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Optimization and its **A**pplications in **L**earning and **I**ndustry (OptALI)

IRSES

Ongoing Deliverable D1.2

Description of Research Seminars

Start date of the Workpackage:	December 2010
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Participants:	UGOE UNIKL DTU UOA UC
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Research Seminar

offered by Jonas Harbering (University of Göttingen)

in April 2014,

in Christchurch, New Zealand

Subject: Stop Location and Line Planning in the Framework of Integrative Public Transportation Planning with LinTim

Problem: Transportation planning in general consists of various different subproblems, each of which is hard to solve. As deviding the planning into different steps each step can be analysed and solved with respect to certain measurements. In the literature for the different problems, such as stop location, line planning, timetabling, vehicle scheduling and delay management a variety of approaches are known and intensively studied. This brings up the idea of combining the different steps within a modular framework. Each step can thus be solved with a certain model, whereas the solution can be passed on to the next planning step. LinTim (http://lintim.math.uni-goettingen.de/) is intended to be such a toolbox, combining different approaches to each of the problems. The aim of LinTim is to study the dependencies between the different planning steps. The talk was intended to give some insight into the programming part as well as the theoretical part of the different models applied. In particular, the approaches to the problem of stop location was highlighted.

Main Results: The following results from the stop location problem were discussed. The initial idea was to introduce a realistic traveling time function in the general stop location problem. Previously, the traveling time was estimated by the number of stops, which turns out not to be an accurate estimate for stops which are close together.

First, we showed the NP-hardness for the general stop location problem with realistic traveling time. Still, a finite candidate set could be

proved to be dominating, i.e. a finite dominating set was obtained. The problem remained NP-hard but two different IP-formulations were developed. The computational behavior of the IP-formulations was compared which showed that one of the IP-formulations was by far more efficiently solvable.

Participants: Researchers and students from the University of Canterbury

Publication: E. Carrizosa, J. Harbering, A. Schöbel: "The Stop Location Problem with Realistic Traveling Time", *submitted at the Journal of the Operational Research Society* (2014)