C4R

Capacity for Rail

SP3 Framework development for capability trade-offs

C4R Workshop M18 report – 11 June 2015

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SEVENTH FRAMEWORK PROGRAMME

- Working status
- Conclusion research GAPS
- Vision 2020
- Task 3.2.4 Enhancing frameworks for modelling and simulations
- Task 3.2.5 Initial evaluation of simulations
- Summary and next steps

Working status

WP 3.2 tasks

- Task 3.2.1 Review of existing processes and state-of-art in modelling and simulation, M1 – M6
- Task 3.2.2 Review of existing models, M3 – M6

Report MS3 (M6): **2014-04-10**

Task 3.2.3 Evaluations measures and selected scenarios, M6 – M12 – done

Report Deliverable 32.1 (M12): **2015-03-04**

WP 3.2 tasks

- Task 3.2.4 Enhancing frameworks for modelling and simulation, M10 – M24 – in progress
- Task 3.2.5 Initial evaluation of scenarios, M10 – M24 – in progress

- Task 3.2.6 Innovation and evaluations of Capacity enhancements, M25 – M42 – not started

WP3.2 Contributors

- **Trafikverket**
- Network Rail
- ADIF, UIC (ÖBB)
- **Linköping University**
- Oltis Group
- University of Newcastle, University of Birmingham
- TU Dresden
- TRL
- IFFSTAR, Systra
- Connections SP3.1, SP3.3, SP3.4 och SP2

C4R Capacity for Rail

MS3 report (Tasks 3.2.1 and 3.2.2)

- Railway capacity
- Planning processes at Infrastructure managers – Sweden, UK, Germany, Generic
- Usage of simulation in planning – France, Sweden, Spain, Czech, UK, Slovakia, Austria
- Driver advisory systems
- Simulation and models: Strategic level, tactical level and operational level
- GAP Analysis and Conclusions

Conclusion
Research gaps

Modelling railway capacity

Capacity for Rail

Capacity demand

Capacity supply

STRATEGIC LEVEL PLANNING

Economic growth

Urbanization

Trip generation

Socio-economic forecasting

Trip distribution

Modal split

Railway network

Junctions

Stations

Signalling systems

TACTICAL LEVEL PLANNING

Economic cycle

No. of cargo trains

Operating RUs

Need for train slots

No. of passenger trains

Planned Maintenance work

Train slots

Rolling stock

Major traffic disturbances

Crew scheduling

OPERATIONAL LEVEL PLANNING

Ad-hoc changes

Train cancellation

Operational changes

On-time performance

Immediate maintenance work

Disruptions

Driving

Real time operations

Enhance research GAP:s timetable planning and operational control

1. Improving processes and flexibility in timetable planning
2. Better planned timetables by improved methods for traffic simulation analysis
3. Evaluation of punctuality from historical data.
4. To develop standards and data management for system simulation
5. To enhance decision support and automation algorithms timetable planning and operational traffic
6. Open source and open data

Vision

Vision 2020: Timetable planning

C4R Capacity for Rail

Timetable planning

- Improved planning of maintenance work (strategies and processes).
- Further developed ad-hoc planning (new/cancelled trains, re-routing of trains)
- Improved international timetable planning, more flexible and business oriented.
- Better follow-up of performance, disturbances and traffic quality.
- Better analyses of current and future timetables.
- Developed IT systems, module based standards for deregulated market with several actors.
- Developed methods and processes, IM – RU/other actors.

Vision 2020: Traffic Control

Capacity for Rail

Traffic control

- Implemented Driving Advisory Systems, DAS.
- Traffic dispatching system with electronic timetable plan.
- Decision support systems for *minor* traffic perturbations, towards full automatized.
- Decision support systems for *major* traffic perturbations, improved processes and routines.
- Closed loop, Traffic control ↔ Driver, including Centrally Guided train operation
- Short-term predictions.
- Better traffic dispatching systems.

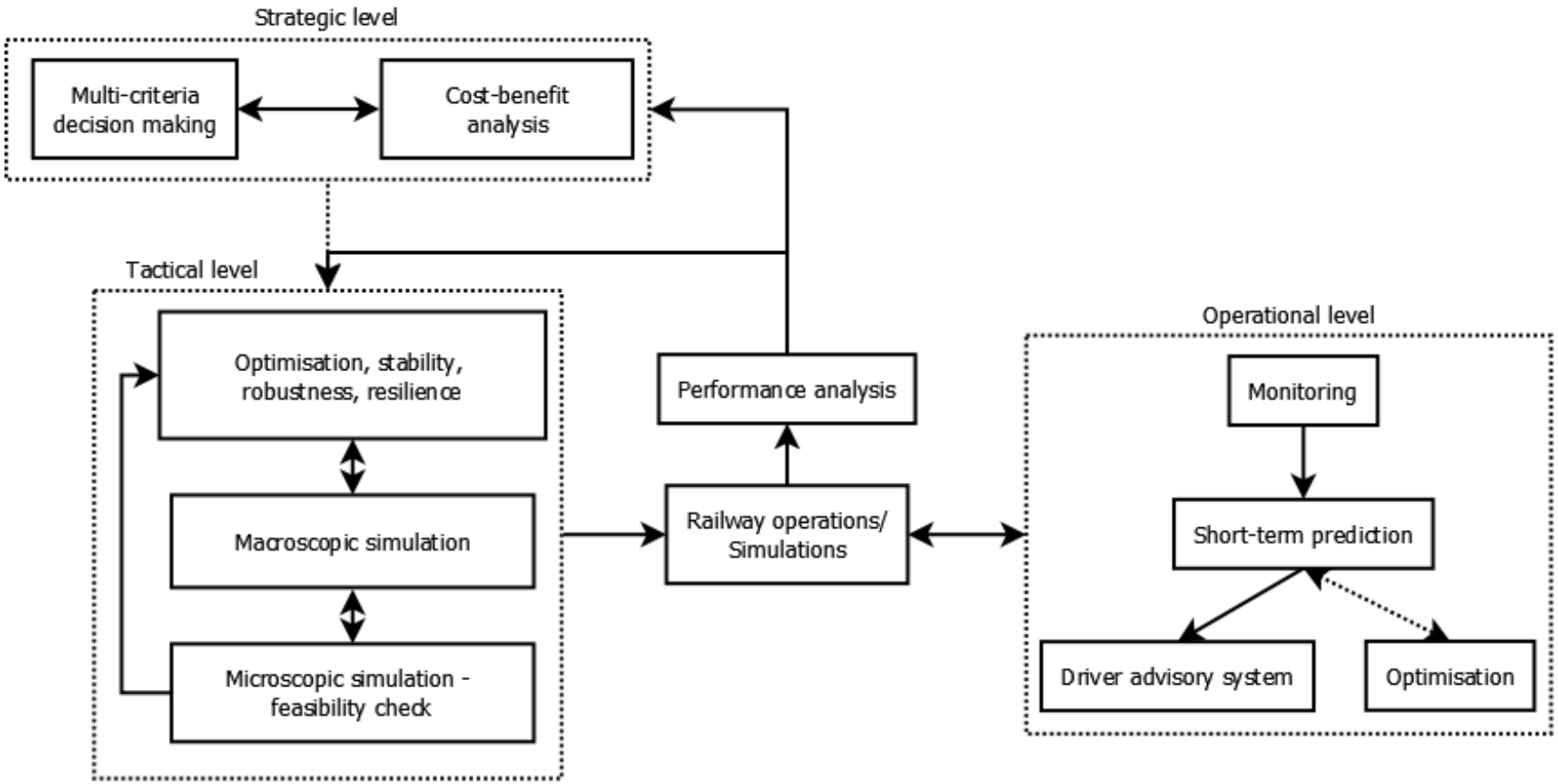
Task 3.2.4 - Enhancing frameworks for modelling and simulations

Task 3.2.1 (2)

What is “simulation and models”:

- Commersial models traffic simulation and timetable planning ie Railsys and Open Track
- Optimisation and analytical models
- Traffic forecasts and traffic scenarios
- Decision support systems
- Open models and demonstrators ie Hermes

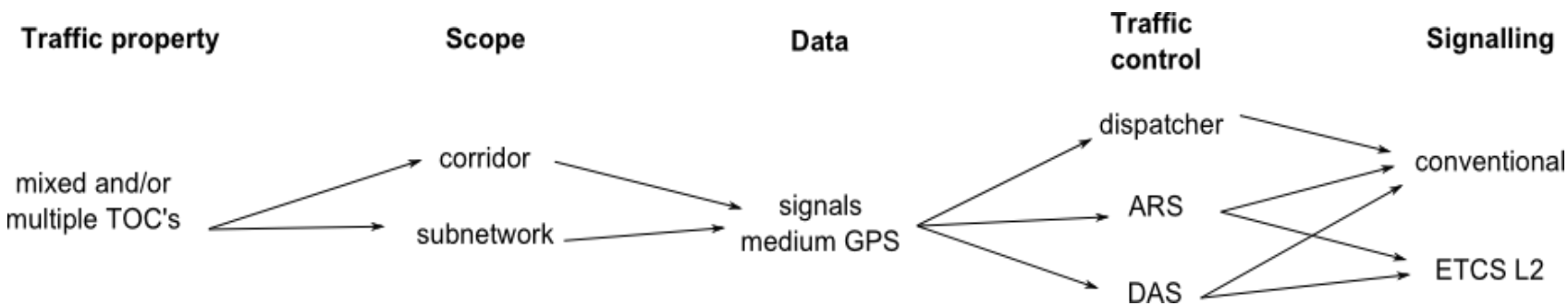
Modelling framework



Framework analysis

- Modelling framework should support analysis of impact of:
  - Inovations in train control (DAS, ATO, etc.)
  - Improvement of operational traffic control
  - Methods and principles in timetabling
  - Enhancements of safety and signalling systems
  - Infrastructure improvements

Stochastic model and empirical data Stockholm/Hallsberg - Malmö



Remaining reports, deliverables and milestones

Internal report M24 (September 2015)

MS17 Initial evaluation results of scenarios part of D32.2, M 30 (march 2016)

Deliverable 32.2 Capacity impacts of innovations (PU, R), M42 **March 2017**

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WP3.2

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