

# Innovate UK

## Results of Competition: SBRI Rail First Of A Kind Round 3: Resilience, Freight, Noise and Environment

Competition Code: 1902\_SBRI\_DFT\_RD3

Total available funding is £7,551,454

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
AP Sensing UK Ltd	SPECTRAIL - Low cost intelligent infrastructure through fibre acoustic transmission.	£349,800	£349,800

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## Project description - provided by applicants

SPECTRAIL - Low cost intelligent infrastructure through self-powered fibre acoustic transmission.

Spectrail is an IoT sensing platform which enables truly intelligent infrastructure. It is simple, low cost, fast to fit, maintenance free and able to sense at a majority of locations, yet, through its novel architecture, remains very flexible to local requirements. It will allow the infrastructure custodian the ability to collect data at sites previously inaccessible to power or connectivity, or at those deemed too high cost. The benefits to the infrastructure owner arise from a new ease in collecting targeted and actionable asset condition knowledge, enabling a predict-and-prevent maintenance strategy across many asset types - benefits which can be passed directly to rail users. The spectrail solution leverages the existing NR (Network Rail) fibre optic network alongside a fusion of three cutting edge technologies recently finding commercial applications in other sectors, but not yet in UK Rail:

- 1) FOAS (Fibre Optic Acoustic Sensing), deployed in overseas rail and Oil+Gas, is a central processor which can 'listen' over a 70km range by observing minute changes in light transmission caused by fibre movements, e.g from sound waves. It can detect and localise acoustic events such as wheel flats, cable theft and trespass.
- 2) PEAT (Piezo-electric acoustic transducers) 'tap' on the fibre, through the sheath, to transmit data. These will be integrated into nodes designed to interface with a wide range of sensors.
- 3) High efficiency photovoltaic panels will harvest energy at those sensor nodes. When coupled with smart power management, this will allow a 10 year fit-and-forget sensor lifetime even in low light or indoor applications.

The result is that the already attractive functions of FOAS are complemented with low cost point measurements, offering the ability to sense almost anything, anywhere in the vicinity of where NR fibre runs, which is over 90% of infrastructure. When a new point measurement is required by NR, node installation will be as simple as selecting a sensor and clipping a small box to the fibre sheath. FOAS then automatically locates and interprets the output.

This project will prove out the approach by integrating the technologies in the laboratory for the first time, then installing an end-to-end prototype at NR's RIDC Melton to obtain mainline test certificates for the next stage of product acceptance. Four sensors will be demonstrated at around a 15km range including two novel in the rail environment: Fire detection (proprietary, event-based); graffiti-in-progress detection (proprietary, sensor fusion); Geophones (COTS, continuous) and Rail temperature (COTS, periodic). Five partners will collaborate to deliver the demonstrator. AP Sensing is the lead partner and system integrator, providing the FOAS system and front end. Lightricity will provide the energy harvesting and management system, CSAC the PEAT system, and Pyreos the proprietary sensor solutions. NR Telecom are providing engineering resources and access to the test site.

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Thales Ground Transportation Systems UK Limited	ASSIGN: Advisory System for SIGNallers for improved User Worked Crossing Resilience	£345,000	£345,000

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## Project description - provided by applicants

Thales and their partners are collaborating to develop the ASSIGN (Advisory System for SIGNallers) solution for improved User Worked Crossing (UWC) Resilience.

John Halsall, South East route managing director at Network Rail has stated: "Level crossings remain the biggest source of risk on the rail network."

Currently around five people a year are killed at level crossings in Britain with hundreds of reported near misses. Of these, the 1700 UWC equipped with telephones contribute to 12.5% and 19% of pedestrian and vehicular related fatalities respectively [ORR2016-Strategy for regulation of health and safety risks - 4: Level crossings].

At these crossings, it is the responsibility of the signaller to determine if it is safe for the user to cross; with UWC in long block sections, the signallers often have to make this decision without knowing the current position of a train in relation to a UWC. The lack of exact train positioning often means that to the signaller has to deny permission to cross, and this increases risk taking behaviours by people faced with long waits.

ASSIGN brings together novel robust positioning technology with existing rail cloud-based system to create a new first of a kind application to provide train time of arrival information at UWCs to signallers. This system aims to allow signallers to quickly validate the decisions that they make and thus giving greater resilience to the infrastructure they control.

The ASSIGN system will be installed to monitor train movement along the Barnstaple Branch Line, which has over 25 UWCs in a 20-mile section and is specifically identified by the ORR as a key challenge to Network Rail that they must address to improve safety and operations. Signallers will be trialling and helping refine the ASSIGN user interface, and evidence from this trial will be used to inform ASSIGN roll-out across the UK.

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Smart Component Technologies Limited	Smart Railway Switches and Crossings	£315,390	£315,390

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## Project description - provided by applicants

Rail transport accounts for almost 7% of transport demand in the European Union with predicted strong growth figures; latest EU-28 available data shows that there were more than 401B passenger-kilometre journeys completed in 2016. One of the most critical assets of the physical railway infrastructure are the Switches and Crossings (S&Cs); the mechanical installations which are used to guide trains from one track to another. S&Cs are subjected to extremely harsh operating conditions, including severe vertical, horizontal and lateral loading, large temperature variations and a wide range of weather conditions. These harsh operating conditions alongside poor maintenance procedures, exacerbate failure of S&C components. These failures pose major safety risks (increased probability of a derailment). Failures also reduce network capacity, lead to poor customer satisfaction and accrue significant annual costs.

The challenge is therefore: how to improve the inspection and maintenance of S&Cs so that the cause of failures can be detected and rectified before they fail in order to improve safety, whilst reducing the number of periodic inspections and services affecting failures to reduce cost, improve customer satisfaction and increase capacity.

The solution: Working alongside UK rail partners, and world leading rail-specific university research groups, Smart Component Technologies Ltd (SCT) have developed the Smart S&C Monitor: a first-of-a-kind condition monitoring technology that measures the causes of premature S&C component failures. The Smart S&C Monitor is a wireless sensor node that features an accelerometer array which can measure the shock, vibration and displacement of the S&C when rolling stock passes. Through combining these data streams, the inbuilt algorithms can identify several typical causes of S&C failures, including; wheel flats, overloaded axles, speeding rolling stock, voiding and track stability issues. The sensor data is wirelessly transmitted to a cloud server where it is stored, analysed and visualised. In the cloud, alerts (SMS and/or email) are sent to the infrastructure owners, providing them with an opportunity to address the issue before significant degradation of the asset occurs.

This project will develop, demonstrate and commercialise the Smart S&C Monitor for Transport for London (TfL) and High Speed Two (HS2) infrastructure. The key objectives of the project are to; develop the Smart S&C Monitor from TRL7-9, tune the data algorithms to be compatible with all UK rail infrastructures (currently only compatible with NR infrastructure), integrate the data into a cloud repository, to conduct compliance testing to demonstrate that the technology meets rail industry regulations, apply for a trial certificate, conduct operational field trials over 40 S&Cs to achieve Product Acceptance (TfL only) and enact a fully costed schedule of commercialisation activities required for wide scale roll out. Through the completion of this project, SCT will be technology ready and commercially ready to roll-out the Smart S&C Monitor on S&Cs across all the UK rail infrastructure.

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Railview Limited	INFRAMONIT Test Vehicle	£331,651	£331,651

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## Project description - provided by applicants

Creation of a rail sub-surface infrastructure inspection test vehicle that will be field-tested to demonstrate strategies for rail infrastructure resilience – INFRAMONIT TEST VEHICLE.

This test vehicle builds on the successful Innovate UK INFRAMONIT project and develops the next generation of Rail Subsurface Transport Infrastructure Inspection Radar that will scan below the track surface, into the track bed and beyond and produce 3D images of the rail subsurface infrastructure assets. Once the exact position and the depth of the assets are known accurate asset mapping and monitoring can be undertaken. This test vehicle will reveal defects, failures and technical issues in the assets and the 3D images produced can be used in order to plan preventative maintenance, thereby increasing resilience of the rail infrastructure system.

INFRAMONIT TEST VEHICLE responds to the challenge of avoiding infrastructure-based rail disruptions by providing a technology to assess and monitor geotechnical assets providing a better knowledge of those assets and with the potential to provide quantitative data across the whole geotechnical asset portfolio. This will facilitate more informed decision making and prioritisation of intervention through use of consistent data allowing greater intervention before failure and therefore reduced risk of derailment and a reduction in Schedule 8 costs by fixing before disruption and failure.

This offers a significant competitive advantage over current state of the art systems which consist of several vertically fixed antennae uniformly positioned along a vehicle's lateral axis, and are therefore limited to acquiring discrete data transects within the lateral extent of the vehicle. In contrast, the INFRAMONIT demonstration platform can provide comprehensive, three-dimensional visualisation of subsurface regions, enabling it to map unknown subsurface structures, and to detect and localise hazards such as voids, collapsed culverts and pooled water.

The idea of this project, is to take the current INFRAMONIT demonstration platform and use the lessons learnt to create a pre-production prototype based on a road-railer. Any resulting project will involve Network Rail, the owner of railway infrastructure assets and an experienced railway organisation that has the potential to become a customer. Network Rail involvement is secure and have already offered a real world test location, such as Tuxford.

The aim of this project is to demonstrate how proven technologies from the INFRAMONIT project can be integrated into a railway environment for the first time and used to provide a First of a Kind demonstrator. INFRAMONIT has already shown that the innovation is at a high TRL and has the potential to deliver subsurface inspections in a real world environment. Our solution will be field-tested and ready for use with an end customer by completion of the project, creating a highly interactive and innovative demonstrator on railway infrastructure and in an environment close to the railway. The project is extremely relevant Theme 1: infrastructure resilience.

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AmeyVTOL Limited	BVLOS Aerial Robotics	£342,837	£342,837

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## Project description - provided by applicants

This project seeks to significantly reduce costs, and improve the safety of rail staff by automating inspections, surveys, and response to incidents, avoiding the need for people to physically set foot on the railway infrastructure.

Recognising that Network Rail and its suppliers currently access the rail infrastructure many thousands of times per year to inspect, survey, and examine the network to make asset management and maintenance planning decisions, as well as to get 'eyes on' in the event of an incident, we have sought to demonstrate how this can be done through the use of an automated long range aerial drone system. The benefits of this system include estimated savings of circa £1bn per control period, as well as the elimination of millions of pairs of 'boots on ballast'.

This project will demonstrate a comprehensive and flexible automated Beyond Visual Line Of Sight [BVLOS] drone system capable of delivering safety and condition surveys, inspections, and examinations remotely from the air rather than from the trackside or from a helicopter. This is a first of a kind capability as current drone technology can only operate Within Visual Line Of Sight [WVLOS] and requires the placement of multiple ground markers to achieve even a coarse level of accuracy. This existing WVLOS approach offers none of the benefits of the proposed project; indeed it is generally recognised to cost far more than conventional methodology.

Capability demonstrated by this project will include a novel BVLOS drone and BVLOS ground control station solution for automated flight path planning and operation, able to undertake both long range and local inspections using a unique hybrid drone design, that can deliver up to 6 times the range and endurance of equivalent multirotor drones. Targeted payloads include gimballed HD EO & IR cameras, LiDAR and 100MP camera. Within this programme we will demonstrate how this system can bring a new approach to BVLOS regulatory approvals and flight management, achieved using a high-fidelity 3D visualisation environment that will provide the framework for both Network Rail internal and CAA external BVLOS regulatory approvals.

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DGauge Ltd	Alternative Gauging Methodology (Probabilistic Gauging)	£284,818	£284,818

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## Project description - provided by applicants

Our proposed idea is to maximise the space on the UK rail network by improving the way in which we undertake gauging. It is widely accepted that the current gauging process includes significant conservatism, and that steps could and should be taken to reduce this where it is safe to do so, maximising the space on the railway. Our technology (probabilistic gauging) has a high TRL rating (TRL7) with a Network Rail recommendation that it should be considered for a First-Of-A-Kind study

DGauge have been developing probabilistic methods of gauging as part of the RSSB / Future Railways challenge examining the Avoidance of Bridge Reconstruction. The technology developed as part of this project has been recently reviewed by Network Rail's Product Development Panel and has been awarded RIRL Level 6 status (Operational Transition). This is also the appropriate level that needs to be achieved to develop the technology 'Roll out'.

This project brief defines is to develop the use of probabilistic methods to RIRL Level 7 (Initial Deployment). This involves developing the 'First In Class' over a specific region and will be presented through and interactive software demonstrator.

Our project will assess areas in Scotland using our new probabilistic gauging technology. Specifically we will focus on the West Highlands Line, a route highlighted by Network Rail. Our demonstrator will allow rail staff to review the traditional gauging approach against our new probabilistic approach, and demonstrate what saving could be achieved in terms of Clearance, stepping and intervention.

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Birmingham Centre for Railway Research and Education	HYDROFLEX MAINLINE TESTING	£350,000	£350,000

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## Project description - provided by applicants

### HydroFlex Mainline Testing

The Birmingham Centre for Railway Research and Education (BCRRE, part of the University of Birmingham) and Porterbrook (train leasing company) formed a partnership in September 2018 to develop the UK's first operating hydrogen train ('HydroFlex'). In 9 months we will have progressed from an initial idea to operating the HydroFlex demonstrator during the Rail Live trade show in June 2019 at the Quinton Rail Technology Centre (QRTC). Following the demonstration of our technology prototype at the QRTC facility, our next phase of development is to undertake mainline testing of HydroFlex on Network Rail infrastructure.

This project will plan and deliver HydroFlex mainline testing in late 2019 and early 2020 on Network Rail mainline infrastructure. From our base at QRTC, we will take HydroFlex out onto the mainline via the Long Marston branch line. Mainline routes under consideration for this testing include the North Cotswold line and the Alloa to Dunfermline line (in conjunction with ScotRail). All mainline testing will require full vehicle approval and we propose to adopt a Common Safety Method (CSM) approach to managing risk.

The aim of this project is to undertake the first mainline operational testing of a train equipped with hydrogen fuel cell technology. Our testing programme will gather evidence and data to inform our on-going development of hydrogen fuel cell and battery technology deployed on a converted electric train. The testing will also generate significant political and media interest in the developing clean energy technologies that can imminently replace diesel in order to deliver the decarbonisation of the railway, without recourse to complete network electrification (which will not be delivered in the desired time frame).

This project is submitted under the Infrastructure Resilience theme - optimised on-board & lineside energy storage technologies. It impacts upon 3 of the 4 Cs as it provides a cost effective network extension for electric trains without the significant infrastructure cost, it provides zero emissions operation and therefore improves the customer experience with clean and quiet transport.

BCRRE lead the project with additional work subcontracted to Porterbrook, Rail Operations Group, QRTC and Jeff Vehicles. We are also working with innovative hydrogen industry suppliers to transfer their solutions into the rail environment, such as Luxfer Gas Cylinders and Fuel Cell Systems. We will also be working very closely with ScotRail (train operator), Network Rail (infrastructure operator), an independent third party approvals body, the Office of Rail and Road (regulator) and the Rail Safety and Standards Board.

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Meteor Power Limited	Retrofit EURO 6 Diesel Hybrid System For Shunters & Other Freight Applications	£348,120	£348,120

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## Project description - provided by applicants

Most images of railways focus on the latest, shiniest, fastest technology. The investment in passenger trains is significant, whether it is rolling stock, new rail lines (HS2), etc. The news is full of developments and investment in hybrid and electric trains. We all know from our own experience that, thanks to their long lifespan, many trains are a lot older and a lot less shiny. Now spare a thought for the rail freight sector, barely thought about and rather lacking in investment yet alone innovation.

Many freight trains are over fifty years old and, thanks to regular overhauls, are still going strong. Others are seen as surplus to requirements and are simply stored, scrapped or plundered for spares. Ironically, for some applications, these older trains are actually better than their more modern counterpart, e.g. the old Class 08 shunter trains have larger wheels, most likely some kind of a throwback to the days of steam, which means they can pull heavier loads.

Let's face it, any train over twenty years old isn't going to be doing anything to help our atmosphere, hence the introduction of the Non-Road Mobile Machinery (NRMM) legislation. This legislation is going to bring tighter and tighter emissions for our railways and drive even more vehicles to the scrapyard. Can companies even afford to buy low emission replacements for these trains or will they simply go out of business?

The opportunity we face is not only can we bring these older engines up to modern standards but we can make it attractive enough to see many of the older, retired engines get updated with new technology that will see them pressed in to service once more.

Harry Needle Railroad Company (HNRC) renovates and hires out over a hundreds of these older engines and even has the facilities to undertake work for other engine operators. Some engines, like the Class 08s in particular, are in high demand. Harry estimates that there are around a hundred in the UK that could be given a new lease of life and several hundred more around the world.

The long term target is clearly to switch everything to pure electric or hydrogen power although without the investment in infrastructure and new engines this is some way off yet. We have defined a clear road map that will allow a staged module by module upgrade to reach these goals. The first stage, i.e. the scope of this project, is to replace the ancient 92.67 litre diesel engine with an integrated modern hybrid electric powertrain using many proven technologies to bring these old engines up to the latest modern EURO6 and NRMM emissions standards.

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G-volution Ltd	Decarbonising Freight Locomotives	£321,596	£321,596

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## Project description - provided by applicants

UK Rail Freight operators face major challenges to their use of diesel locomotives. There is increased attention being paid to vehicle emissions by both the public and politicians within the UK and the British government has placed a requirement on the rail industry to remove diesel only traction vehicles from the network by 2040. This is coupled with an indication that plans to electrify up to 80% of the network will be significantly curtailed for cost reasons. Therefore, UK Rail Freight operators are actively seeking viable alternative solutions for new powertrains for self-powered non-electric / non-infrastructure powered locomotives. This will enable freight operators to move away from purely fossil-fuel based diesel engines and transition to alternative sustainable fuel types, to improve engine emissions and air quality.

Margins in the rail freight business are small and the sector faces fierce competition from road hauliers. Therefore, significant investment in untried solutions will be limited, solutions to move away from diesel must be technically proven, and financially beneficial to succeed.

This project will demonstrate dual-fuelling in the British Freight market using technology that has already been proven the road freight sector in the UK. It will help to develop the business case for dual-fuelling and demonstrate the carbon and cost saving advantages for freight locomotives. Demonstration in the GB market will also open the potential for this technology within the global freight market.

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Hive Logic Limited	iPort Rail App	£347,600	£347,600

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## Project description - provided by applicants

Title: iPort Rail App

Development and Demonstration of a collaborative Digital Platform Solution to Substantially Improve the Rail-Road Freight Interface

This project aims to help address a strategic need to develop a capability of Flexible Freight in the rail sector through the development of a digital platform that will enable diverse actors within the rail-road freight supply chain (incl. Freight Forwarders (FFs), Freight Operating Companies (FOCs), road haulage and end-customers) to contract for rail-connected logistics services, easily and cost-effectively. The collaborative platform will enable more efficient linkage between container-based rail freight arriving at an inland port and its onward journey by road to the end customer.

The project will prototype and demonstrate various manifestations of the platform (apps), such as a mobile smart device that links rail container freight with local road logistics companies to facilitate speedier and more efficient off-loading and loading of containers. The platform will create 4 interfaces (apps) with the following stakeholders: (a) Rail freight companies that want to take orders for train fulfilment (to run trains at capacity), (b) Road Hauliers to bid for 'final mile deliveries' from the port to the end-customer and recover back-loads, (c) FFs looking to 'place orders' to move containers from the seaports to the customer, using rail, (d) End-customers for visibility of their container movement to integrate their operations with logistics.

The project will prototype the digital platform and field-test it in an operational rail freight environment at iPort Rail in Doncaster, with other actors in the supply chain also contributing to the field-testing, including a road haulage company and a Freight Forwarding company. It is anticipated that there will be multiple stakeholders attracted by the benefits of the platform, evidenced through the field trials at iPort Rail, in terms of the reduction of waste and locked-in value within the current logistics delivery system.

Adoption of the solution is expected to make a significant contribution to increasing rail freight capacity, reducing carbon, improving customer satisfaction and reducing costs. At a time when the digital transformation of every industry is well and truly underway, this project will lead the next revolution in logistics and ensure that rail-freight is at the heart of this revolution.

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University of Hull	NR+: UK's first Integrated Digitised Rail Infrastructure Platform for Planning	£344,352	£344,352

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## Project description - provided by applicants

Title: NR+: UK's first Integrated Digitised Rail Infrastructure Platform for Planning

Planning and scheduling of trains are very complex tasks due to their highly specialized and combinatorial nature. In the UK, the required information for planning and scheduling is very fragmented. Planners must deal with a large number of requests and must consider a myriad of infrastructure constraints, consulting a variety of databases and paper-based documents to perform their tasks which is quite frustrating and inefficient in this day and age. The opportunity identified in this project is to demonstrate the rail freight planning process on our integrated digital Network Rail Plus Suite (NR+Suite) of products that consists of the NR+ Infrastructure platform (NR+IP), the NR+ integration Services (NR+IS) and the NR+ set of applications (NR+App). The NR+IP consists of a comprehensive and integrated database of UK's rail network, with all the attributes and constraints that can be queried and viewed on a map, together with the current set of scheduled routes and planned activities. It consists of two powerful and highly-scalable graph databases that are well suited for very large networks and routing problems, real-time analytics and AI. The first database contains all the data that defines the rail network, its capabilities and constraints. The second contains schedules and line availability information (including Working Time Tables, short term additions, variations or cancellations and planned possessions for engineering works). NR+IP will also contain a history database of executed trips.

The project has the following aims: integrate existing data sources in NI+IP ; complete and validate the data to define the network capabilities; perform live trials with Network Rail and freight operators to validate, improve, and demonstrate the usability and value of the platform and applications; and develop a number of APIs to allow the data in NI+IP to be accessed, utilised and embedded in other 3rd party applications used in the rail industry.

The novelty is in having a unique state-of-the-art, consolidated, easily accessible and maintained digital database of UK's fragmented rail system and a first set of integrated applications for the safe and efficient planning of freight. If successfully proven during the demonstrator, NR+IP could form the basis for a unique eco-system of integrated applications to generate more efficient, resilient and safer plans and schedules for freight and passenger trains, to better manage disturbances and delays and for dissemination of information.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
JR Dynamics Limited	Smart Oil Plug; Disruptive Rail Gearbox Condition Monitoring Solution	£350,000	£350,000

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

### Smart Oil Plug; Disruptive Rail Gearbox Condition Monitoring Solution

The Smart Oil Plug is designed to reduce the risk of gearbox failures and increase time between routine maintenance intervals. Improved confidence in gearbox condition not only reduces risks of incidents but it aims to significantly extend running time and mileage between major overhauls. This project allows scaling up a recently developed technology, funded by Innovate UK, to take it from the initial successful field trial, to a larger first of a kind pioneering demonstrator trial on 40 gearbox units and to bring the product to full commercial readiness.

The Smart Oil Plug measures oil temperature, ferrous debris, and gearbox vibration, and wirelessly transmits this information to a globally accessible portal for stakeholders to access and use for asset management. The system can deploy an alarm in cases when immediate action is required, such as for example rapidly increasing gearbox temperature, sudden onset of oil debris, significantly increased vibration level, etc.

Following completion of a previous successful Innovate UK grant it transpired that delivery of the above parameters is now complemented by a significant amount of additional information including integrity of the entire drive system, wheel flat detection and rail track quality monitoring, on in-service trains.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results



## Results of Competition: SBRI Rail First Of A Kind Round 3: Resilience, Freight, Noise and Environment

Competition Code: 1902\_SBRI\_DFT\_RD3

Total available funding is £7,551,454

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Perpetuum Limited	Wireless condition monitoring of freight locomotives	£336,440	£336,440

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

### OPTIMISATION OF FREIGHT OPERATION RESILIENCE, RELIABILITY AND COSTS WITH REAL TIME SELF-POWERED WIRELESS CONDITION MONITORING OF LOCOMOTIVES

Perpetuum has deployed thousands of its innovative vibration energy harvester powered wireless sensor nodes (WSNs) on passenger trains worldwide. These installations enable operators and maintainers to improve reliability, availability and maintenance costs by providing real-time information about the condition of wheelsets, bearings and drive components, adapting Condition Monitoring techniques widely used in many other industries. However, these improvements and savings are not available for freight locomotives due to very tight space constraints and vibration and shock levels on freight loco bogies that prevent successful use of existing WSNs.

In response to market demand, Perpetuum has invested in significant engineering development to innovate a completely new slimmer, lighter wireless sensor node (WSN). This new WSN will enable a large new market to be addressed where there is only very limited space around the axle box of the target rail vehicle and to enable it to withstand very high vibration and shock. This project will demonstrate a robust economic case for real time condition monitoring driven optimised wheelset and axle bearing maintenance for freight locomotives, initially on Direct Rail Services (DRS) owned Class 66 locomotives, the most widely used type in the UK.

The immediate benefits anticipated from this project include:

- Higher reliability and resilience with fewer expensive breakdowns disrupting rail services.
- Significant reductions in maintenance costs for freight locomotive operators
- Noise reduction by identifying poor wheel quality causing wheel/track interface noise
- Improved freight locomotive availability
- Improved utilisation of (and fewer journeys to) maintenance facilities
- Reduced environmental impact from wheelset wastage.

Implementation of an efficient wheelset management system for freight locomotives is a more challenging problem than optimisation of passenger trains because of the disparate locations of both vehicles and facilities with wheel lathes. By providing knowledge of wheel and bearing condition, the system will enable more accurate maintenance planning, and with less disruption to revenue earning service. The installation will enable integration of new maintenance practices into the organisation. Customer feedback will guide future product development. This installation will also facilitate the introduction of further monitoring of the drive systems and other parts of the locomotives. The new system will also be capable of track condition monitoring similar to that available from the existing passenger train monitoring. This will be a significant benefit particularly to freight only lines. This new freight locomotive system will also pave the way for Perpetuum's developments for freight wagon condition monitoring and train integrity: these developments are part of two H2020 Shift2Rail projects: ETALON and INNOWAG. IINNOWAGandanIINNOWAGG.INNOWAG.(<https://cordis.europa.eu/project/rcn/206229/factsheet/en>).

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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## Results of Competition: SBRI Rail First Of A Kind Round 3: Resilience, Freight, Noise and Environment

Competition Code: 1902\_SBRI\_DFT\_RD3

Total available funding is £7,551,454

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Incremental Solutions Ltd	OLErt	£341,585	£341,585

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

OLErt (Overhead Line Equipment in real-time): dynamic monitoring of electrified networks & trains to prevent failure

Over the last 12 months, there has been an increasing focus on the role that electrification of the UK rail network has to play in mitigating climate change through decarbonising the economy and meeting the aspiration to remove all diesel-only trains by 2040. This has given impetus to efforts to look for the best solution to meet the challenges of making electrified networks a safe, efficient and reliable mode of rail transport for passengers and staff working across the network.

Incremental Solutions in collaboration with Network Rail, Great Western Railway, The University of Oxford, Icomera UK and RDS International will address this challenge through the delivery of project OLErt. By providing an innovative, low-cost technology solution OLErt will dramatically reduce the incidence of failures to electrified infrastructure and fleets through continuous and dynamic computer vision monitoring and alerting on service trains.

The approach integrates Oxford's visual measurement algorithms with Incremental's award winning analytics platforms and RDS' precise positional certainty, to leverage imagery from existing roof-mounted camera equipment. The gathered data is then analysed to highlight abnormal infrastructure events before being transmitted in real-time through Icomera's connectivity platform to provide failure and emerging alerts to operational maintenance teams for immediate remedial action. No other available technology can provide dynamic monitoring in this way or will have such a transformative reduction in the incidence of overhead-line dewirements or pantograph train damage.

Following a successful trial delivered by the project collaboration team on Network Rail's Western route, the system is targeted for national roll out as well as global export. Incremental Solutions is uniquely placed to maximise this opportunity, having already delivered software solutions to nearly two thirds of the UK rail market. With electrification delivering a larger part of the infrastructure traction mix, the performance improvements generated in this project will contribute to the economic and energy efficiency of electrical networks, while reducing the delays and disruption that play such a role in the public's perception of rail travel.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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# Innovate UK

## Results of Competition: SBRI Rail First Of A Kind Round 3: Resilience, Freight, Noise and Environment

Competition Code: 1902\_SBRI\_DFT\_RD3

Total available funding is £7,551,454

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Artonezero Limited (T/A JUNCTION)	An Automated Operations Decision Support Tool for Disruption Management	£289,800	£289,800

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

JNCTION, a rail-tech startup based in Shoreditch, London, is developing a state-of-the-art Operations Decision Support Tool for Train Operating Companies (TOCs).

JNCTION's Decision Support Tool uses AI and Machine Learning techniques to assist control teams to automatically plan train operations in disruption by suggesting train plans based on historical data and previously devised contingency plans.

During a service disruption, the system will suggest the quickest and most effective way to return services to the timetable; limiting any impact and costs caused by disruption and to help maintain high levels of customer satisfaction.

The system will also deliver improved customer information via multiple channels quickly so that passengers can plan around disruption.

The Decision Support Tool builds on JNCTION's existing information system, DART, which provides operators and customer experience staff with a live picture of network operations, and results of the Research & Development work carried out during the Rail Safety and Standards Board's (RSSB) recent PERFORM machine learning projects.

JNCTION's Decision Support Tool will:

- Use State of the Art AI techniques & Machine Learning, building on academic research and programs carried on in recent RSSB performance program, to evaluate and suggest train plans during disruption
- Combine with existing JNCTION DART train information system
- Deliver an easy to use user interface dashboard tool for real time operations support
- Integrate Customer Information output feeds

In 2017, JNCTION was selected as one of ten companies to take part in the LMLabs2 cohort and received seed project funding for their Aubin app: an innovative journey planner app for Autistic passengers from London Midland in 2017. In 2018, JNCTION was selected as one of seven companies to receive government funding as part of the RSSB's Rail Accessibility Competition for their Aubin app. In July 2018, JNCTION was invited to deliver a presentation to CRRC Corporation Ltd covering the topic of Innovation in the UK rail sector on 12th July 2018.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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## Results of Competition: SBRI Rail First Of A Kind Round 3: Resilience, Freight, Noise and Environment

Competition Code: 1902\_SBRI\_DFT\_RD3

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Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
CPC Systems Limited	VPVision: Development of Remote Monitoring for Automatically Controlled Trains	£333,701	£333,701

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

### VPVision: Development of Remote Monitoring for Automatically Controlled Trains

CPC Systems and Vantage Power are working in collaboration, along with London Underground's Jubilee Line, to develop a cutting-edge system to remotely monitor automatically controlled trains. The aim of the project is to improve the operational resilience of the railway, by utilising data produced by the on-board computers controlling the train to improve train maintenance in a variety of ways, and make fleets more reliable.

Currently the data produced by on-board computers is manually transferred from the train to a computer if requested and requires a series of labour intensive tools to interrogate even the smallest sample of data. This means that diagnosis of faults is slow, and only happens once a fault has occurred and the train has returned to its depot. Also, trends in the data are not easily identified since only requested data is analysed, and so preventative indicators of faults often go undetected. By wirelessly transmitting all of the data from on-board computers and storing it in an easily accessible cloud database its value can be unlocked. Fault diagnosis can be made quicker, trends can be identified and preventative maintenance schedules can be implemented; a train could be removed from service before a failure manifests, minimising any impact to the operational railway.

CPC Systems and Vantage Power will work together to develop Vantage Power's existing product, VPVision, a next-generation Internet of Things telemetry platform that has delivered new operational and maintenance capabilities on London Buses and other heavy duty vehicles through the use of artificial intelligence and machine learning. CPC Systems have developed processes to quickly and accurately decode train on-board computer data, triggering notifications about faults that are emailed to the train engineer although this cannot be done until the data has been manually collected. These 'health codes' will be integrated into the VPVision platform, along with newly developed prognostic notifications, which will analyse trends in the datastream to identify potential faults before they arise.

Through a series of demonstrations in increasingly representative live rail environments, culminating in a test trial period of the system in use on an operational train, CPC Systems and Vantage Power will demonstrate the potential benefits of this system to the railway, including reduction in maintenance costs, improved fleet reliability and therefore a better customer experience.

This project represents an exciting opportunity for two UK-based companies to provide innovation for the railway industry in partnership with TfL's Jubilee Line and expand their market reach, since this product could be used on up to 80 automatically controlled railways around the globe.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Competition Code: 1902\_SBRI\_DFT\_RD3

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Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Transreport Limited	TiPA: Transreport intelligent Passenger Assist for resilience during disruption	£349,760	£349,760

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

### PROJECT TITLE

TiPA: Transreport intelligent Passenger Assist for resilience during disruption

### PUBLIC DESCRIPTION

Transreport Limited is an innovative start-up developing disruptive software solutions connecting rail users to rail operators, which have evolved to focus on those facing challenges accessing the rail network, in order to democratise rail transport in the UK and beyond. The first of these is Transreport Passenger Assist, which is a novel solution for disabled passengers to either pre-book or dynamically make assistance requests at major stations.

With increasing numbers of disabled customers now seeing rail travel as a real option due to improvements in accessibility, many mainline stations already now find themselves delivering a substantial number of assistance at peak times. Whilst clearly delivering the intentions of policymakers, the risk of not meeting this challenge will lead to unfulfilled assistance requests, with potentially negative effects on customer experience for those with diverse and complex disabilities and requirements. These impacts will be felt even more acutely during periods of disruption. For disabled passengers, even a small delay getting the right assistance can have far reaching effects on journey outcomes when a problem on the network arises.

However, whilst it is usually the case that operators have access to the staff resource they need to deliver disabled passenger assistance and alternative services, they lack the information to effectively deploy them to the right place at the right time. Similarly, disabled passengers currently have no meaningful visibility of the potential impacts of the disruption they are facing.

Directly addressing this challenge, Transreport and their partners from across the rail industry now target an innovative and transformational mechanism assisting operators to predict and better respond to the impacts of disruption on disabled passengers. With direct impacts on operational resilience, this novel platform will be configured, integrated and tested with operators and a cohort of disabled passengers through this project, to prove first-of-a-kind capability.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
CoCatalyst Limited	Improved braking through controlled water addition	£349,440	£349,440

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

### Improved braking through controlled water addition

For many years the UK rail industry has struggled to manage the effects of low adhesion. The problem is most severe in Autumn when track-side leaf fall can contribute to very slippery condition - the so called problem of "leaves on the line". Annually, the UK rail industry spends over £50 million trying to deal with the problem. We discovered that the issue doesn't occur at all on days with heavy rain, even during Autumn. Our solution simply creates "rainy day" conditions on the track by spraying a small amount of water from the train to the track when a slippery rail is detected. Our idea has been shown to work well on a test train. This project aims to extend the work to prove the benefits on a passenger service train.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Emission Solutions Limited	Emissions as a service for the Rail Industry	£349,863	£349,863

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

### Emissions as a Service for the Rail Industry

EMSOL and the East West Rail Alliance (EWRA) are collaborating to test EMSOLs solution at four locations in and surrounding Bletchley railway station as a first of a kind service to mitigate and drive change to improve local air pollution including noise and other emissions that impact rail construction and day to day operations of stations.

This project is an innovation IoT (Internet of Things) technology platform that will be introduced into the alliance (EWRA) which consists of the major players in the rail industry that includes: Volker Rail, Network Rail, Laing O'Rourke and Aitkins.

EWRA is a £1.5bn construction project of the railway line between Cambridge to Oxford and this project gives EMSOL the opportunity to position EMSOL technology as a viable and scalable 'emissions as a service' platform for the rail industry.

The EMSOL platform is focused on mitigating air pollutions incidents which are done by our tracking capability of 'objects' (vehicles, machinery, buses, taxis etc) and to provide real-time accurate data on local air quality conditions. Our platform can support multiple sensors types. So whichever emission essential to monitor, our platform can add specific sensors. The data analytics and identifying mitigations are provided with a mobile and web dashboard structure for multiple users from: Site owners, drivers, fleet managers, the general public, local residents and the Local Authority.

Early deaths caused by poor air quality is 22 times higher than road traffic accidents at 40,000 deaths per annum. Solving the air quality problem is a massive challenge owned by Governments, Regulators, Local Authorities and businesses. The rail and construction industry are significant contributors to emissions, and as such have a responsibility and opportunity to innovate solutions to solve the problem.

This project is a perfect opportunity to engage some of the best talents across industries to test, validate and adopt an emerging technology (IoT, low-cost sensors & tracking) for the Rail sector to solve the air and noise pollution problem that is scalable. With EWRA as a diverse expert rail partner, this will ensure the platform is robust and fit for purpose with a measurable impact.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Eartex Ltd	Railway Works Noise Visualisation and Management (RaW-NoViMa)	£252,921	£252,921

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

At EAVE we are developing a novel, standalone noise management platform for both operative and environmental noise management. The platform gathers noise data from numerous digital sensors embedded in intelligent ear defenders that automatically capture continuous noise data before transmitting it to EAVE's noise management platform called PEAK. PEAK is cloud based and so can be accessed remotely using secure login details via any web-browser. PEAK analyses and displays the noise data in a highly visual, intuitive and interactive manner that allows stakeholders to see any noise level from across their sites from any point in time. Seeing the data in this way allows for a proactive data driven approach to noise management and elimination. The active headsets themselves provide enhanced workforce safety by protecting the wearer from noise whilst removing a common temptation to take off hearing protection in order to hear what is going on around them or simply talk to a colleague.

As awareness of the harmful effects of noise exposure increases, at EAVE we believe that our unique system provides the best way to view and manage noise for those within the rail maintenance and rail construction industry, protecting both the workforce and the industry itself from the varied short- and long-term risks associated with noise. Hearing damage caused by exposure to noise at work is permanent and incurable. The Health and Safety Executive estimates that over two million people in the UK are exposed to potentially harmful noise levels at work. The current measures required to correctly form a Hearing Conservation Programme (HCP) require extensive investment, time, expertise and specialist sound measurement equipment. This high barrier to compliance frequently results in ineffective risk assessments, unsuccessful interventions and ultimately harmful levels of noise exposure and permanent, debilitating hearing loss for employees.

EAVE is an industry leader in the development of novel solutions to reduce the incidence of occupational deafness in the construction and manufacturing industries. The aim of this project is to demonstrate the EAVE innovation to railway customers in a representative railway environment. With support from High Speed 2 in recognising the potential of the EAVE innovation in the railway industry, HS2 as an experienced railway organisation and a potential customer is working with EAVE to deliver this project with a focus on the first implementation of the EAVE system into the rail industry via the Costain-Skanska Joint Venture (CSjv). CSjv are an owner of the railway assets and a potential integration partner.

EAVE wishes to conduct this project in order to i) gather evidence on integration challenges ii) demonstrate to railway stakeholder the commercial and social benefits of the solution iii) collect first hand data on user experience to develop a business case for using the EAVE solution in the rail industry.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Hack Partners Limited	Hubble   Project Number 111960-651155	£252,341	£252,341

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

Hubble is an artificial intelligence assisted lineside inspection and maintenance planning solution helping the rail industry add more resilience to infrastructure and operations.

Starting with lineside inspections for vegetation growth which continues to be an urgent priority for the railway leading to:

- Delays and cancellations to passenger and freight services resulting in less available capacity
- High maintenance costs which ultimately are passed back to operators, the tax payer, and passengers
- An overall poor customer experience for the passenger and freight operators
- The increased utilisation of front-line engineers which must travel by van to perform trackside inspections

Current methods for addressing vegetation management are either too slow and labour intensive increasing costs and risk; or automated but very expensive (ORBIS' LiDAR) and do not focus how route level users makes use of the data resulting in a situation where asset managers are ""data rich, but insight poor"".

Both approaches as a result are not used very often leading to poor quality information on when and where vegetation management should occur. This results in the infrastructure and operational resilience of the railway to be susceptible to adverse environmental and future weather conditions and the availability of the railway not being at its maximum due to inaccurate maintenance plans.

Hubble uses artificial intelligence which follows the latest Vegetation Management Standards produced by Network Rail to addresses multiple problems associated with vegetation management, namely the lack of:

- Decision support tools which have clear geographical mapping of vegetation throughout the network
- Integrated workflow management system allowing for better maintenance planning
- An accurate, reliable, and integrated objective method for identification of non-compliant vegetation.

By identifying which vegetation poses a risk to the resilience of rail infrastructure and operations Hubble ensures that the GB Rail remains a point of pride and economic growth for the nation, one hedge at a time.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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# Innovate UK

## Results of Competition: SBRI Rail First Of A Kind Round 3: Resilience, Freight, Noise and Environment

Competition Code: 1902\_SBRI\_DFT\_RD3

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Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Qualis Flow Limited	Intelligent Data & Environmental Analytics (IDEA)	£261,420	£261,420

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

Qflow is the first machine learning powered tool for predicting environmental impacts during engineering and operational works.

Environments around railway works, stations and depots are currently at risk of dangerous air quality levels, noise pollution, inefficient resource consumption and local disruption to passengers and stakeholders. Many of these impacts can be avoided through access to real-time data and understanding the causes of these key risks. Over £6bn per year is spent trying to tackle these environmental impacts by the construction industry in the UK, through programme delays and cleaning up when things go wrong in relation to mis-managed environmental risks. This is also mirrored in the rail sector, through station upgrade works and operations, railway engineering and depot operation.

A new software for monitoring and forecasting these risks based on data collected at source has demonstrated technical feasibility in the building sector, recognized and awarded by multiple industry bodies including the Royal Academy of Engineering, NCE Techfest, LWARB and the Mayor of London's Clean Tech campaign. This project will focus on creating a real-time platform for gathering environmental data and analyzing this against programme activities to predict upcoming exceedances. It will be delivered in partnership between Qflow and Skanska Costain Strabag JV (SCSJV), with High Speed 2 (HS2) acting as the project demonstrator, where the southern sections on the new HS2 route between Euston station and West Ruislip will be used to demonstrate how machine learning can be applied to predict critical environmental risks; to enable a safer, cleaner way of working and preventing disruption to local communities and passengers.

"SCSJV are interested in pursuing a commercial agreement for using Qflow in order to minimize impacts on the local environment and communities. We are therefore keen to work with Qflow to trial a new way of monitoring and managing our activities."

Following project testing, the opportunity exists to deploy the Qflow system onto multiple other sections along the HS2 route, and enter other contracts involved with station upgrade works. The project will be used to validate technical feasibility in a live railway environment, as well as develop the longer term commercial model for expansion into the rail sector.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Competition Code: 1902\_SBRI\_DFT\_RD3

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Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
4Silence BV	WHIS@wall	£265,373	£265,373

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

Use the Competition Code given above to search for this competition's results

## Project description - provided by applicants

The overall exposure to traffic noise in Europe is escalating. Today, more than 1 in 4 Europeans is exposed to traffic noise levels dangerous to their health in their homes, schools and workplaces. The World Health Organization has classified traffic noise as the second worst environmental stressor affecting human health in Europe behind only air pollution caused by fine particulate matter, and the only one that is still growing. According to the European Commission's 2011 White Paper on Transport, traffic noise-related external costs would increase to roughly € 20 billion by 2050 unless further action is taken. This puts railway authorities under acute and growing pressure to come up with new and better solutions to fight train traffic noise.

Currently, there are worldwide only two large-scale applied noise abatement methods in existence, namely blocking noise with a noise barrier/screen or absorbing it with for instance rail dampers. These solutions have seen only incremental improvements over the years and have proven to be insufficient or unattractive in many situations because of issues with noise reduction levels, high costs, applicability and landscape view.

4Silence helps to solve the problem. It develops highly effective innovations based on the principle of diffraction, i.e. bending traffic noise in an upward direction in order to reduce noise. Worldwide, it is the first company to have successfully translated the acoustic principle of diffraction into effective noise abatement solutions, which is substantiated by the many prestigious prizes 4Silence won in the Netherlands.

Currently, 4Silence is developing the WHIS@wall, which is a 1 meter high concrete wall combined with a diffracting element (resonator) made of weathering steel that reduces noise by 8 dB, which is comparable to that of a 3 meter high noise barrier. Small-scale tests with the WHIS@wall have shown that its noise-reducing capability is a proven technology. However, the WHIS@wall requires additional prototyping and field-testing by using the data generated from the previous small-scale tests. Therefore, this project revolves around continuing the development of the WHIS@wall and subsequently field-testing and validating it in an operational, UK railway environment.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Ultra Light Rail Partners Limited	Ultra Light Rail Smart Transport Innovations – Project STEAM Ultra	£349,990	£349,990

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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## Project description - provided by applicants

### Ultra Light Rail Smart Transport Innovations

The aim of this project is to redesign the existing driveline and powertrain within an operational low carbon /zero particulate emissions Parry People Mover Class 139 Light Railcar to become powered through a zero carbon, ultra low noise emission, zero particulate material emissions hybrid powertrain combining methane engine with a flywheel within a conventionally laid out bogie frame. This smart transport, next generation driveline and powertrain will build on the current hybrid technology which draws on a propane engine and flywheel as described below. The project will look to transfer existing methane engine developments within bus transport into a smart transport, light railcar to produce a 'first of a kind' zero carbon, ultra low noise emissions powertrain for the rail industry by measuring safety, efficiency, noise and carbon / particulate emissions and power capacity of this hybrid powertrain within a live environment on track at Severn Valley Railway. The project will aim to demonstrate through live on track testing the benefits to rail crew, track and station-side residents and railcar users from the option of smart transport ultra low noise, zero emission railcars. The project will be managed and overseen by Ultra Light Rail Partners Ltd (ULRPartners), the funding applicants, with Parry People Movers Ltd, designers and manufacturers of the existing light railcars operating at Stourbridge, Black Country, West Midlands, and drawing on the expertise of research engineering expertise working to manage and oversee the testing phases and work packages described in this bid.

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