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Railway Research, Education and Innovation @ Birmingham

Alexander BURROWS, Director of Enterprise & Innovation @ BCRRE

Ljubljana, Thursday 30 June 2022

AGENDA

- Introducing the Birmingham Centre for Railway Research and Education (BCRRE)
- Innovation and Industrial Activity
- The South East Europe Rail Research and Innovation Network
- Hydrogen and Rail

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Introducing the Birmingham Centre for Railway Research and Education (BCRRE)

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UNIVERSITY OF BIRMINGHAM
Ranked in the
TOP 100
of the world's universities
TOP 20
of all UK universities
Birmingham is the
second most targeted
university in the UK
by top employers
We teach over
34,000
students at both
undergraduate and
postgraduate levels
11
alumni and staff
recognised as
Nobel Prize winners
We are investing
£1 billion
in our campus over ten years

The Birmingham Centre for Railway Research and Education (BCRRE)

- Part of the School of Engineering
- Multidisciplinary approach
- 50 years old
- The largest specialist railway research, education and innovation centre in Europe

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Railway Activity at Birmingham

BCRRE has more than 170 researchers and support staff

Over 500 students studying railway engineering with us around the world

2017 Queen's Anniversary Prize for Higher and Further Education

Lead for the £92M UK Rail Research and Innovation Network

Partners: Siemens, Bombardier, SMRT, Unipart, Hitachi, Thales, RSSB, British Steel, Atkins, RIA, AECOM, Pandrol, Progress Rail

National College for Advanced Transportation and Infrastructure (NCATI)

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Partnerships and Collaborations

Strong industrial relationships:

UK/EU - HS2, Network Rail, London Underground, West Midlands Trains, GTR, Siemens, Bombardier, Thales, Hitachi, Atkins/SNC Lavalin, RSSB….

Singapore – SMRT, NTU

China – CRRC, Beijing Jiaotong University, Guangzhou Metro, MTR (Hong Kong), Hefei Metro, Beijing Metro, Lutong Freight Railway, South West Jiaotong University, Zhejiang Uni, Guangdong-Hong Kong-Macau Greater Bay Area Union

Japan – Hitachi, JR Central, RTRI

Malaysia – UHTM, UTCS, UiTM

Other countries - India, UAE, USA, Thailand, Brazil, Serbia/SEE….

Core BCRRE themes

All our key research themes focus on systems thinking to solving multi-disciplinary and cross industry problems. We provide **Technical Leadership and Strategy Development**:

1. Develop global leading expertise in **Future Railway Operations and Control** for railway digitialsation
2. Provide much needed **Data Integration and Cybersecurity** for the data driven railway and Internet of Railway Things research capabilities and facilities
3. Developing the next generation of **Smart Monitoring and Autonomous Systems** for radically improved sensing and sense-making
4. Full **Decarbonisation of the Railway** through the development of well evidenced, clear and consistent long-term policy
5. Significantly improving processes for **Introducing Innovation** for rapid realisation of benefits into operational railway systems
6. Ensuring that **Railway Education and Skills** and processes are appropriate for the next generation of railway professionals

What We Like To Do – Research to Impact


Conceptual propulsion system design for a hydrogen-powered regional train


Development and design of a narrow-gauge hydrogen-hybrid locomotive

Innovation and Industrial Activity

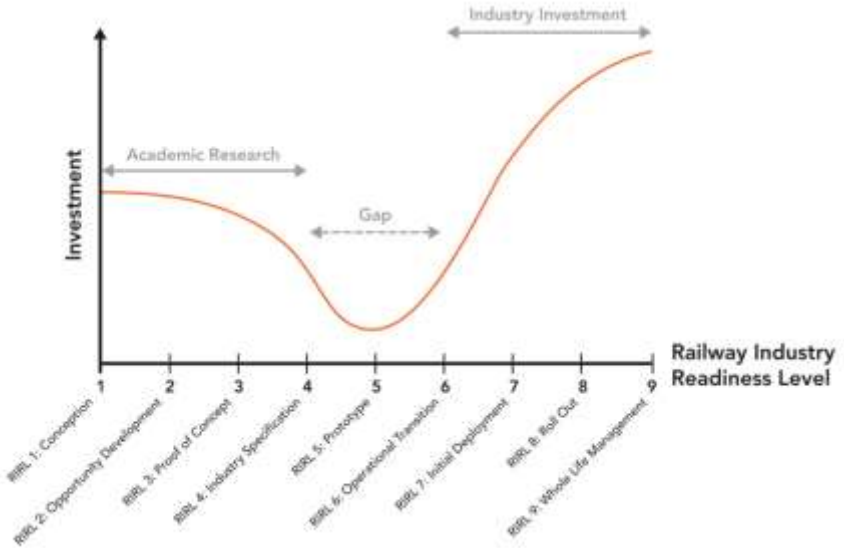
Rail Research + Introducing Innovation

Our objectives are:

- To develop our research further in order to deliver real world impact and operational benefit
- To support industrial partners to undertake more / better innovation and derive benefit
- To support the rail industry in realising benefit from R&D / innovation

Enterprise & Innovation at BCRRE

- The BCRRE Enterprise & Innovation team supports our Research and Education Groups to grow our industry partnerships / collaborations and to increase the impact of our research
- We are here to support industry to thrive in the rail industry, particularly with introducing innovations into rail



Innovation

Why does rail need to enable innovation?

Solving Challenges (eg decarbonisation)	**Effectively using state of the art technologies**	**Meeting evolving customer needs and expectations**	**Reducing operating costs / increasing efficiency**	**Improving performance (safety, capacity, reliability)**

- Rail needs to emulate other industries (automotive, aerospace) and more proactively focus on supporting / enabling innovation to happen
- Issues: industry structure, risk appetite, procurement

- *Digitalisation + Decarbonisation are both major rail industry challenges AND opportunities to facilitate increased rail innovation*

Innovation

- We work with our University colleagues and the industry to support, facilitate and enable innovation to happen
- We are at the heart of UKRRIN collaborating with a range of industry partners and key actors
- We have established the BCRRE Rail Innovation Cluster and are a proud member of the European Rail Clusters Initiative
- As part of our civic duty as a university, we work closely with many SMEs to help them enter the rail industry and to innovate

UK Rail Research and Innovation Network (UKRRIN)

UKRRIN
UK RAIL RESEARCH AND INNOVATION NETWORK

UKRRIN is designed to create powerful collaboration between academia and industry, aiming to provide a step-change in innovation in the sector and accelerate new technologies and products from research into market applications globally.

- Supporting and building UK rail capabilities
- Delivering a step-change in investment in rail innovation
- Radically increase UK rail productivity
- Develop new strategic relationships with SMEs, supply chain, rail industry and wider transport sector

Founded in 2018	4 Centres of Excellence
16 Universities	20 Industrial Partners

BCRRE hosts the Centre of Excellence in Digital Systems and is the UKRRIN lead for Introducing Innovation

The South East Europe Rail Research and Innovation Network (SEERRIN)

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SEERRIN

SOUTH EAST EUROPE RAIL RESEARCH AND INNOVATION NETWORK

The South East Europe Rail Research and Innovation Network is the regional rail champion. Founded in 2020 to enable innovation and facilitate collaboration across the regional rail industry, SEERRIN brings together industry, academia and governmental bodies to drive growth and development of the regional rail industry.

What can SEERRIN do for industry?

FUNDING: identifying opportunities and build collaborations to access funding streams

PEOPLE & SKILLS: develop the workforce with the right skills to deliver modern railways, enhancing the university offering and connecting it to industry requirements

R&D / INNOVATION: partnering to deliver more/better research; providing the capability and resource to partner and provide reduced risk and greater impact

ACCESS TO NEW MARKETS: build partnerships to access new international export opportunities

POWER OF COLLABORATION: facilitate collaboration between partners/clusters (to access major international funding streams; major procurements etc)

REGIONAL RAIL INDUSTRY CHAMPION: advocate for the regional rail industry – the existing capabilities and skills PLUS promoting and enabling the technologies and skills that are needed

Hydrogen and Rail


HYDRO
FLEX
porterbrook
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Delivering the UK's first hydrogen train!

2018:
collaboration agreement signed

2019:
prototype train runs in public testing and demonstration

2020:
upgraded prototype train obtains approvals and starts mainline testing

2021:
first in class production train runs at COP26 in Glasgow

Delivering the UK's first hydrogen train!