RailBusinessDaily

The technologies driving digital skills in rail

May 17, 2021

The fourth day of last week's Railway Industry Association's Unlocking Innovation webinar series looked at the technologies driving digital skills and learning.

High Speed One

The first speaker of the day Peter Turrell, Head of Asset Management at HS1, gave an overview of their Digital Twin projects. Peter presented on High Speed 1's Customer Focused Digital Twin and their aim to develop a platform to digitise and understand the movement of customers at scale. Through this data they can better utilise their space, improve the customer experience and make better informed decisions for planning.

Over the last 15 months in particular, their cameras have monitored the density of passengers, identifying pinch points and enabling the team to monitor and respond to ensure social distancing is maintained. They also have CCTV to anonymously track trends in passenger movements. He added: "We can begin to see and map how customers interact to the situations around them – this could be down to the level of a lift closing or when to reintroduce of passengers."

Peter also outlined their 5G Integrated Railway AR Digital Twin, which they have developed in partnership

with Pauley, Network Rail, and the University of Sheffield. They are using condition monitoring technology on assets in stations – this data is then shared with maintenance teams, monitoring the real-time performance of critical rail assets.

Peter showed a demonstration of how they are using Augmented Reality to utilise this data – with the benefits of improving maintenance and better training and testing. Using this tool, the team can take their understanding of what's happening with real assets "to another level".

National College for Advanced Transport and Infrastructure

RIA next welcomed Nick Rodney, Digital Rail Lead at the National College for Advanced Transport and Infrastructure (NCATI), who covered the work they are doing to train the next generation of digitally-skilled rail industry professionals.

He stressed the importance of experiential learning, explaining that you need to experience something to understand how to do it. Another tool NCATI are utilising is Gamification – with Nick showing how even simple games such as Paper Train or Train Station Simulator enable students to understand the behaviour of signalling and rolling stock to help understand timetabling and signalling requirements as well as some of the challenges around stations such as timetabling.

NCATI are collaborating with Pauley to use Augmented Reality (AR) – particularly their Old Oak Common Station simulation and Bentley's OpenRail Station. The college also have an ETCS simulator donated by Siemens, enabling them to simulate real world experiences such as when failures occur.

Nick was honest about the challenges such as development costs of tools, time needed and the needs of different learners – "we need to consider users' individual needs". Overall, it provided a clear overview of the work NCATI is doing to improve digital skills in the rail sector.

Depot Modelling

Next onto the virtual stage was David O'Neil, from Frazer-Nash Consultancy, who showcased their Depot Modelling capability. He explained that historically depots were designed based on experience and functional requirements. However with new digital tools they are beginning to use systems thinking to consider depots as a "dynamic environment".

David explained that "static capacity", such as fleet size and maintenance activities, is not enough – they need to consider what he described as "dynamic capacity" which includes other inputs such as stock types and train

timetables for example. According to David, understanding something as a system needs to take into account the people.

He ended by emphasising that there is a real need across the industry to understand depots better as many were built without an understanding of the new technologies and trains that are now in service.

Digital Twins

The University of Birmingham's Professor Clive Roberts and Dr David Kirkman joined to highlight their Birmingham Railway Virtual Environment (BRAVE) platform. Through the platform they can build full models of a railway, including track, train types, timetables, and track topology.

David highlighted their work in Hefei metro in China to develop a model to build the metro system. Through the data they were provided they are able to map the system that would be required. This enabled them to test the timetable, work out ow many passengers could be and how they would move around and were able to produce various disruptions to monitor how they effect the network.

David also showed their work with HS2, taking the scheme plans and information about trains to map how they will run on the network.

The University of Birmingham are also working on the current West Midlands trains network working in collaboration with Network Rail. David explains how their work fits in with the right-hand side of the 'V' project lifecycle, helping to monitor a network as it performs in real time on current lines and networks.

Their ambition is to monitor trains on the network, and if something unusual happens they can play back what happened to analyse whether different decisions would have led to different outcomes.

Copy and photo credit: Railway Industry Association