SESSION 3: Investigate future or other technologies attractiveness

ITS from the UK Railway Perspective

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RSSB is an expert body with a wide range of knowledge, skills and experience. We’re part of the rail industry, non profit-making and independent of any commercial interests. Our research programme is cross-industry and multi-disciplinary, and is driven by the needs and aspirations of the railway. RSSB manages and maintains industry standards for the GB railway.

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RSSB’s members include:

- 30 Passenger Operating Companies
- 10 Freight Operating Companies
- 3 Infrastructure Managers
- 3 Rolling Stock Owners
- 6 Infrastructure Contractors
- 21 Suppliers
The Rail Technical Strategy – Vision

https://www.youtube.com/watch?v=m7RoWVMLciQ
RTS Key Capabilities – Needs for Better Data Connectivity

- 01. Running Trains Closer Together
- 02. Minimal Disruption to Train Services
- 03. Efficient Passenger Flow through Stations and Trains
- 04. More Value from data
- 05. Optimum Energy Use
- 06. More Space on Trains
- 07. Service Timed to the Second
- 08. Intelligent Trains
- 09. Personalised Customer Experience
- 10. Flexible Freight
- 11. Low Cost Railway
- 12. Accelerated Research, Development and Technology Development
Key Capability Example – Running Trains Closer Together

01 Running trains closer together

- Transfer between vehicles on the move
- Vehicles can travel much closer together
- Multiple vehicles using single platform
- Automatic train operation (driverless trains)
- Super fast reliable fail-safe switching
- No line-side signals
- Train vehicles from T+ units
- Vehicles split and joining in transit
- Standards
Key Capability Example – Minimal Disruptions to Trains Services

2. Minimal disruptions to train services

- Real time monitoring
- Plug and play
- Informed decision making policy/planning
- Maintenance robot
- Eye in the sky (Satellite/drones)
- Just in time repair (depot)
- Railbot
- Railway data bus
- Modular real time replacement parts
- Supply chain

20:08
More than technology

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<th>As-is</th>
<th>Technology</th>
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<td>Govt. Policy &amp; Legalisation</td>
<td>Processes</td>
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<td>Ind. Standards /Business Policy</td>
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<td>Infrastructure &amp; Assets</td>
<td>Org Design</td>
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Levers of change
Rail Communication Challenge

Trends and Needs e.g.

- More trains, high speed up to 400 kmph by 2030
- 1200 – 1500 passengers on a 12 coach train
  - Data demand doubling every 2 years
  => 10 Gbps per train by 2030?
- Automated train operations
  - Massive safety critical communication
- Autonomous asset management

Challenges e.g.

- Requirements - bandwidth, latency, reliability, availability, security and privacy, etc.
- System approach: integrated communication system? technologies? standards?
- Business models: who owns? who runs? how to charge?
- Research and innovation strategy/approach outside classical rail domains

Source: Department for Transport
UK Railway Initiatives – Example 1
Future Connected Train and Customer Communications

Rail Technical Strategy Objectives
(capacity, carbon, cost, customer experience, sustainability)

User Requirements Capture
(Current and Foreseen Future)

Technology Industry Input
(Forseen Requirements and Capability Trajectory)

Future Connected Train and Customer Communications Requirements and Strategy

Technology Gap
Requirement Map

Innovations
New / Disruptive Business Models and Opportunities, Deployment Road Maps and Market Take-Ups

“Franchise Obligation”
Leveraging Current Mobile Solutions

Scalable High Data-Rate Train Connectivity

CP 5 2014
CP 6 2019
CP 7 2024
CP 8 2029
UK Railway Initiatives – Example 2
Rail Infranet

Source:
.... or continue to evolve naturally?
UK Railway Initiatives – Example 3
Intelligent Asset Management

Smart Data Collection: Fixed and Mobile sensors
- Better data collection techniques, prioritisation of data, faster information sharing, better quality information

Autonomous Inspection and Maintenance Planner based on asset condition
- Predictive instead of reactive maintenance, autonomous decision making, based on cost/risk analysis, less time needed on track

Autonomous Robotics, Drones for Inspection and Maintenance
- Safety of our staff, less staff on track during live running.
- More productive Inspection and maintenance periods.

Fail and find
Predict and prevent

Source:
NetworkRail
UK Railway Initiatives – Example 4
Real Time Information for Customers

National Rail Enquires Data Engines

1. Darwin – GB railway’s official train running information engine, providing real-time arrival and departure predictions, platform numbers, delay estimates, schedule changes and cancellations.
2. Knowledgebase – Static and real time information about travelling by train in GB e.g. station facilities, service disruption, and engineering work.
3. Online Journey Planner - to plan routes, calculate fares and establish ticket availability.

Open Rail Data – Maintained and provided by ATOC

Infrastructure Manager
Train Operators
Other Transport Modes (e.g. TfL)

Application Developers => End user applications
APIs, XML feeds

Better passenger information during disruption
Cross modal, cross sector and cross lingual information
Personalised travel services
Customer data privacy and security
Passenger entertainment

Rail Delivery Group
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Customer Information – Core Architecture Projects

[Diagram showing various projects and their connections including GPS, TMS, TOC Resources Project, DARWIN TMS Project, DARWIN PIS Project, DARWIN CIS Project, Train Comms, TOC PIS, TOC CIS, and Train Movement Data.]
UK Railway Initiatives – Example 5

Intelligent Integrated Transport System

- Make travelling an end-to-end user centric experience
- Collaborative transportation planning and delivery across modes
  - Cross modal information sharing and exploitation
  - Dynamic disruption management
- Real time customer information across modes
  - Security by design
  - Private-Public collaborations

Multi-modal navigation
Thank you...
Let’s make future railway vision a reality!

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Relevant RSSB’s Recent Publications

- Cyber security strategy for protecting Britain’s railway (to be released)
- Rail industry standard for Internet access on trains for customer and operational railway purposes, June 2016
- T964 - Operational communications: Rail mobile communications requirements, March 2012
- T817 - Assessing bandwidth demand for future communications needs on GB railways, July 2010
- T911 - Development of a cross-industry business case and spectrum valuation for wireless telecommunications
- T809 - Development of a technology roadmap and action plan for the GB railways: short term roadmap

Available on www.sparkrail.org
Intelligent Asset Management – RSSB’s Recent Work

- **T1010 – Cross-industry Remote Condition Monitoring (RCM)**
  - Outputs: Data architecture, Commercial architecture, Standards and Business case tool update (available on www.sparkrail.org)
  - Next steps:
    - Provide a case study which can be widely shared to demonstrate how in practice T1010 tools can used and the benefits of doing so
    - Reveal in a greater level of detail the practicalities of applying the toolkit, potentially leading to some modifications or enhancements of the toolkit

- **RSSB/NR Funded RCM Programme**
  - 24 project teams undertaking feasibility studies across 9 different challenge areas
  - The feasibility stage challenges include flood warning, slope instability, control of railway property access and data analytics
  - Next stage - Demonstrate how RCM solutions can enhance the GB rail network

- **RSSB/RRUKA Robotics and Autonomous Systems to Rolling Stock Maintenance**