RailBusinessDaily

Unlocking Innovation Whole Systems series concludes with a focus on solving challenges to the industry

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Over the week of 10 May, the Railway Industry Association (RIA) explored how Whole Systems approaches are supporting the delivery of projects in rail. The series of webinars concluded on Friday 14 May with a look at the challenges the industry needs to solve.

Developing New Technologies and Software

Arvinder Sangha, Senior Systems Engineer at Harmonic, began the day by explaining how Harmonic Transformation delivered effective end-to-end approaches to integrate engineering, architecture, P3 Delivery and People transformation in one coherent lifecycle.

“A question we’re often asked is how does rail compare to other industries?” Every project is different and comes with its own challenges – “regardless of sector, you need to tailor the programme to the project’s specific needs.”, Arvinder told the audience.

Their holistic approach ensures that there is a coherent solution across process, organisation and people, tools, technology and information. “We have a transformation methodology – we measure our approach based on project needs” says Avinder, setting out how Harmonic develop a project through from inception to completion.

Avinder also summarised the key issues and challenges – “we’re often pushed as engineers to not gold plate – this [Harmonic’s approach] is certainly not that, it’s about a full life cycle process”. This means engaging with stakeholders, both direct and indirect, particularly passengers.

“There is no way out of reducing complexity – we are asking systems to have more and more functions” but we can ensure we deal with that complexity effectively, he added.

Testing is also a key issue and you need to consider testing from the outset, says Arvinder, presenting their Whole Systems solution, named Model Based Systems Engineering.

We need to develop technology, but focused on business need, concluded Arvinder – not just technology for technologies sake.

Automated Design & Testing

Next up was David Shipman of Network Rail on automation in design and the testing of future Command Control & Signalling (CCS). David set out the role of the Signalling Innovations Group, which sits within the Route Services function of Network Rail. “Amongst a wide range of activities, we’ve been involved in embedding automation in a number of programmes” David said.

“Our largest issues in the signalling industry, is that conventional CCS systems are costly, slow to instal and we have a significant upcoming work bank.” says David. “With conventional solutions we have higher costs and constraints than if we move to digital signalling.” However, signalling technology is still not enough – so we also need to create a sustainable workbank, to bring the cost below £190,000 per / signalling equivalent unit.

The Rail Sector Deal set out the plan for how the industry would work together to reduce signalling cost. Network Rail’s solution is the Long Term Deployment Plan for digital signalling roll out, with T190+ as their research and development programme to help achieve the cost target.

There is a huge potential for automation – helping improve safety, speed, coverage of activity, better integration as well as assurance and quality, David said. Knowledge transition and training of staff can also be supported by automation. It can reduce the need to deliver work on site and can reduce errors, Shipman says. And every one of these areas helps reduce the cost.

Showcasing how automation can help design, Shipman showed how you can use data integration to feed the data into existing digital tools, as well as integrating data from video monitoring, helping reducing ‘form filling’.

“For all the work we are doing, there are challenges” says David – one of the problems with using lots of

data is that data can be flawed, leading to flawed outcomes. Handing over a project between parties can be particularly dangerous – we need to make sure the data is handed over correctly, he concluded.

David's final point? It's also about trust and credibility, which needs to be built up and can be so easily lost.

Starting from Scratch

Nassar Majothi, Head of Systems Integration at HS2 spoke about the systems integration on the UK's largest rail infrastructure scheme. He started off by highlighting that systems integration is not a new idea, with systems theory first appearing in Aristotle's texts. The Apollo programme was when the modern approach to systems engineering was established, as shown in a recent interview at RIA's Innovation Conference where astronaut Charlie Duke spoke about what rail could learn from space exploration. Majothi said that manufacturing and logistics now use many of the learnings of the Apollo programme throughout their processes.

There is still plenty more to do, says Nassar with reports from institutions, Government and various stakeholders looking at how we best deliver system engineering. "The lessons are not just technical", says Nassar, "a lot is around culture and behaviours and that the organisation understands the importance of integration." You have to keep focused on the end goal – and have clear accountability, Nassar adds.

Nassar then went through the three lenses of system integration – first as technical leadership. This is about looking at the sub systems such as train, track, stations and tunnel and looking at key issues like human factors, safety and cyber security across these sub systems. "This is the domain of the system engineer."

The second lens is process control, where we look at the lifecycle of the scheme, particularly looking at standards and processes. We need to acknowledge that humans are not computers so need to think about how humans will interact with these systems.

The final lens is system integration as enterprise capability, such as around contracts, the organisation, project management, supply chain, funding and many other areas.

Nassar set out how HS2 works as the Prime Systems Integrator, taking a progressive approach to carefully plan and track integration milestones. There is collaboration across all levels, he adds, between Network Rail, HS2 and West Coast Partnership as well as with the wider supply chain.

Very Light Rail

How do we apply the process of systems engineering to innovation? Richard Jones from BCIMO gave his view on how the proposed innovation centre is helping support R&D in the area of very light rail.

Richard set out the key benefits of the scheme – being collaborative, progressive, transformative and better connected.

Richard also set out what BCIMO hopes to achieve – creating a system that processes technical R&D and

the making of an industry as a product. In other words, creating an ‘industry factory’.

It is clear that Richard sees very light rail as a key industry for rail and a prime opportunity for innovation which could then be used to boost the UK’s global offering.

Richard concluded on a clear call to arms for the industry – encouraging them to get involved in Very Light Rail and their drive to develop new projects.

The next Unlocking Innovation event will take place on 9 June, looking at Accessing Funding from Horizon Europe. Find out more here.

Photo credit: Railway Industry Association