Project overview
2nd Dissemination Workshop – Brussels, 3rd November 2016
The transport challenge of 2030/2050

• Challenging demand

Demand for railway transport is rising, driven by several factors:
  o Urbanisation
  o Environmental concerns
  o Energy costs
  o Road congestion

• Concentration of traffic
  o On already busy corridors
  o Freight routing from a limited number of large sea ports
  o to already congested urban areas

EU White Paper target ⇒ 50% of road freight over 300 km to be shifted to other modes by 2050
Making the rail the mode of choice

- Increase the attractiveness of railways by making it:
  - Resilient
  - Adaptable
  - Automated
  - Affordable

Squeezing extra capacity out of existing needs to be done without impacting the quality of the rail offer.
Resilience to daily malfunctions

• **Capacity management** has to cope with trains which are not on time, with technical defects, with HR dropouts, etc.

• % of on-schedule trains indicator allowing up to 10’ delay to be considered “on-time” spoils the capacity in nodes, where the accuracy is essential -> temptation to build time schedules with safety margins of extra time.

**Automation**: automatic re-scheduling and decision helping; real time information to drivers, automatic driving.

**Reliability** of vehicles
Resilience: challenges and levers

- Resilience to the expected increase of climate events
  - Average temperatures, extreme temperatures, heavy rains, snow, floods, landslides

- Resilience to the expected increase of duty
  - Higher axle loads, speeds, cumulated tonnage, accelerations and breaking efforts...

  | Infrastructure: Design of earthworks, Switches & Crossing, innovative slabs, rails |
  | Advanced monitoring and alerts |
  | Incident management plans |
  | Reliability of vehicles |
Adaptability: challenges and levers

- Market needs flexibility and extensibility
- Necessity for shippers to be able to order a train path at very short notice.
- Adaptation to daily, weekly, yearly or seasonal variations

**Automatic timetabling:** forecast models based on real time information on operation, giving ability to allocate or re-allocate remaining capacity with short notice.

Improved real time **data collection** and **exchange of information**.

Adaptation of wagon design to customer’s upcoming needs.
Affordability: challenges and levers

- Capacity needs to be created at low cost, or users and shippers will not go on the most expensive lines

- **Procurement cost:** cheap design solutions and building process, modularity

- **Operational costs:** low maintenance needs and high maintainability

- **Environmental friendliness:** maintain the rail advantages and improve its noise performance.

- **Social affordability:** maintain the expected high level of safety
**Automation: challenges and levers**

- **Release human resources** for high value activities
- **Use of algorithms and information technology** to **streamline the processes**.
- **Increased throughput**; **improved robustness** of processes

**Automated timetabling:** development algorithms for optimised resolution of bottlenecks

**Help for decision making**

**Assistance to the driver**

**Automated infrastructure self monitoring**
High-Capacity: challenges and levers

- Virtually **no constraints** on operations
- Can **accommodate customer’s demand** at any time
- Tolerates interventions with **minimal impact**

**Carrying capacity of trains/slot:** longer trains, improved loading space, heavier payload.

**Optimised design and freight operations** at transshipment terminals

**Reduction of capacity consumers for infra:** quicker installation, less maintenance needs, quicker maintenance, non-intrusive monitoring, train-borne solutions
The overall objective of CAPACITY4RAIL is to set up a vision and bring the railway system towards a resilient, affordable, adaptable, automated and high-capacity railway for 2030/2050, through major step changes in:

- infrastructure design, construction and maintenance (including advanced monitoring)
- freight operations, with a particular focus on transshipment and improved performance of rolling stock.
- operations management, automation
- incident recovery through real-time data management
Project structure breakdown

- **SP1 - Infrastructure**
- **SP2 – New concepts for efficient freight**
- **SP3 - Operation for enhanced capacity**
- **SP4 - Advanced monitoring**

Scenarios for smooth migration from now to 2050
Assessment of the full sustainability of the developed solutions
Demonstration

**SP6 – Dissemination and management**
The C4R consortium

**Facts and Figures**

- Total Budget: €15 million (€9.9 M€ EU funded)
- Duration: 48 months
- Project Start Date: 01/10/2013
- Project End Date: 30/09/2017
- Partners: 46
- Grant agreement n° 605650