Innovation Landscape in UK Rail

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Contents

Introduction

UK rail is in a time of huge upheaval. As a sector, we are transitioning away from our franchising model towards Great British Railways; uniting operators and infrastructure owners. This presents great opportunity as well as challenge; one of the most common questions we are asked at Innovate UK KTN is what the rail landscape currently looks like with regards to rail innovation and funding, and what it might look like as we move towards Great British Railways.

This document aims to provide some clarity by outlining some of our current innovation processes (as of April 2022), some opportunities, and a look towards the future. This document is not exhaustive and is intended to provide a snapshot look at the sector. It was prepared by Innovate UK KTN, with assistance and input from Innovate UK, Railway Industry Association and Rail Safety and Standards Board; thanks must go to them for their valuable insight.

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Innovate UK KTN is the UK's innovation networking agency, connecting ideas, people and communities to respond to challenges and drive positive change through innovation. Find out more at https://ktn-uk.org.

Innovate UK is the UK's innovation agency, a non-departmental government body with a mission to drive sustainable economic growth through business-led innovation, by investing in innovation and giving innovative businesses access to support. Find out more at www.gov.uk by searching for Innovate UK.

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- Rail Safety and Standards Board (RSSB) – Guy Yeomans and Andi Flint
- Thales – David Taylor
- South Western Railway – Dan Piner

Funding

Funding Basics

There are many different funding sources within the UK. Given the industry transition to government-led, this document will primarily focus on government funding.

However, for clarity, there are many different sources of funding through equity, loans and grants which can be accessed to support innovation.

Innovation Funding Landscape graph
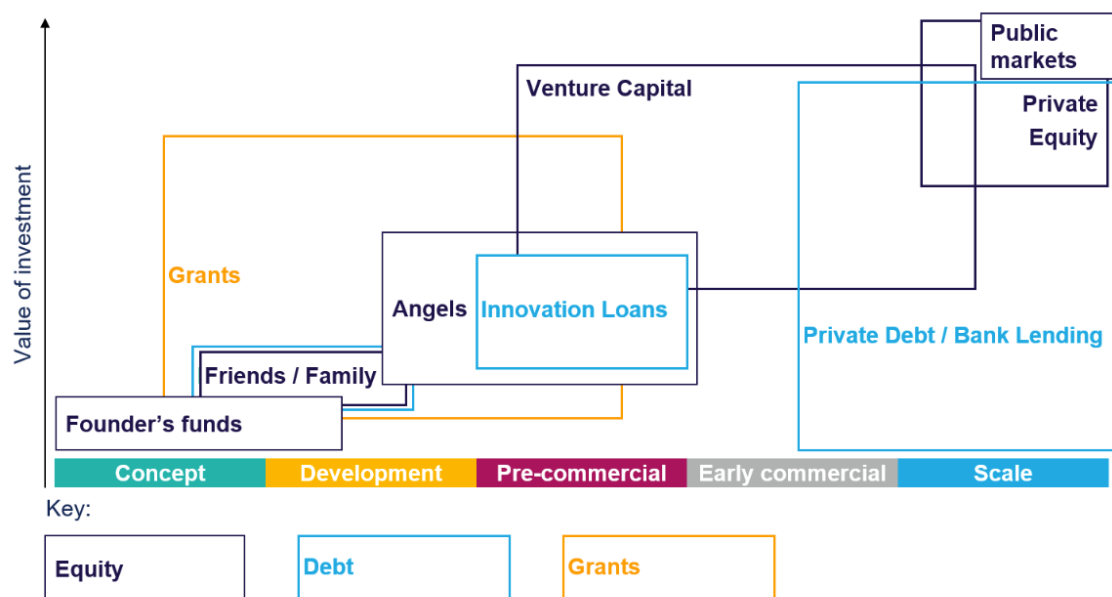
Source: British Business Bank and Innovate UK

There are plenty of useful sources where funding is listed, and events where funding may be referenced where it is not directly set out in the public domain. They include, but are not limited to:

- UKRI
- Innovate UK
- Innovate UK KTN
- Railway Industry Association
- Rail Forum
- Network Rail Regional Supplier events
- Network Rail Challenge Statements
- European opportunities including Horizon Europe, Shift2Rail and Space4Rail

Specific links include:

- Europa via: https://ted.europa.eu/TED/browse/browseByMap.do
- HS2 via: https://www.hs2.org.uk/contract-opportunities/?status=not%20started&category=0&value=0
- RSSB via: https://www.rssb.co.uk/research-and-innovation
- TfL via: https://tfl.gov.uk/corporate/publications-and-reports/contract-opportunities
- Government export events via: https://www.events.great.gov.uk/ehome/index.php?eventid=200209668&
- Welsh procurement via: https://www.sell2wales.gov.wales/SOCInformation.aspx
- Scottish Rail Cluster via: https://www.scottishengineering.org.uk/railcluster/rail-cluster-directory/

Typical funding streams

Funds within rail change based on industry needs, government priorities, operator priorities and more. However, some of the most common within the sector/relevant to rail are outlined below:

Grant name	Usual £ boundaries	Grant owner	Usual constraints	Regularity
First of a Kind	£50k - £400k	Innovate UK	- Any size organisation - Must involve rail asset owner, an experienced rail	Annual

			organisation, and a potential rail customer - A letter of support and an integration partner	
Smart Grants	£25k - £2m	Innovate UK	- UK registered business, any size - Include an SME - Carry out all project work in the UK and intend to commercially exploit the project from/in the UK	3-4 times per year
T-TRIG (Transport-Technology Research and Innovation Grants)	Up to £30k or up to £100k	Connected Places Catapult	- Based or registered in the UK - Any size	Annual
A-TRIG (Accessibility-Technology Research Innovation Grants)	Up to £120k	Connected Places Catapult	- Based or registered in the UK - Any size	Annual
Horizon Europe	€234m total funds available (in rail)	EUROPE's Rail	(Detailed, outlined in part B of the General Annexes of the Horizon Europe Work Programme 2021-22) - Any legal entity may participate, established within the EU or eligible non-EU country (including the UK, depending on current status)	Ongoing

HS2 Accelerator	N/A	High Speed Two	- Open to SMEs	Annual
LNER Future Labs Accelerator	N/A	London North Eastern Railway	- Open to SMEs	Annual
Transport for Wales Rail Accelerator	N/A	Lab by Transport for Wales	- Open to SMEs	Annual

Advice when applying for funding

When you are applying for grant funding, four fundamental questions will be considered by assessors:

1. Is it a big enough market? Does it represent value for money compared to the investment requested?

2. Can the innovation be world leading? Is the idea sufficiently distinctive and strong to be successfully exploited in the UK and globally?

3. Is it at the right stage of development? It must be market driven, rather than predominantly a research project

4. Why should public money be used? Why not use company funds or raise additional finance via VC investment or a bank loan?

Top tips for applications:

- Fit within scope - Make sure your project is within the remit for the competition – details can be found in the briefing document.
- Agree key points with partners - Get started on your outline project plan and Consortium Agreement as soon as possible – who will do what and who will own what when it comes to IP?
- Be clear & concise - You don't have much space so make every word count and avoid overly technical language and explain your acronyms.
- Make a realistic plan.
- Be convincing - Why do you need the money?
- Remember risk & innovation.
- Quantify & justify assertions - Provide numbers and evidence.
- Excite & inspire - Stand out from the crowd and make sure your first few paragraphs are particularly strong - that first impression counts!

- Get advice & feedback from Innovate UK KTN - We are grant funded to support you – we can provide independent, objective feedback and advice. Contact us early to get the most value.
- Don't leave it too late to ask questions or submit! Remember that Innovate UK deadlines are strict but you can upload and overwrite your application as many times as you like - only the last version will be evaluated.

Remember:

- Each competition is different – don't make assumptions!
- The Guidance for Applicants changes – always re-read it.
- Don't assume you're in scope.
- Always answer the question(s).
- Don't push boundaries or you will become ineligible.
- Consider your collaborators.
- Explain the internal team.
- Don't get the deadline wrong or leave it too late.
- Consult Innovate UK KTN.
- Download the Innovate UK KTN good application guide!
- Attend networking events for support and partners; Innovate UK KTN, Railway Industry Association, Rail Forum all run excellent events, alongside others in the sector.

Successful funding case studies

Below are three brief examples of some excellent past projects funded through some of the sources listed above.

Window Seater

First of a Kind 2021 funded
£149,955

Window Seater is a start-up that connects rail travellers to the world outside their window, providing high quality geolocated audio stories which link all the fascinating features along the railway. Window Seater partnered with Community Rail Network and Great Western Railway to develop a new Community Rail Content Platform that integrates collected stories from community rail partnerships (CRPs) with passenger-facing technologies used by railway organisations. The platform offers a cost-effective way to improve customer experience and attract leisure travellers, re-engages passengers in rail following COVID, and helps to tell the stories of Community Rail Partnerships.

DSCIENCE LTD and NERC Centre for Ecology and Hydrology

Smart Grant (October 2019)

£90,000 (approx.)

Invasive Non-Native Species (INNS) are organisms introduced into areas outside their native region where they then threaten ecosystems. They are regarded as one of the top five threats to biodiversity worldwide (IPBES, 2019), as well as having significant economic impacts. Traditional methods for identifying the presence of INNS rely on ecological surveys, which are time consuming and costly, especially on rail infrastructure. Keen AI, the UK Centre for Ecology and Hydrology (CEH) and Time-Lapse Systems combined their expertise in Artificial Intelligence (AI), INNS and image collection to provide a faster and more efficient method of conducting surveys of this kind, reducing costs, and providing location specific information to support decision-making and management actions.

Sirocco

Privately TOC-funded
£300,000 per annum (approx.).

Developed by South Western Railway (SWR) working with Mistral Data Limited (FirstRail's IT Development), Sirocco is a real-time, on-the-day decision support tool for control centres, which presents a live view of train running, resources, and service data on maps and dashboards. Sirocco integrates multiple railway data sources - GPS, TRUST, TD.Net, GSMR, Stock and Crew systems, into a single portal. It uses rules-based alerts to flag delays or issues, presenting information across a series of maps and dashboards to improve the quality and speed up the flow of information during disruption. Sirocco was designed to integrate system avoiding the large implementation and on-going costs of alternative products available to the industry.

Sirocco has a wide range of benefits, including:

- Disruption is quickly managed through the aggregation of data into one source of information for service management.
- All data refreshes automatically, no user action required, so the data presented is always the most up to date available.
- Sirocco can return crew workings enquiries in 10s compared to 4 mins via previous/legacy processes, making post incident investigations quicker and more efficient.
- Performance awareness as a result of Sirocco has empowered all operational staff to react to performance issues, enabling the business to be transparent with customer

The development of Sirocco also enabled Data to be captured and reported to Control and Customers which has not previously been available. For example, the Island Line now has the equivalent data reporting to the Mainland railway using GPS/ Sirocco architecture linked to Rail industry systems.

Whilst there are plans to further develop Sirocco in Year Two of SWR's business plan, a ballpark cost of Sirocco currently is approximately £300,000 per annum.

The Industry

Industry Groups

The Rail Innovation Landscape is wide and varied and encompasses many groups not strictly within rail. In one way or another, all these groups assist innovators within rail. Innovate UK KTN can connect you into these groups to access this support. The below diagram outlines just some of the major groups involved.

Network Rail

Infrastructure ownership and innovation; challenge statements listed online. Also offers RiDCs (Rail Innovation and Development Centres); safe environments where new and modified rolling stock, plant, on-track machines, infrastructure, equipment, and technology can be tested. Network Rail also funds R&D activities.

Train Operating Companies (TOCs)

Operate and innovate within passenger service networks, sometimes publish challenges. Within 2022, TOCs are experiencing a major change in funding, which means they may not have some of the funds available which they had historically. Some operators offer accelerator programmes or innovation programmes, especially for SMEs.

Freight Operating Companies (FOCs)

Operate and innovate within freight service networks, sometimes publish challenges.

Open Access Operators

Open access operators (like Lumo or Grand Central) do not receive any funding (from government or the taxpayer) to run services, unlike TOCs. They take full commercial risk.

Regional transport bodies (including statutory sub-national transport bodies):

Transport for London

Transport for Greater Manchester

Transport for the West Midlands

Merseytravel

South Yorkshire Mayoral Combined Authority

Tyne and Wear Passenger Transport Executive

West Yorkshire Combined Authority - Metro

Transport for the North – a sub-national transport body

- These have different levels of regional authority over transport, working alongside private and government operators. Some publish their challenges online.

Non-statutory bodies include England's Economic Heartland, Midlands Connect, Transport East, Transport for the South East, Western Gateway and Peninsula Transport.

Transport Scotland (Còmhdhail na h-Alba)

The national transport agency for Scotland, delivering the Scottish Government's vision for transport.

Irish Rail (Iarnród Éireann)

The operator of the national railway network of Ireland.

Translink

Translink is the brand name of the Northern Ireland Transport Holding Company, a public corporation in Northern Ireland which provides the public transport in the region.

Transport for Wales Rail (Trafnidiaeth Cymru)

A publicly owned Welsh train operating company, a subsidiary of Transport for Wales, which is owned by the Welsh Government.

Northern Powerhouse Rail

A strategic rail programme aiming to provide effective and efficient rail connectivity between the North's major economic centres.

Scottish Rail Cluster

Through Scottish Engineering; links Scottish SMEs with rail manufacturers, contractors, academics, and research centres across the country.

Government

Innovate UK KTN, the UK's innovation networking agency. This encompasses KTPs (Knowledge Transfer Partnerships), which connect business and academia through shared challenges.

Innovate UK; the UK's innovation agency, hosting multiple funding competitions paid for by the Department for Transport; most notably, the annual First of a Kind (FOAK) competition.

Department for Transport (DfT), Department for International Trade (DIT), Department for Business, Energy, and Industrial Strategy (BEIS); DfT leads on transport policy, collaborating with BEIS and DIT to enable wider and international opportunity. Government departments fund innovation programmes.

ORR

The Office of Rail and Road (ORR) is a non-ministerial government department responsible for the economic and safety regulation of Britain's railways.

Local Authorities

Contribute to planning and funding of local transport services, run concessionary schemes, invest in local networks and more.

Local Enterprise Partnership (LEP)

Locally owned partnerships between local authorities and businesses. A LEP plays a central role in deciding local economic priorities and undertaking activities to drive economic growth and create local jobs.

Railway Industry Association (RIA)

A national trade association for UK-based suppliers to the railway industry. RIA has over 300 member companies from across the supply chain, over 60% of which are small or medium sized enterprises (SMEs).

Rail Forum

Rail Forum is a national industry body for railway suppliers and organisations, operating from a base in the Midlands (formerly known as Rail Forum Midlands).

Rail Safety and Standards Board (RSSB)

RSSB is a not-for-profit company owned by major industry stakeholders, governed by its members and a board. RSSB's cross-industry rail research programme, funded by an annual grant from the Department for Transport, is driven by the needs of the rail industry, targeting challenges and opportunities that will not, or cannot, be addressed by other mechanisms. Intrinsically linked to RSSB core functions in system safety and standards, the research undertaken seeks to enhance the safety and interoperability of the rail network. The aim is to benefit the entire rail ecosystem, specifically including the system interfaces and uniquely, to be able to address market failures and tackle issues that may offer significant return over multiple Control Period timeframes.

Rail Delivery Group (RDG)

A membership body that brings together passenger and freight rail companies, Network Rail and High Speed 2. The Technical Leadership Group (TLG) operates from RDG, acting as the rail industry sponsor and owner of the Rail Technical Strategy.

Rail Supply Group (RSG)

The Rail Supply Group (RSG) is a leadership body for the rail supply sector, working in partnership with the Rail Delivery Group (RDG) to set direction for the industry.

Rail Freight Group (RFG)

The representative body for rail freight in the UK.

UK Rail Research and Innovation Network (UKRRIN)

Designed to enable collaboration between academia and industry. Built on three Centres of Excellence formed by a consortium of universities, in collaboration with existing industry testing and trialling facilities such as Network Rail's Rail Innovation and Development Centres.

- Digital Systems (led by University of Birmingham, in partnership with Lancaster University, Imperial College London, Swansea University and University of Hull),
- Rolling Stock (led by University of Huddersfield, in partnership with Newcastle University, Loughborough University, University of Cambridge, University of Bristol, Brunel University and University of Nottingham) and
- Infrastructure (led by University of Southampton, in partnership with the University of Nottingham, the University of Sheffield, Loughborough University and Heriot-Watt University).

Community Rail

Community Rail has powerful links into local communities and groups. Community rail is a growing grassroots movement made up of community rail partnerships and groups across Britain. They engage communities and help people get the most from their railways, promoting social inclusion and sustainable travel. The national membership body is Community Rail Network.

Tier 1s, 2s and 3s

A tier 1 vendor is a large and well-known vendor, often enjoying national or international recognition and acceptance. Tier 2s and 3s are less well-known or smaller organisations. All of these will often work with SMEs.

Tier 1s include:

- Alstom
- Align JV
- AmcoGiffen
- Amey
- Arup
- Atkins

- Balfour Beatty
- BAM Nuttall
- Colas Rail
- Costain
- Dyer & Butler
- Mott MacDonald
- Rhomberg Sersa
- Siemens Mobility
- Skanska Construction
- SSE Rail
- XYZ Rail

Original Equipment Manufacturer (OEMs)

An Original Equipment Manufacturer. These will often work with SMEs. This includes companies that build the passenger trains in Britain:

- Alstom and Bombardier (part of Alstom)
- Hitachi
- Siemens

Transport Focus

Transport Focus is the independent watchdog for transport users.

Rail Accident Investigation Branch (RAIB)

Independently investigates accidents to improve railway safety and inform the industry and the public.

ROSCOs

Rolling Stock Leasing Companies own most of the coaches, locomotives, and freight wagons on rail, which they hire out to TOCs. FOCs sometimes own some of their own rolling stock. Leasing companies include:

- Angel Trains
- Beacon Rail
- Caledonian Rail Leasing
- Eversholt
- General Electric (GE)
- Halifax Asset Finance
- Macquarie European Rail

- Lombard North Central
- Porterbrook

Catapults

A network of technology and innovation centres established by Innovate UK. The Connected Places Catapult accelerates innovation for cities, transport, and places.

The Rail Innovation Group

The Rail Innovation Group is a not-for-profit community helping to change cultures and bring digital technology into rail.

Strategies

A huge number of strategies, programmes and documents underpin innovation in rail. Some of the most significant are:

- The Williams-Shapps Plan for Rail
- Transport Decarbonisation Plan
- Inclusive Transport Strategy
- Rail Technical Strategy
- Integrated Rail Plan for the North and Midlands
- Network Rail's Delivery Plan (Control Period 6)
- Rail Data Marketplace

The Future

Future Industry Innovation Structure
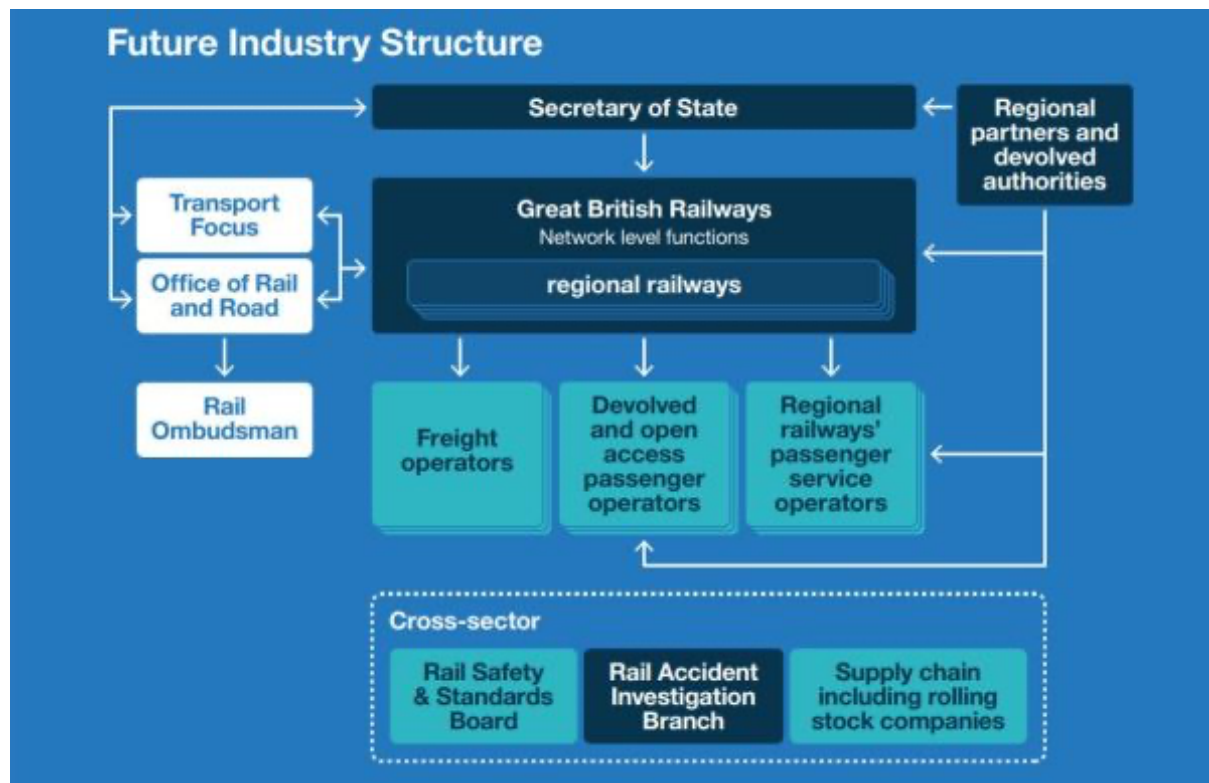
This industry structure outline was taken from the Williams-Shapps Plan for Rail. Looking to the future of innovation, this white paper outlining Great British Railways promises:

- Great British Railways will become the primary public funder of RD&I initiatives across the sector, delivering priorities set by Ministers. Stronger links with centres of industry and private sector innovators will be a core part of the new RD&I system. Great British Railways' regional divisions will lead delivery of RD&I projects to focus them on the needs of passengers and freight customers. They will work more closely with partners such as the UK Rail Research and Innovation Network (UKRRIN) to improve collaboration across the sector and beyond. This includes using the emerging network of

regional innovation centres at universities and technical institutions, such as the National College for Advanced Transport and Infrastructure, to act as incubators, support networks and more active partners in modernising and expanding the supply chain across the rail sector.

- RD&I schemes and funding pipelines will seek to break open the rail supply market, encouraging and supporting innovative new partners and incumbents to deliver new customer-focused benefits. Using open competitions for new initiatives, will incentivise innovation and efficiency in the supply chain. Benchmarking across regions and more transparent data will help to measure effectiveness, promote efficient spending, and strengthen accountability.

- New ways of working with the private sector. Passenger Service Contracts will focus on reliability, performance, and efficiency. New opportunities for innovators, suppliers (including small and local partners) and funders will be created through streamlined contracts and more contestability. The contracts themselves will feature scorecard linked incentives that feature innovation. It is also intended that the geographic and financial size of Passenger Service Contracts will reflect local markets and needs; meaning fewer barriers to entry for new and innovative bidders where this offers value for money. Stations will also have a stronger local focus, enabling locally focussed innovations to be implemented.

- A 30-year strategy will provide clear, long- term plans for transforming the railways to strengthen collaboration, unlock efficiencies and incentivise innovation. The strategy aims to save time, reduce costs, and enable innovators to develop new ideas and solutions. The 'Whole Industry Strategic Plan' will become the first 30-year strategy and should be ready within 2022.

- The government wants to ensure that rail combines the best of the public and the private sectors in future. The railways will take the very best of the private sector – innovation, an unrelenting focus on quality, outstanding customer service – and harness it under the single guiding mind of the public sector. This includes creating an open, innovative system with shared data, new forms of competition, and opportunities for new ideas to flourish and scale-up to benefit passengers, freight customers, the economy, and taxpayers.

- Simpler procurement, open data sharing (the Rail Data Marketplace will begin to open up this data) and the use of testing environments such as sandboxes, will also help to remove barriers to investment and innovation and enable more effective testing of emerging technology.

- GBR promises greater adoption of design sprints and competitions to identify and solve challenges at pace locally and regionally. Targeted partnerships between Great British Railways, its partners and other transport authorities, investors and start- ups will enable collaboration between the public and

private sectors to push innovative solutions forward. Tailored programmes to support entrepreneurs and local operational teams in developing solutions will help to reshape the culture of the sector to achieve smarter working, more affordable results, and quicker adaptability.

- Local engagement will better support SMEs and start-ups. Teams will be empowered locally to work collaboratively with private partners to do the right thing for passengers and freight customers. They will also improve engagement with local businesses and communities, including through creating new opportunities for local partners and businesses to play a greater role in shaping investments in their area. Through engaging innovators, third-party funders and investors, regional divisions will be able to use their new procurement and research, development, and innovation (RD&I) capabilities to unlock additional private investment and support promising new start-ups. This will open up opportunities for innovative suppliers to secure funding, improve competition and speed up delivery.

Source: https://www.gov.uk/government/publications/great-british-railways-williams-shapps-plan-for-rail

Summary

Whilst we are still waiting for further information around the future of innovation within Great British Railways, we can see several key points:

- There are available funding opportunities in UK rail which can be accessed with the support of the industry groups listed above.
- UK Government has committed to innovation into the future of rail as it transitions to Great British Railways.
- Great British Railways will become the primary public funder of RD&I initiatives across the rail sector. There will also be regional delivery opportunity. This aligns to RIA's "Railway Innovation Strategy"; with a key recommendation to increase government investment in rail research, development, and innovation, providing a pathway and funding for radical innovation, as well as a focus on supporting innovation during the roll-out phase.
- Passenger Service Contracts will focus on reliability, performance and efficiency and will feature scorecard linked incentives that feature innovation. This aims to overcome some of the key barriers to innovation within rail, particularly for SMEs, through incentive encouragement.
- The 'Whole Industry Strategic Plan' will become the first 30-year strategy and should be ready within 2022. This again aligns to RIA's Railway Innovation Strategy recommending whole-system, long-term innovation thought leadership.
- In the Queen's speech (May 2022), a Transport Bill was announced which will create Great British Railways (GBR). The main elements of the bill will:
  1. Create Great British Railways to act as the national leader of rail, establishing accountability and joined-up leadership from/in 2023. It will also focus on customers, with improved accessibility and open data, with direction set by government.
  2. Transfer contracting powers of passenger services to GBR alongside private sector elements.
  3. Address laws around self-driving vehicles and vessels, and roll-out of electric charge points for vehicles.