over- and understocks. Improvements can be achieved by partly postponing decisions after some uncertainty has revealed. Therefore, several stochastic inventory models have been developed which allow for a second order or delivery in the classical newsvendor problem. However, most contributions just consider a single location whereas in retail distribution, typically several outlets are served by the same vehicle and therefore, inventory and routing decisions need to be taken in an integrated way.

From empirical data, we fit Compound Renewal demand processes and for each retail outlet determine the initial stocking quantity and whether a second order will be scheduled. All second orders are then distributed in multiple vehicle routes and restock the shelves according to observed demand. The inventory allocation problem is solved by a stochastic dynamic program whereas different heuristics are proposed for solving the retailer assignment and routing problems.

In a numerical study and a case example we illustrate the benefits of the redistribution opportunity and provide insights into structural properties how distances and degrees of demand uncertainty influence the optimal redistribution and routing decisions.

Tolga Bektas, Southampton Management School, University of Southampton, UK

Ye'll tak' the high road, and I'll tak' the low: Reducing emissions in freight transportation

The transportation sector is a significant emitter of greenhouse gases, especially carbon dioxide. In this talk, I will provide an overview of my recent research aimed at reducing externalities of freight transport. In particular, I will talk about Pollution-Routing Problems, the new research agendas and algorithmic challenges such problems have brought to fore, and ways in which these were (or are being) dealt with. The talk is based on past and ongoing research collaboration with Emrah Demir (TU/e), Anna Franceschetti (TU/e), Dorothee Honhon (University of Texas at Dallas), Ola Jabali (HEC Montreal), Cagri Koc (University of Southampton), Gilbert Laporte (HEC Montreal), Tom Van Woensel (TU/e).

Fredrik Olsson, Department of Industrial Management and Logistics, Lund University, Sweden

Quantifying Sustainable Control of Inventory Systems with Demand Time Window Constraints

In some industries a customer in need of a spare part may be willing to wait a pre-specified time limit, but not longer. Contracts may exist between the spare parts provider and the customer where the provider is obliged to pay a fee to the buyer if the spare part is not delivered within a certain time window. Consider for example the dairy industry. A packaging machine down due to the need of a spare part may in some cases resume production if the downtime is kept under a certain limit. If the time limit is exceeded, the whole batch of dairy product must be discarded causing both economic and environmental costs. This paper considers a two-echelon base-stock inventory system with one central warehouse and multiple local sites. The local sites face Poisson demand and all unsatisfied demands are backordered. In this paper, we consider a fixed backorder cost whenever a customer's time in backorder exceeds a prescribed time limit. An emergency replenishment model is also considered. In this model the possibility of placing an emergency order if the waiting time exceeds the acceptable limit, at an additional cost, is introduced.

Tarkan Tan, Technische Universiteit Eindhoven, The Netherlands

Making Transport Mode Choices to Meet Voluntary Carbon Emission Targets

In this talk we address two problems on making transport mode choices when carbon emissions are also taken into account. In the first part of the talk, we discuss the problem of a producer that has outsourced transport and has decided to cap its carbon emissions from outbound logistics for a group of customers. We focus on reducing emissions by switching transport modes within an existing network. In the second part of the talk, we consider a company that orders several products from suppliers, which can be fulfilled via a fast or a slow channel. We study a multi-item dual-sourcing problem subject to an emission constraint.