**Development of Train Driver Advisory Systems**

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Train Driver Advisory Systems (DAS) have become an important topic during the past years. Many projects all over the world are dealing with the display of additional information in the drivers’ cabin. Main goal of most of these projects is energy saving through better usage of margins in the timetable. While there certainly lies potential in this approach, the most potential lies in the connection between train traffic control and train drivers. An advanced DAS that displays the current traffic plan and traffic situation in the cab is the key to effective train traffic control. It does allow the train drivers not only to drive more energy efficient according to margins in the timetable, but also to optimise the whole journey of a train in a way supporting recovery from perturbations in the traffic – rather than causing them due to sub optimisation, i.e. when the optimal solution for one train would affect other trains negatively. Additionally, feedback from the train and its driver can provide detailed information about the status of a train, e.g. current speed, status of motors, or weather effects, allowing the traffic controllers to plan more accurately.

We applied GMOC, a model for analysis and design of human work in complex dynamic processes, to determine the train drivers’ need for information. Vision seminars involving train drivers and traffic controllers helped us to design a DAS prototype that provides this information and can improve the collaboration between train drivers and traffic controllers. Our concepts have been implemented as STEG, a new graphical tool for traffic control, and CATO, a DAS that displays real-time information about traffic plans made in STEG, at the iron ore line in northern Sweden. We will present our design and explain the need for closer collaboration between train drivers and traffic controllers. Further we will share our experience from design and deployment of this first system, including our plans for future development, tests, and evaluation.

The presentation will mostly address the topics:
- Usability of advisory and assistance systems
- Mental workload
- Situation awareness
- Human Factors Integration (e.g., in organizational processes)