

THE INNOVATION GAME

PAUL STEPHEN exclusively reports from the inaugural **UKRRIN Annual Conference (#UKRRINannual)**, on how the ground-breaking new partnership with universities is providing the rail industry with a step change in research, development and innovation

RAIL photography: JACK BOSKETT MEDIA LTD/UKRRIN

On November 13, more than 170 delegates gathered at Kings Place in central London for the first ever UK Rail Research and Innovation Network (UKRRIN) Annual Conference. It came just nine months after the official launch of the partnership in February, and provided an early opportunity to learn more about UKRRIN and its benefits to members, as well as the capabilities, facilities and services that the wide-ranging network has to offer. With a comprehensive line-up of speakers drawn from UKRRIN's growing membership of nine leading universities and 15 rail sector companies, the conference also provided a powerful reminder of the strength of support that exists for its mission to bring together the industry's leading players with academia. It also demonstrated why the network is the UK's foremost collaborative body in the rail sector, and how - through its varied current and future research activities - it looks set to propel innovation, new products and rail industry growth into Control Period 6 (CP6, April 2019-March 2024) and beyond. First up to the podium was Head of Innovation at Siemens Mobility Ltd Jo Binstead, who chairs UKRRIN's Steering

Group. She explained how UKRRIN was formed to enhance UK rail's research and development and innovation capabilities. The need to adopt a more joined-up approach in pursuit of these goals is enshrined in both the Rail Supply Group's Fast Track to the Future productivity and growth strategy (published in February 2016) and the Rail Technical Strategy Capability Delivery Plan (published in 2012). It is also expected to underpin the proposed Rail Sector Deal and UK Industrial Strategy that will set out the Government's ambition to position the UK as a leading player in a number of global markets, including rail. UKRRIN's predecessor Rail Research UK Association (RRUKA) was created in 2010 to expand the achievements of RRUUK as a much-needed bridge between the rail supply chain and academia. RRUUKA and UKRRIN consolidated earlier this year in a bid to deliver five core functions to best meet industry needs. This consolidation also helped to clarify the rail research and innovation landscape, with one body representing collaboration between academia and industry in rail. Binstead said that UKRRIN would now use this as a

UKRRIN'S NEWEST MEMBER

On November 13, it was announced that Porterbrook had become the latest industry member to join UKRRIN. The rolling stock owning and leasing company says its decision to join the network builds on its existing links with the University of Birmingham - with which Porterbrook is already working to develop a full-size UK hydrogen-powered passenger train. The HydroFLEX is planned to be demonstrated at Rail Live (organised by RAIL) in summer 2019, while the research and development partnership is being tipped by the University of Birmingham and Porterbrook to develop into the full commercial production of standard gauge hydrogen-powered trains. "I am particularly pleased that Porterbrook is able to join UKRRIN," said

Porterbrook CEO Mary Grant. "Through our work on HydroFLEX we know the quality of people and thinking to be found in British universities. We hope that we can complement that with a little commercial flair, so that the railway's passengers can benefit from improved technology that delivers better journeys." Clive Roberts, Professor of Railway Systems at the University of Birmingham, said: "We're delighted to be welcoming Porterbrook into UKRRIN. Their commitment to investing in UK rail R&D is great testament to the skills and knowledge we provide to industry. This is a strong statement of support, and we are looking forward to working with Porterbrook on a number of exciting projects."

foundation to bring conceptual ideas and innovations to market much sooner, and on a larger global scale. With the rail industry facing the tough task in CP6 of improving productivity while reducing costs, and with Brexit looming, UKRRIN also needs to help bring these products to market and to support growth against a more challenging backdrop of uncertainty than existed previously. "We think UKRRIN is very special, and we're already demonstrating success," said Binstead. "We're thrilled that the country is already benefiting from the high levels of collaboration we've already experienced, and we'd like to grow even further so that the rest of the industry has an opportunity to share in our success." Binstead was joined by Professor Clive

Roberts from the University of Birmingham, which is the lead partner in UKRRIN's dedicated Centre of Excellence in Digital Systems. He told delegates that in just nine months the network had already grown, with UKRRIN welcoming Cranfield University as an academic partner and rolling stock company Porterbrook as a new industry

member to complement the network's founding members. Membership is expected to climb further still, with UKRRIN open to new suppliers and universities in order to increase the breadth of both its research facilities and expertise. "UKRRIN will bring about what we cannot do already, such as system integration and more full-scale testing," he said.

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Jo Binstead, UKRRIN's Steering Group Chair

"It is obviously already delivering for the UK, and people around the globe are now looking at us for how to organise their innovation and research in the same way. "I'm delighted to say that we have a pipeline of research and prospective members in the UK and overseas, and I can today welcome our newest industry member Porterbrook [see panel]. We also have a route for academic institutions to join us, and Cranfield University has just signed up to add to our expertise in robotics and AI. "There are lots of different routes for more companies or academic institutions to engage with us and to consider applying to join UKRRIN. More information is available on our website [www.ukrrin.org.uk]." The UKRRIN university partners have combined their resources to form three Centres of Excellence, in:



More than 170 academics and industry representatives attended the first UKRRIN Annual Conference on November 13, at London's Kings Place.



UKRRIN Steering Group Chair Jo Binstead and Professor Clive Roberts (University of Birmingham) welcome Porterbrook's Head of Communications and Engagement Rupert Brennan-Brown (centre) to the UKRRIN Annual Conference in London on November 13.

→ ■ Digital Systems (CEDS). University of Birmingham.

■ Rolling Stock (CERS). University of Huddersfield, Newcastle University and Loughborough University.

■ Infrastructure (CEI). University of Southampton, University of Nottingham, Loughborough University, University of Sheffield, and Heriot-Watt University.

Cranfield University has recently joined as an affiliate member of UKRRIN.

In addition, a fourth Centre of Excellence (CET) has been created in Testing. This incorporates testing facilities at Network Rail's Rail Innovation & Development Centres (RIDCs) at Melton Mowbray (Leicestershire) and Tuxford (Nottinghamshire), alongside those of other key partners Transport for

London and the Quinton Rail Technology Centre (QRTC).

Together, these four Centres of Excellence are benefiting from more than £90 million investment to develop their research facilities - comprising £28.1m awarded by Research England and £64m from industry. All sites are due to be completed by 2020.

These world-leading facilities will be open to UKRRIN industry members from the rail supply chain - including infrastructure managers, train operators, manufacturers and others that are in a position to fund research and then bring innovations to market.

In turn, university researchers and students will have improved access to industry experts and real-life projects, helping to expand their skill sets and boost their employability.

Senior representatives from each of the four Centres of Excellence made presentations at the UKRRIN annual conference, to deliver an insight into what facilities they could either already offer or those currently under construction, and to provide a flavour of current or future research projects being undertaken.

Roberts said that a new 3,000m² UKRRIN facility would be ready to open on the University of Birmingham campus by mid-2020, housing the Centre of Excellence in Digital Systems. Procurement has recently begun for equipment including train cab simulators, data platforms, 3D visualisation technology, and signalling and communications equipment.

"These will be facilities for all, not just the University of Birmingham's Birmingham Centre for Railway Research and Education (BCRRE)," he said. "They will help us face a number of grand challenges as an industry in the next few years, including ensuring system-wide cyber security and achieving zero on-site testing for railway equipment."

New initiatives currently under way at BCRRE include the hosting of a University Innovation Day by Siemens and two Network Rail engineering conferences. BCRRE is also leading the DIGI-RAIL business support and demonstrator programme to assist more than 100 small and medium-sized enterprises (SMEs) to exploit the opportunities created by NR's Digital Railway programme.

Professor William Powrie gave a presentation on behalf of the University of Southampton which leads UKRRIN's Centre of Excellence in Infrastructure, where the new £46m National Infrastructure Laboratory (NIL) is due to open in April 2019. It will include a geotechnical centrifuge and other facilities for advanced soil sub-grade testing, while the University of Sheffield will receive increased capacity for testing full-sized components.

decarbonisation.

Forde told the UKRRIN annual conference: "NR did a lot of innovation in CP5, but it was dispersed, so in CP6 we've decided to focus it into a single portfolio with six programmes including efficient asset management and future train control."

"Collaboration will be critical for us because we are an infrastructure manager and don't deliver products. We will increasingly be using mechanisms such as Small Business Research Initiatives and innovation partnerships like UKRRIN."

"We need implementable ideas, and not 'zombie projects' that just meander along consuming resources. We need to make sure that projects are solid and agile enough for changing environments like Brexit, but to do that we must work together with people and organisations like you."

NETWORK RAIL ON UKRRIN

As one of the rail industry's largest stakeholders, and the lead partner in UKRRIN's Centre of Excellence for Testing, Network Rail is putting its weight behind the new partnership as a key means of fostering the required level of innovation in Control Period 6 (CP6).

Between April 2019 and March 2024, NR will have more than £350 million to spend on research, development and innovation - through a combination of direct funding from government and third party funding for collaboration.

According to NR's Research, Development and Technology Programme Manager Rob Forde, UKRRIN and its members will play a key role in helping NR develop collaborative solutions as part of its CP6 R&D programme - particularly in its key focus areas of building asset resilience, increasing automation, improving cyber security, and

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Professor Clive Roberts, University of Birmingham

"The important thing is that we'll have a lot of collaborative space in the NIL. And it's not just for students and staff in Southampton, but for everyone," said Powrie.

Professor Simon Iwnicki from the University of Huddersfield, which is the lead partner in UKRRIN's Centre of Excellence in Rolling Stock, was up next to discuss future plans. He told delegates that new facilities are being built in Huddersfield for pantograph interaction dynamic testing and train hi-fidelity on-board motion simulations, while a new traction, drivetrain and braking facility will be built at the University of Newcastle. Flexible 'hardware in the loop' facilities are also being installed on university campuses in Huddersfield and Loughborough.

He said: "Our objective is to be a one stop shop for rolling stock research, and like the other Centres of Excellence to support the four C's of Rail Technical Strategy, which are: halving costs, doubling capacity on key routes, halving carbon emissions, and increasing customer satisfaction."

Finally, Peter Ellis from Network Rail represented the Centre of Excellence for testing. He said: "Between NR, QRTC and London Underground, we are three entities supporting UKRRIN with at-scale testing

CASE STUDY: BRITISH STEEL

Based in Scunthorpe, British Steel was formed in 2016 following its sale by previous owner Tata Steel. The company employs approximately 5,000 people and has an annual output of three million tonnes of steel.

According to British Steel's Rail Technologies Manager Rob Lambert, joining UKRRIN as a founder member in February was a "no-brainer", given the unrivalled access it now has to the research facilities and human resources of the four Centres of Excellence.

Lambert says that the future of British Steel looks much brighter as a result of the collaborative journey it has chosen to embark on with UKRRIN.

"As Tata Steel we had access to hundreds of researchers at dedicated facilities, and also worked with specific universities on projects," he said.

"We arguably did some aspects of

innovation much better ten years ago than we do it now, but we lost access to the majority of our facilities when we became British Steel and we naturally has a smaller research team.

"We quickly set about building relationships with the Universities of Sheffield and Huddersfield, and then UKRRIN came along which was a technical no-brainer. Our thinking was that we work with these researchers anyway, and it allows us to better leverage competitive public funding for our projects.

"Meanwhile, the skills and expertise align very well with the requirements of our rail business. It's only just beginning, but with the University of Sheffield we are already defining our focus areas for the next two years - including the expansion of their facilities and scale testing."

facilities for equipment and type testing at line speeds of up to 125mph. We are effectively the next step along in the project lifecycle from the academic centres, and provide a safe and representative railway environment to test innovations and to invite stakeholders or funders along to see them in action."

At the heart of UKRRIN is its co-ordinating hub, which is led by RSSB and brings together the Centre leads and representatives from RIA (Railway Industry Association) and Unipart. The hub supports the network in the five key areas of: promotional activities; bridging services; capability mapping; links to industry strategy; and route to market."

RIA Technical Director David Clarke explained how UKRRIN would provide a test bed for innovations but would also offer

practical support in bringing them through the full product lifecycle to commercialisation.

He added: "We're really proud to be a founding member of UKRRIN, because innovation is a process that experience has taught us isn't easy. Our 'valley of death' for new ideas that don't make it to demonstration phase is much deeper than in other industries, because of the number of parties you need to bring together. There are also lots of demonstration products out there that have not yet made it into revenue-earning service or providing a public service.

"That's where UKRRIN comes in, and the Centres of Excellence are about overcoming that first valley of death from research to proof of concept. The second one, route to market, is a challenge where we [RIA] can help, which is why we became founding members."

"UKRRIN is now very much open for business, and welcomes approaches to join from all interested organisations. To find out more about working with its Centres of Excellence, contact the co-ordinating hub (ukrrin@rssb.org.uk) as a first port of call. You can also follow UKRRIN on *Twitter* @UKRRIN or visit the UKRRIN website at www.ukrrin.org.uk."

Further reading

- University Challenge - RAIL 837
- Innovation Central - RAIL 855



Delegates were given the opportunity to meet UKRRIN's Centre of Excellence leads and network members on November 13, to understand how individual components of the partnership fit together.

ENGAGE WITH UKRRIN

- RIA Unlocking Innovation Scheme: January 8 2019
 - UKRRIN/REF Lecture Series - Rolling Stock: January 29 2019
 - RIA Technology and Innovation Conference: March 19-20 2019
- www.ukrrin.org.uk