

Shift²Rail: a new chapter f



The formation of a joint undertaking for rail research is a priority of the Greek presidency of the Council of the European Union, which adopted a favourable position on the initiative last month. **Philippe Citroën**, director general of the European Rail Industry Association (Unife), explains why the Shift²Rail programme is so vital to the future of Europe's railway industry and the EU's ambitious modal shift targets.

INNOVATION in rail is not as straightforward as in many other industries. Rail transport relies on a system comprised of myriad components produced by a fragmented industry that runs on pan-European infrastructure, often with many different standards and varying degrees of interoperability.

The components of newly-developed rolling stock must be compatible with every metre of infrastructure on which it will operate. Revolutionising the rail system therefore requires an upgrade of all of the component parts, and this

goes without mentioning the many segments of rail. Nevertheless, rail transport is one of the most sustainable, energy-efficient and eco-friendly forms of transport and it has huge potential to ease congestion.

The virtues of rail travel have been repeatedly noted by the European Commission (EC) over the past decade. As such, the Commission's ambitious transport strategy calls for a significant modal shift to rail transport as a means of combating congestion and reducing greenhouse gasses. In its 2011 White Paper on Transport, the EC asserts that

by 2050, 50% of road freight over 300km should shift to rail or waterways and the majority of medium-distance passenger journeys should be made by train.

Furthermore, the Commission acknowledges the challenge rail has in attracting customers and the need to invest in technological advances. The 2011 White Paper states: "rail, especially for freight, is sometimes seen as an unattractive mode. But examples in some Member States prove that it can offer quality service. The challenge is to ensure structural change to enable rail

For European rail research

to compete effectively and take a significantly greater proportion of medium and long-distance freight (and also passengers). Considerable investment will be needed to expand or to upgrade the capacity of the rail network." It is evident that a major evolution in rail technology is a cornerstone of the Commission's goal of creating a Single European Rail Area (Sera).

Another concern is that the European rail industry is facing increased competition from elsewhere in the world, notably from Asia, where governments put generous subsidies behind research and development in the rail sector. This threatens Europe's leading position in the global rail market - only with major innovation of its own can this position be maintained and the European industry remain competitive.

For rail to be more attractive to end users, both in the freight and passenger markets, it must be more reliable, cost less, and be capable of handling more traffic. To achieve this, a step change in rail technology is necessary, and to enable such a punctuated improvement, research and development must be systematic and integrated in its approach. The EC's Shift²Rail initiative proposes exactly such an approach, and as a result of this public-private partnership, rail will witness a technological revolution over the next decade.

Partners in research

The European rail industry has long been active in European-funded projects and many of these projects have produced satisfactory results, although in some cases they have not been sufficiently developed to bring them to market. Nevertheless, cooperation on rail research between the EU and industry has been fruitful; perhaps the most striking example is the development of ERTMS, which has been remarkably successful in progressing interoperability and is sold and deployed on railway networks all over the world.

In general, however, EU cooperative research is carried out and tested in laboratories, but lacks the appropriate



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Philippe Citroën

real world system testing to build confidence in the marketplace. Realising the need to innovate in order to compete with Asian rail industries, in 2010 European industry leaders, through the European Rail Industry Association (Unife), began to organise an industry-wide, large-scale, multi-annual research initiative - taking inspiration from other EU research and development initiatives such as CleanSky and Single European Sky Air Traffic Control Research (Sesar) in the aviation industry. Since 2010 the initiative, dubbed Shift²Rail has come a long way and now includes participants from across the entire rail sector: industry leaders, SMEs, urban and mainline operators, infrastructure managers, research centres and universities. Currently no fewer than

115 organisations have signed the Memorandum of Understanding to participate in Shift²Rail's preparatory work, which is being coordinated by Unife.

In December 2013, the EC officially launched their proposal for the Shift²Rail initiative, calling on the EU Council of Ministers to pass legislation to establish the Joint Undertaking (JU) and proposing €450m in funding allocated over six years through the EU's Horizon2020 Research and Innovation programme to be matched by €470m from the private sector. The initiative has been positively received in the European Parliament, Council, and the European Economic and Social Committee and is expected to be adopted by the Council of Transport Ministers this June under the leadership of the Greek Presidency of the EU. If events unfold as expected, the JU could be set up in the second half of this year and research activities could begin as early as 2015.

Comprehensive programme

Shift²Rail's research programme focuses on three main challenges that have been identified jointly by the EC and the programme's promoters. These include:

- increasing the capacity of the European rail system by up to 100% in order to cope with increased passenger and freight demand
- increasing the reliability and quality of service by up to 50% of next-generation products and solutions to attract passengers and businesses to rail transport, and
- reducing life-cycle costs of the rail system by up to 50%, which could be reflected in reduced fares/shipment costs for users and lower public subsidies from the taxpayer.

Shift²Rail's approach is comprehensive and targets all segments of the rail market, including high-speed, mainline, regional, suburban, commuter, and freight sectors.

The proposed research in Shift²Rail is divided into Innovation Programmes (IPs) which focus on the areas of the overall rail system that must be developed to elicit the step-change in performance that is required. Each IP is

Rolling stock



Skoda and Siemens locomotives on test at the Velim test centre in the Czech Republic.

comprised of technology demonstrators (TDs), and a total of 40 TDs will contribute to the targets of the IPs, and thus the overall initiative. There are five IPs:

IP1—Cost-efficient and Reliable High Capacity Trains aims to design trains that will be lighter and more energy efficient, causing less track damage and less impact on the environment, thereby delivering a lower overall life-cycle cost. At the same time, operational reliability of trains will be increased, ensuring that passengers reach their destinations on time and with a better quality of service.

IP2—Advanced Traffic Management & Control Systems seeks to develop a new generation of signalling and train control systems, building on current ERTMS technology and maintaining backward compatibility to enable intelligent traffic management with automatically-driven trains that optimise capacity and reliability while minimising life-cycle costs.

Convergence between ERTMS and CBTC will be included in this IP.

IP3—Cost-efficient and Reliable High-Capacity Infrastructure offers a comprehensive and systematic approach to improve the durability, capacity and efficiency of track, tunnels, bridges, maintenance and energy systems to cope with increased traffic and higher operating speeds. This will allow the development of the pan-European railway infrastructure into a high-availability, low-cost transport mode that encourages a shift from less sustainable and less safe modes.

IP4—IT solutions for Attractive Railway Services aims to develop technologies that will reduce the fragmentation of the pan-European transport landscape and foster a more attractive, seamless and end-user oriented approach for travel shopping, ticketing and real time journey-tracking that encompasses multi-modal travel (air, rail and urban transit).

IP5—Technologies for Sustainable & Attractive European Freight focuses on railfreight technologies that will deliver reduced door-to-door transport times and enhanced security and traceability, thereby demonstrating a real business case for smart interoperable railfreight that offers reliable, competitive, sustainable, and flexible transport services that efficiently interfaces with other modes.

Key performance indicators (KPIs) have been assigned to each IP and TD which feed into overall Shift²Rail KPIs so that progress on the overall capacity, reliability and life-cycle targets can be measured.

In addition to the wide scope of the research, Shift²Rail puts emphasis on developing solutions that can be tested on the overall system and brought to market. To do this, the initiative proposes testing all of the developed technologies as far as possible at the system level on four-system-platform demonstrations that will recreate the conditions of the four major rail segments identified previously.

In the rail sector the first customer of newly-developed rail technology is frequently the first system-level tester of

the product, and this makes early adoption a risky undertaking. The comprehensive system testing with Shift²Rail will not only bring all component technologies together to realise the upgrade of the rail system, but will also instil confidence in potential customers and investors, thus ensuring a greater market uptake of the research results.

Congestion and environmental concerns are mounting and rail transport offers a practical solution to mobility challenges, but not to the full extent possible in its current state. To unlock the full potential of rail, significant investment and a system-wide perspective are necessary to make the mode more attractive to end-users. Shift²Rail is an unprecedented initiative that focuses the resources of the EU and the broader European rail sector on globally-defined mobility challenges in a systematic way, and ensures that the research undertaken produces tangible results that will make rail a more competitive mode of transport. **IRJ**

To learn more visit www.shift2rail.org. As coordinator of the preparatory phase of Shift²Rail, Unife would like to thank the broader rail sector for its active support and in particular, EC vice president Mr Siim Kallas and DG-Move and DG-Research for their major work on the initiative, the Greek Presidency of the EU Council for making Shift²Rail a priority during their presidency, and the European Parliament's ITRE and TRAN Committees - especially chairwoman Mrs Amalia Sartori and chairman Mr Brian Simpson.