Developing a vision for Operational Concepts

Work backwards using ‘back casting’ to identify methods, processes and technologies that can be developed (and adapted) to fit all the operational concepts.

“2050 Operational Concepts”
SP3 Objectives

1. Provide strategies for traffic management which increase the capacity of the network
2. Derive joint requirements and testing for incident management plans, e.g. in extreme weather and other hazards
3. Analyse and classify network topologies and traffic characteristics and thereby identify and characterise system bottlenecks and vulnerability of system elements
4. Identify optimal strategies for resilient operations of the identified classes of system bottlenecks and traffic types and develop a roadmap for automation strategies in rail traffic management
5. Specify requirements for reliable and cost effective collection of real-time data on train operations and delay monitoring
An Overview of SP3

SP3 will contribute to the project by paving the way for:
1. Operations that are resilient to extreme weather and other hazards;
2. Automated maintenance and operations;
3. Adaptable solutions for different route characteristics including (very) high speed;
4. An increase of capacity of freight transport.

WP1 Capability trade-offs
To test appropriate and adaptable strategies for capacity enhancement
(Links with SP1, SP2, SP5)

WP2 Models and simulations
Understand the implications of different operational strategies on resilience, capacity, potential for automated solutions and requirements for adaptability
(Links with all SPs)

WP3 Optimal strategies
Development and testing of new strategies for resilient operations.
Solutions for automated operations.
(Links with SP4, SP6)

WP4 Data modelling and architecture
Development of data management and integration approaches that support information flow in resilient operations, automated maintenance and operations
(Links with SP4)

Development of innovative and cost effective technologies for collecting real-time data on the train operation (WP4)
Development of innovative solutions for traffic capacity computation for freight and passengers based on data gathering, analysing and utilising processes (All)
Determination of data requirements and models to improve rail punctuality and level of service (WP2, WP3, WP4)
Longer trains and/or high-speed freight (WP2)
Development of joint requirements and testing for incident management plans (WP3)
Sub-project 3 in Context

WP3.1 Capability trade-offs

Opportunities and requirements for affordable, automated, adaptable and resilient solutions (including parameters to model (WP3.2), manage (WP3.3) and make available (WP3.4))

WP3.2 Models and simulations
Models and simulations that are able to assess affordable, automated, adaptable and resilient operational solutions

WP3.3 Operational strategies and incident management plans
Operational strategies and incident management plans that enable affordable, automated, adaptable and resilient operations

WP3.4 Ubiquitous data for railway operations
A solution for providing ubiquitous data that support the vision for affordable, automated, adaptable and resilient operations
Approach to Trade-off Studies

Train capacity

Reliability

Platform capacity

Availability

Train turnaround

Complexity

Station capacity

Variability

Passenger advice

Train performance

Headway

Dwell time
Optimised Operation

- Signalling Headway
- Track Speeds
- Train Power
- Train Mass
- Train Capacity
- Dwell-times
- Reliability
- Operating Margins
- Waterloo Capacity
- Variability
Passenger Friendly

Signalling Headway

Variability

Track Speeds

Waterloo Capacity

Train Power

Operating Margins

Train Mass

Reliability

Train Capacity

Dwell-times
More Connected

- Signalling Headway
- Track Speeds
- Train Power
- Train Mass
- Train Capacity
- Dwell-times
- Reliability
- Operating Margins
- Waterloo Capacity
- Variability

Capacity for Rail
SP3 Input from ON-TIME

- WP3.1: Capability trade-offs
- WP3.2: Simulation and models
- WP3.3: Optimal strategies
- WP3.4: Ubiquitous data

Simulation

Input ONT-WP4

„Improved methods for perturbation handling in the operational process“

XML-Scheme in railML

Development of ON-TIME data model
- Open source simulator
  - Framework description (prepare specification)

Optimal operational strategies
- Reactive (e.g. results ON-TIME)
- Preventive (e.g. T3.3.1 et al.)

ON-TIME XML-Scheme Mapping of
- reactive & preventive strategies in railML? (Vision 2050)
- cargo tracking (IM → RU) & application of train path (RU → IM)?
- …
**C4R tasks**

**T3.3.2**
Classification of network topologies and traffic characteristics including connectivity to other transport networks (Rail as part of European Transport System)

- Topology
- Traffic characteristics
- Intermodality → Preparation for T3.3.4

**T3.3.3**
Optimal operational strategies for traffic management and incident management

- Reactive strategies
- Preventive strategies
  → Vision 2050: Formal evaluation of recommendations, Emergency plans

**T3.3.4**
Strategies for information and automation

- Traffic state information
  e.g.: IM → RU: communication of strategy
- cargo tracking (IM → RU) & ad hoc application of train path (RU → IM)
- Intermodal transport chain (passenger & freight)
Next steps

- Framework
- Data Architecture
- Scenarios
- Automation
- Prototypes
Thank you for your kind attention

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