Key technology and infrastructure delivery developments / likely innovations in the next 5-10 years

Simon Iwnicki
Director of the Institute of Railway Research
University of Huddersfield
Contents

• The strategic framework
  • RTS (covered by James Hardy)
  • Shift2Rail
• Research capabilities
  • RRUKA
• Example research projects
  • SUSTRAIL
  • University posters
• Panel discussion
The strategic framework

• UK ‘Rail Technical Strategy’ 2012
• The academic response to the RTS
  • To support the railway industry’s future ambitions as set out in the RTS 2012
  • To ensure alignment of university research with the long term vision of the industry
• The European perspective - Shift2Rail
  • The S2R Master Plan
  • More detailed ‘Scoping document’
  • IP5 : Technologies for sustainable and attractive European rail freight
“The modal share of intra-EU rail freight transport has slightly declined in the past decade. The cost competitiveness and the reliability of freight services need to be considerably improved if the sector is to meet the ambitious objectives that were set in the Transport Doubling the use of rail freight (2005 to 2030)”

“The challenge is two-fold:
• To acquire a new service-oriented profile for rail freight services based on excellence in on-time delivery at competitive prices, interweaving its operations with other transport modes,
• To increase productivity, by addressing current operational and system weaknesses and finding cost-effective solutions to these problems, including optimisation of existing infrastructure and fostering technology transfer from other sectors into rail freight.”
Shift2Rail IP5

Technologies for sustainable and attractive European rail freight
[total €81M]

<table>
<thead>
<tr>
<th>Research and Innovation Area</th>
<th>Proposed Demonstrator</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation Strategies and Business Analytics</td>
<td>T.D. 5.0 - Implementation Strategies and Business Analytics</td>
<td></td>
</tr>
<tr>
<td>Freight Electrification, Brake and Telematics</td>
<td>T.D. 5.1 - Freight Electrification, Brake and Telematics</td>
<td></td>
</tr>
<tr>
<td>Access and Operation</td>
<td>T.D. 5.2 - Access &amp; Operations</td>
<td></td>
</tr>
<tr>
<td>Wagon design</td>
<td>T.D. 5.3 - Wagon Design</td>
<td></td>
</tr>
<tr>
<td>Novel Terminal, Hubs, Marshalling yards, Sidings</td>
<td>T.D. 5.4 - Novel Terminal, Hubs, Marshalling yards, Sidings</td>
<td></td>
</tr>
<tr>
<td>New Freight Propulsion Concepts</td>
<td>T.D. 5.5 - New Freight Propulsion Concepts</td>
<td></td>
</tr>
<tr>
<td>Sustainable rail transport of dangerous goods</td>
<td>This area is mainly handled in 5.1 and 5.3</td>
<td></td>
</tr>
<tr>
<td>Long-term vision for an autonomous rail freight system</td>
<td>Handled in 5.1-5.5 with better functionality in traffic management (signalling) and automatic loading and unloading at terminals, and more efficient marshalling yards with better design.</td>
<td></td>
</tr>
</tbody>
</table>
RRUKA

• The Rail Research UK Association
• Acts as a bridge between Academia and Industry
• 53 University members
• Organises regular networking events
• Initiates research activities
• Capability statement available online
Example: The SUSTRAIL project

• Aims to provide a whole system improvement by including innovative components in both infrastructure and vehicle.
• Targeting a modest speed increase (160km/hr)
• Vehicle innovations include:
  • Longitudinally soft suspension with lateral links
  • Condition monitoring
  • Electronic braking with disk brakes
  • Noise reduction measures
• Infrastructure innovations include
  • Advanced condition based predictive maintenance tools
  • Optimised track geometry including switches and crossings
University Posters

Southampton
‘Improving the resilience of ballasted track under heavier loads by random fibre reinforcement’: Femi Ajayi
‘The impact of axial load on track substructure deterioration’: Letisha Rorke

Sheffield
‘Rail freight system research at the University of Sheffield’: Adam Beagles

Leeds
‘Rail Freight Business Case and economic research at the University of Leeds’: John Nelthorp

Huddersfield
‘the SPECTRUM project’: Phil Shackleton
‘the SUSTRAIL project’: Simon Iwnicki

Newcastle
‘Critical topic areas in rail freight’: Mark Robinson
‘Innovative solutions in railway vehicle design’: Cristian Ulianov

Birmingham
‘WiRailCom – Wireless Railway Condition Monitoring for freight trains’: Edd Stewart
‘Autonomous, zero-emission refrigeration units to achieve an end to end railway focussed cold chain’: Clive Roberts