

Management Science Seminar

Operations Research in passenger railway transportation

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Tuesday, June 20th, 2006

Time: 1pm to 2pm

Room: TBA

Abstract: During the last decade, many Operations Research models and techniques have been developed to solve planning problems arising in the railway industry. The main challenge for the OR community in the coming decades is to develop models and algorithms for optimization problems during the operations. Therefore, this presentation is split into two parts: in the first part we look at planning problems and the second part we consider a particular problem, which is a step from planning towards operation. In the first part of this presentation, we discuss some successful applications at NS (the largest Dutch railway operator) of OR models and techniques in the planning process. Therefore, we start with a description of the planning process at NS. Afterwards rolling stock and crew scheduling problems arising in the tactical and operational planning phase are discussed in more detail.

The second part of the talk deals with the Crew Re-Scheduling Problem (CRSP), which is still a planning problem but very close to operations. The CRSP arises when tracks are out of service for maintenance during a certain period. Then, trains cannot be operated on those tracks resulting in a modified timetable, and infeasible rolling stock and crew schedules. We will give a formal definition of the CRSP and formulate it as a large-scale set-covering problem. A column generation based algorithm is used to solve this problem. The performance of this algorithm is tested on real-world instances of NS.

Bio: Dennis Huisman (1978) is a part-time Assistant Professor at the Econometric Institute of the Erasmus University Rotterdam. Moreover, he works part-time as logistic consultant at NS, the Netherlands Railways. He combines these two jobs since 2004 after obtaining his Ph.D. at the Erasmus University Rotterdam. In both jobs, Dennis does research on topics as vehicle scheduling, crew scheduling and crew rostering. He has published several articles in journals as *Transportation Science*, *European Journal of Operational Research* and *Journal of Scheduling*. Moreover, he is one of the founders and current director of the Erasmus Center for Optimization in Public Transport, where optimization problems in public transport are studied.