

Simulation and models Demonstrator optimized timetabling Dissemination 2, Brussels 3 November 2016



Magnus Wahlborg, Trafikverket,













- Scope
- Frameworks for modelling and simulations
- LiU model
- The Cain LiU demonstrator
- CAIN/LiU life demonstration





Scope



Modelling railway capacity







First half

 state-of-art, models and processes, research Gap, scenarios, set up a framework

Second half Tasks 3.2.4, 3.2.5 and 3.2.6

- Enhancing frameworks for modelling and simulation
- LiU model optimisation
- Oltis IT system
- Demonstrator CAIN
- Scenario Malmö Hallsberg
- Remaining work: Further study CAIN LiU interaction and scenario Malmö - Hallsberg





• Purpose:

Improve methods in tactical (timetable) planning and operational traffic => better capacity and improved punctuality/robustness

- Main partners
 - •Infrastructure manager Trafikverket
 - System supplier Oltis Traffic management systems
 - Research institute Linköping U optimisation





Increased automation of tactical planning and operational process

- Ongoing trend tactical timetable planning process and operational traffic process is merging
- The limit between planning and operational traffic is 24 hours (8 hours)
- A third process is to carry out maintenance and monotoring (status of infrastructure and vehicles)





Frameworks for modelling and simulations



Modelling framework



LiU model

- Stochastic railway traffic model
- Data-driven model of traffic based on Bayesian networks (BN)
- Data driven model of traffic control actions based on Naïve Bayes classifier (NBC)
- Online use uses real time information for dynamics of uncertainty and predicts traffic over long horizons
- Offline use timetable simulation resulting in analysis of stability, robustness and resilience

Improved traffic control prediction of uncertainties

The CAIN - LiU:

Demonstrator

Scheme of Oltis KADR and systems

CAIN – CApacity of the INfrastructure

CAIN – Demonstrator

- IT tool developed by OLTIS Group
- Based on KADR (CZ & SK infra-managers)
- Real time software for:
 - input of ad-hoc train paths into the real timetable
 - optimisation of the timetable
 - simulation of different scenarios
- CAIN interacts with the model from Linköping University

TRAFIKVERKET oltis group

CAIN – CApacity of the INfrastructure

CAIN – part I

- Import static data of Sweden:
 - Railway infrastructure
 - Timetable
 - Vehicles
- Corridor Malmö Hallsberg
- Data in RailSys/railML format
- Process the data
- Create a virtual network
- **Display** the railway network

CAIN / LiU model: Life demonstration

List of path requests: ready / for construction

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Construction detail and possible conflicts:

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Magnus Wahlborg

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Trafikverket

Magnus.wahlborg@trafikverket.se

