techUK response: Rail and Urban Transport Review

Call for evidence questions

The core focus of this review is to examine how to accelerate the delivery of better intra- and inter-city connectivity to support a strong, sustainable economy with rail and urban transport networks and infrastructure fit for the century ahead. The following questions seek to explore this challenge from a variety of angles and perspectives.

Executive summary

The UK is a world-leader in digital innovation, adding £150bn to our economy every year. The investment in digital technologies from artificial intelligence (AI) to cloud computing and mobile connectivity is essential to support the delivery of rail and urban transport. Technology facilitates more effective planning and decision making, provides services that improve the customer experience and support the decarbonisation of the sector. Accelerating its adoption requires a clear and outcomes-led vision that can address longstanding barriers because, as things stand, solutions in rail and urban transport are struggling to scale-up, underinvestment is hindering systematic improvements, and an unstable policy environment is eroding private sector confidence.

The Williams-Shapps Plan for Rail (2018) was welcomed by the technology sector as setting the right framework for the rail industry to embrace data and innovation. Many of the themes and challenges were well addressed and we believe that the transition Great British Railways (GBR) can have transformative benefits through introducing a holistic and open approach to innovation. However, like the entire rail supply chain, we are concerned by the government's slow progress in implementing the Plan for Rail and giving GBR the legislative footing needed to advance at pace. The next government has an opportunity accelerate the rate of change through fully embracing GBR, bringing cost and revenue into one place, prioritising innovation and positioning rail as an industry capable of being cutting edge in its adoption of technology. If rail and urban transport is to become the backbone of our economy, meet the expectations of passengers and allow other sectors – from manufacturing to logistics – to thrive, it must be built around technology and innovation.

About techUK:

techUK is a membership organisation launched in 2013 to champion the technology sector and prepare and empower the UK for what comes next, delivering a better future for people, society, the economy and the planet. It is the UK's leading technology membership organisation, with more than 900 members spread across the UK. We are a network that enables our members to learn from each other and grow in a way which contributes to the country both socially and economically. By working collaboratively with government and others, we provide expert guidance and insight for our members and stakeholders about how to prepare for the future, anticipate change and realise the positive potential of technology in a fast-moving world.

Growth opportunity through unlocking planning

1. What do you view as the current key challenges hindering the delivery of rail and urban transport networks and infrastructure?

The UK lacks an integrated transport strategy underpinned by a vision of what we want from our future transport system. The recent testimonies given to the Transport Select Committee's inquiry into strategic transport objectives[1] have been clear that although there is no shortage of strategies on different topics and modes, there has been a failure to provide an overarching

[1] https://committees.parliament.uk/work/7794/strategic-transport-objectives/

vision that can be used by key supporting sectors, such as digital technology, to support long-term objectives and key requirements.

We urgently need a holistic vision for transport that is driven by national priorities and informed by data. This should build in flexibility to adopt cutting-edge technology which we have addressed in the response to section 3 of this document.

2. What spatial planning and associated policy and legislative changes would help unlock the delivery of rail and urban transport projects?

Digital technologies can play a significant role in improving the planning process. 'The Planning for The Future' White Paper[2] published in August 2020 highlighted that the system makes poor use of digital tools and set-out that digitisation can bring "real-time information, high-quality virtual simulation [and] straightforward end-to-end processes." It also identified that planning "should be based on data, not documents, inclusive for all members of society, and stimulate the innovation of the great British design industry". The revised National Planning Policy Framework (NPPF) from 2023 highlighted the need for the Planning system to be 'plan-led' and accessible using digital tools to assist public involvement and policy presentation.[3] For infrastructure schemes, this is even more critical as long planning times stifle delivery, drive up cost and erode public and market confidence. The Government's Digital Planning Programme[4] is a positive step forward however, to date, progress has been scattergun at best.

We believe that the rail infrastructure sector can lead by example by taking the following steps:

- Ensure all published and commissioned documents and the methods and data within them are machine readable, so they are easy to interrogate, share and re-use.
- Work towards standardising common built environment languages, processes and data to support cooperation between government, developers, infrastructure providers and wider players.
- Harness digital technology to foster participation in planning, unpack the decision-making process, and communicate the impacts of development.
- Ensure that Local Planning Authorities and the Planning Inspectorate have the capacity to procure and deliver the right digital tools, and the skills to interrogate their outputs.

Digital infrastructure and connectivity

The UK currently lacks a holistic plan for improving connectivity on-board rail and public transport services. From improved on-board monitoring systems to trains equipped with IoT connected sensors and more, the coming years will usher in a new era of highly connected trains and railways. For rail operators, this means greater management over the day-to-day services that passengers rely on to reach their destinations on a regular basis.

Three quarters of rail users believe it is important to improve connectivity available on trains but while expectation remains high, satisfaction is low according to Transport Focus[5]. The UK's poor progress comes down to a failure in commercial models and ability to plan long-term. The technology on-board rolling-stock is aging and not equipped to deal with the demands of modern usage such as streaming. In addition, communications infrastructure across the country is of varying quality and density, leading to a patchwork of 'not spots' that make consistent connectivity extremely difficult to achieve. While there have been improvements along some

[2] https://www.gov.uk/government/consultations/planning-for-the-future

[3] https://www.gov.uk/government/publications/national-planning-policy-framework--2

[4] https://www.localdigital.gov.uk/digital-planning/

[5] https://d3cez36w5wymxj.cloudfront.net/wp-content/uploads/2020/07/23175047/Keeping-connected-passengers%E2%80%99-experience-of-internet-connectivity-on-Great-Britain%E2%80%99s-railways-FINAL.pdf

stretches such as East Coast Mainline and London to Brighton routes much more needs to be done to meet expectations.

We need a national strategy for connected transportation. This should be viewed with the same degree of importance as spatial planning given the critical importance of connectivity in a digital age. This must be a joined-up approach between rolling stock, infrastructure and other connected assets such as vehicles and IoT devices, and includes the delivery of use cases such as automated train operations, track side maintenance, real-time video surveillance and train integrity. This strategy should set out the anticipated timeline for the digitisation of the sector, alignment of key technology solutions and based on common global standards.

3. Are there best practice or wider international examples that could be adopted to support growth through unlocking transport network and infrastructure delivery?

Across Europe, the standard railway control-command and traffic management system is the European Train Control System. This allows trains to run closer together and to travel at their best speeds while maintaining safe braking distances. This system is currently enabled by the Global System for Mobile Communications – Railway (GSM-R)[6], the standardisation of which has been driven mainly by the International Union of Railways (UIC)[7]. GSM-R addresses the needs of critical voice communications and data transmissions for certain rail use cases. Despite the success of GSM-R, it is becoming obsolete, due to the technological advancements of mobile communications systems, the widespread use of broadband services, and the increasing deployment of 5G cellular networks. 5G capabilities are also creating many new opportunities for railway systems, whether they concern use cases aboard a train, along railroads, or combining the operation of trains, signalling systems, operational centres, and workshops to enable (semi-) autonomous train operations.

Recognising the need to gradually replace GSM-R with the 5G technology, the UIC has laid the foundations of the Future Railway Mobile Communication System (FRMCS)[8], of which the main goal is to fully digitalise railway operations, support an increasing level of automatic train operations, and embrace the possibilities offered by 5G without creating a railway specific cellular network technology. Besides these basic goals, FRMCS aims to be cost effective and future-proof, interoperable, and allow seamless migration of GSM-R to FRMCS. These requirements are defined as part of the FRMCS standardisation process. Across Europe, FRMCS trials are underway with mobile infrastructure vendors, rail industry stakeholders, MNOs and Systems Integrators. Recent examples in Europe include trialling the 1900 MHz spectrum band in Germany with Deutsche Bahn and Gigabit Innovation Track.

Clarity and certainty of policy and funding

1. What are the key tenets of a successful, strategic long-term policy for the delivery of rail and urban transport networks, taking into account wider decarbonisation and transport integration goals?

Successful long-term policy for the delivery of rail and urban transport networks hinges on ambitious leadership that takes a ‘systems-level’ view. To date, the rail industry has operated in a fractious and siloed manner, with divisions between rolling-stock and infrastructure, cost and revenue, leaving no entity capable of taking a holistic view of the sector and how it supports wider transportational goals.

We support the principles set out within the Williams-Shapps Plan for Rail that the rail sector requires a ‘guiding mind’, enabling it to become more outcome focused and forward thinking by

[6] https://www.networkrail.co.uk/running-the-railway/gsm-r-communicating-on-the-railway/
[7] https://uic.org/
[8] https://uic.org/rail-system/telecoms-signalling/frmcs

balancing competing priorities carefully. It should be focussed on breaking down longstanding silos both within the rail sector itself and with other transport modes. This is critical if the sector is to be able to adopt technology and innovation at the rate needed to support modal shift, integrate with other transport modes, increase resilience and deliver for passengers.

An outcome-focused approach will consider, in partnership with the private sector, the challenges of highest priority to address. These challenges should be clearly communicated to the supplier ecosystem through 'challenge statements', underpinned by a culture of transparency and willingness to engage in an early and sustained manner with the technology sector.

Solving the Scale-Up Challenge:

The UK's technology sector is one of the most dynamic and innovative in the world. It adds £150bn to the UK economy every year and is one of our most valuable sectors.

techUK members have been supplying technology services to the rail industry for decades, providing technology from remote sensing, advanced analytics (digital twins), artificial intelligence (AI) and connectivity services to support business intelligence and improve services.

However, the rail sector is an industry in which the scale-up and commercialisation of new technology is extremely difficult. techUK members report a multitude of barriers which are preventing the rail industry from being able to address longstanding challenges through applied innovation. **As such, it is critical the railway of the future treats solving the scale-up challenge as a fundamental priority.** In 2022, rail accounted for just 2% (trips per person) of all travel in England[9]. Without urgent and co-ordinated action, the railways will continue to underperform and fail to increase patronage.

We recommend the following steps be taken as a matter of priority:

- **Pipeline visibility:** supply chains require visibility over project pipelines in order to know where it should focus innovation efforts. Currently, rolling stock specifications are so near term that there is little point investing in innovation without a steer from the Original Equipment Manufacturer. On the infrastructure-side, a wait time of up to three years to get a new product approved by Network Rail stifles progress. A steady and visible work pipeline will help counter these negative impacts, injecting confidence, investment and innovation throughout the supply chain.
- **National approach of R&D funding:** While funding for R&D projects such as First-of-a-Kind or Demonstrators is welcome, the innovator community is left with a sense that the same trials are being undertaken over and over again, albeit with a slightly different slant. We need a nationally coordinated plan for how we trial and demonstrate new technology in rail, ensuring that the various funding bodies and accelerators are led by a guiding mind which derives maximum value from finite time and resources.
- **Focus funding on deployment:** It is essential funding focuses on deployment as well as R&D. Technologies ready for deployment today, like innovative data sharing environments, can offer immediate economic, social and environmental value. There should be considerable focus on ensuring we deploy available technologies and avoid fixating testing the next generation of emerging technologies.
- **Address the transport data challenge:** data underpins the digital ecosystem of the rail sector, however its availability and shareability determines the extent to which rail can leverage the benefits of digital technologies. Initiatives to improve data-sharing such as the Rail Data Marketplace are a positive step but do not go far enough. Pooling data into a central location is the first-step but must be supported by state of the art tooling, analysis and computing capabilities if genuine innovation is to follow. In addition, the

[9] https://www.gov.uk/government/statistics/rail-factsheet-2023/rail-factsheet-2023#rail-statistics-overview

Department for Transport's Data Strategy[10] sets out a number of ambitious actions for government, however since its publication appears to have made limited progress in implementation. The private sector can spearhead data sharing initiatives to enable innovation such as Mobily-as-a-Service and digital ticketing, however, government must play its part by delivering on its commitments to the sector.

2. What reforms to current transport funding approaches would support the safeguarding and expansion of rail and urban transport networks and infrastructure? Does the Green Book allow for sufficient factors to be taken into consideration and what should any additional factors/considerations be regarding infrastructure?

As above.

3. What mechanisms are available to facilitate effective public/private relationships and funding?

As above.

4. What role does the maintenance of existing transport assets play in harnessing growth and how could the current approach be improved.

There is enormous potential for cost reduction through the adoption of new technologies. Intelligent infrastructure in the rail sector brings about transformative benefits by enhancing efficiency, safety, and overall performance.

Advanced technologies, such as sensor networks and real-time data analytics, enable predictive maintenance, reducing downtime and ensuring optimal operational conditions. Smart systems also improve safety through the implementation of automated monitoring and response mechanisms, preventing accidents and enhancing emergency response capabilities. Additionally, intelligent infrastructure fosters better resource utilisation, optimising energy consumption and reducing environmental impact.

Case study: INSIGHT - The Health Data Research Hub for Eye Health

INSIGHT[11] is an NHS-led initiative set up to make routinely collected eye data available for approved health research from which there are interesting learnings for the transport sector. Its aim is to improve healthcare by making it simpler for researchers to use large, anonymised sets of patient data in a safe and ethical way. The data provided currently comes from two NHS foundation trusts, Moorfields Eye Hospital and University Hospitals Birmingham. State of the art analytical and computational tools are then applied to research conditions including diabetes and dementia. The Department for Transport has the opportunity to embrace this concept through establishing transport data research hubs that can help address complex challenges such as adapting to changing behaviours to mitigating the impact of climate change.

Devolution and sustainable partnerships

1. What role does devolution have in supporting and accelerating the delivery of rail and urban transport networks and infrastructure fit for the future?

The UK has achieved a great deal in devolution for transport and we welcome continued government efforts to empower local authorities, regions and sub-national transport bodies.

[10] https://www.gov.uk/government/publications/transport-data-strategy-innovation-through-data
[11] https://www.insight.hdrhub.org/

These bodies must be given the flexibility needed to make decisions and the resources needed to deliver locally while supporting the national objectives and key results set by central government.

Devolved authorities can also be more responsive to the application of emerging technologies and can take risks that would be harder for central government.

2. How can effective relationships be facilitated between all tiers of government, to help accelerate growth and deliver rail and urban transport networks and infrastructure?

There needs to be a clear connecting strategy that unites all layers of government in respect of rail and urban transport. As previously discussed, the UK lack an integrated transport strategy which leads to siloed and activity and divided priorities at the local level. We need to see all layers from government from hyper-local to regional, driven by national objectives and key results for factors such as modal shift, net zero, and what we want from our public transport system.

3. How can the capacity of public bodies be enhanced to effectively partner, procure and deliver urban transport and rail networks and infrastructure and provide value for money?

No comment.

Private Sector and Industry Capacity

1. How can effective private sector investment be best leveraged in the long term to unlock growth?

To attract private sector investment in the rail industry, there is a critical need for transparency regarding upcoming projects and industry challenges. The technology supply chain hesitates to invest without a clear understanding of potential returns and commercial opportunities. Unfortunately, current confidence in the sector is low due to a perceived lack of long-term vision from the government and the reconsideration of major projects like HS2. This contributes to the belief that rail is not a growth sector, leading to a deficit in political and financial commitment.

Reversing this trend requires fostering open and transparent communication with the private sector, supported by a visionary approach that stimulates investment and innovation across the entire supply chain.

2. What can be done to build resilient and efficient supply chains and necessary skills to accelerate infrastructure delivery and maximise value/job creation to local communities?

The rail industry, like many others across the economy, needs to urgently strengthen its digital skills base to ensure it has suitable levels of technology and data literacy across both the public and private domains. Attracting and retaining digital skills is critical, however the ‘pipeline’ of skills and attracting young talent into a historically ‘less exciting’ sector is also a key issue.

techUK outlined a series of wider recommendations for addressing the skills gap in transport in a report developed in partnership with our members in 2023[12]. These include policy-driven measures such as a review of the Apprenticeship Levy and introducing a Digital Skills & Productivity Tax Credit, with strategies to improve transport’s reputation as a dynamic and exciting place to come and solve challenges through technology.

3. How to best harness the benefits and be adaptable to future technological trends in the sector?

[12] https://www.techuk.org/resource/driving-the-future-of-transport-addressing-the-skills-gap.html

We are in a golden-age of technological and scientific progress. Britain's railways need to modernise if they are to serve our economy, meet passenger demands and connect the country. The rail sector has the capacity to adopt this innovation to address longstanding challenges from mobile connectivity to reliability. However, the sector must think differently about its approach to applied innovation if it is to take advantage of new technologies.

- **Reframe public procurement to support innovation:** the current system of complex product approval processes and supplier frameworks must be overhauled. Driving innovation through procurement was a key policy in the 2023 Science and Technology Framework[13] that highlighted promised reforms in the 2023 Procurement Act[14] as a major opportunity to boost innovation. Public sector procurement in rail must embrace the principles of the Act while supporting the adoption international standards that will enable integration with global services. Earlier and more effective engagement with small and medium sized businesses forms a key part of this, as well as coming to faster decisions. We recommend a root and branch review of rail industry procurement takes place as soon as possible, engaging organisations such as techUK and the Innovation Procurement Empowerment Centre[15].
- **Open data to drive innovation:** the rail sector has made strides to move towards an open data future. Opening up datasets will make it easier for partners to provide services such as Mobility as a Service, 'Find my Seat' features and personalised travel offers. In operations, the sharing of data from remote monitoring devices and sensors can enable the use of 'digital twins' which support the applied application of machine learning and predictive algorithms to improve business intelligence. The benefits of open data and data sharing have been set out by the DfT's Data Strategy. However, open data initiatives such as the Rail Data Marketplace have only resulted in limited progress due to longstanding issues surrounding data standards, accuracy and completeness and lack of innovative computational and analytical tools.
- **Data as a strategic asset:** rail operators and infrastructure authorities have the opportunity to drive long-term financial sustainability through viewing data as a strategic asset. In transport, infrastructure and built environment it is rare that Chief Information, Technology or Digital Officers will sit on management boards and leadership committees, meaning the 'voice' for data and digital is often not heard. However, data is critical to operational and commerical success and requires fully developed strategies for how it can be harnessed to support wider objectives. Through working with innovators, the owners of rail data can then develop new products, services and revenue streams that help achieve wider organisational and nationally defined goals.
- **Improve cyber-security collaboration:** according to the UK's National Risk Register[16], transport infrastructure cyber-attacks have a significant likelihood (5-25%) however cyber security remains a key challenge to rail and urban transport stakeholders, many of which remain relatively immature in this area. Government, including the DfT and ORR, should facilitate better rail cyber security information intelligence exchange and reinvigorate the industry's Security Working Group. This also includes equipping rail regulators with the resources and skills to effectively enforce cyber security principles and work with the sector to consider new certification schemes for rail solutions. .

Case Study: HS2 Innovation Accelerator

HS2's procurement approach is a forward thinking model for supporting innovation. Focused around HS2's three innovation challenges: productivity; the environment; and the circular

13 https://www.gov.uk/government/publications/uk-science-and-technology-framework
14 https://www.legislation.gov.uk/ukpga/2023/54/contents/enacted
15 https://www.ipec.org.uk/
16 https://www.gov.uk/government/publications/national-risk-register-2023

economy; the HS2 Innovation Accelerator, run in partnership with Connected Places Catapult and Innovation Birmingham, aims to bridge the gap in rail innovation by building a thriving SMEs ecosystem. Its success lies in empowering SMEs with added support while fostering partnerships with Tier 1 suppliers. Beyond its conventional role in advancing commercial, investment, and technological readiness, the programme assisted SMEs in navigating HS2's preferred procurement platforms and supply chain frameworks. Treating Tier 1 suppliers as supply chain partners, throughout the process, from challenge inception to SME selection, resulted in 50% of these SMEs securing procurement post-programme. While HS2's procurement is private, this model of engaging suppliers throughout procurement phases and supporting SMEs could be a blueprint for the public sector.