DTU Management Engineering
Department of Management Engineering

Integrated Disruption Management of Passenger Railway Transport

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Disruption Management

This PhD project is part of the larger research project RobustRails. The research in RobustRails focuses on railway transportation and how it can be made more green and sustainable by improving the transport system such that it becomes more punctual, reliable, high-frequent and comfortable. This project will focus on railway disruption management. Trains do unfortunately not always run on time. This is due to unplanned events such as accidents, human mistakes, infrastructure failures, rolling stock breakdowns and weather conditions. Some events cannot be absorbed by network buffers and will therefore lead to a disrupted situation in the network. In such cases the network operators have to make changes to the timetable in order to avoid total breakdown. An updated feasible rolling stock and crew schedule must be found within a matter of minutes by the dispatchers. The rescheduling problem is complex, thus the plans made may be far from optimal. We will investigate the potential of using mathematical models and algorithms for making timetable changes and rescheduling crew and rolling stock.

A New Research Scope

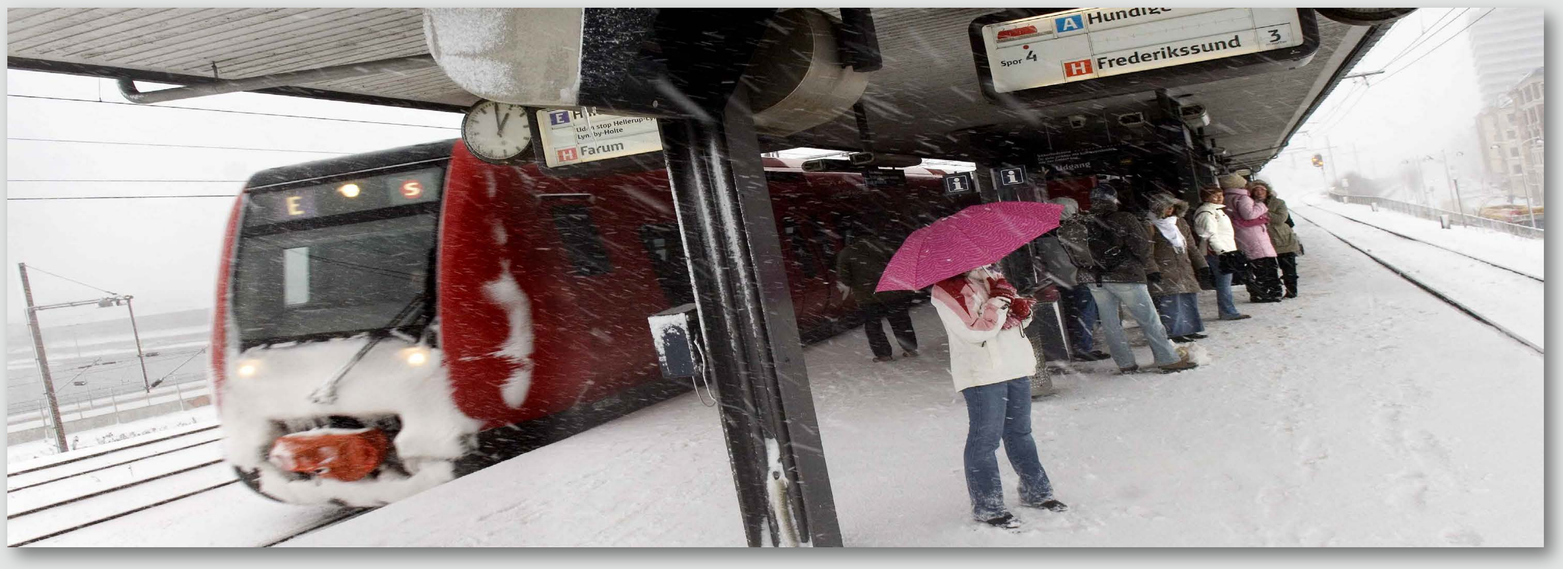
Crew, rolling stock and timetable scheduling are the main sub-problems in railway disruption management and they have been subject to research for the past ten years. The sub-problems have been subject of study in strategic, tactical and operational planning but literature on the recovery or disruption problem is however scarce. No research is found that considers an integrated recovery that jointly considers crew, rolling stock and timetable scheduling.

Solution Methods

A holistic solution model will be developed and algorithms will be implemented to solve the rescheduling problem. I intend to integrate the three subproblems using a loose feedback mechanism in order to meet the strong time requirements. A given timetable may prove to be infeasible with respect to crew and rolling stock rescheduling, and in such cases the timetable must be changed and account for the infeasibility feedback given by the crew and rolling stock problems. The holistic method becomes an iterative approach that strives for feasibility and secondly maximizes customer satisfaction and overall robustness.

Expected Results and Contributions

I expect to develop new prototype algorithms that are able to aid DSB S-tog dispatchers in finding new plans when a disruption occurs. The resulting models, algorithms and experimental results will be published in scientific journals.



Collaborating parterners:

DSB S

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RobustRailS website:

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