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Time is of the essence: delivering tech success in rail

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KPMG InfraTech director David Smallbone and associate director Cristobal Pollman discuss the challenges, and benefits, of tech deployment

Timing is crucial in the rail industry. Whether companies are working to deliver the timetable itself or making important decisions about the repair of an asset, time is a critical dimension. And, as the industry reconfigures around Great British Railways, there is a window of opportunity to address UK rail's tech problem.

New technologies are the key to addressing its most pressing concerns around performance, cost and sustainability, but the industry has long struggled to take advantage of them. Indeed, for many organisations, uncertainty around what they should invest in, when they should act, and how technologies can be deployed and integrated to maximum effect, is delaying innovation. Below, we explore today's barriers to successful tech deployment, discuss the action required to overcome them, and outline some of the emerging trends in rail technology. More specifically, we'll draw on our experience of working with clients and solution providers in rail, and other complex and critical national infrastructure, to explain why now is the right time to break the deadlock and unleash the benefits.

Addressing the lag: barriers to tech success

Organisations are waking up to the potential of technology-enabled solutions – which, if used correctly, could help them to keep their workforces safe, improve asset performance, increase resilience, and minimise impacts on the environment. It's no secret that, where other industries such as automotive and manufacturing are successfully deploying new technology, rail continues to lag behind. There are pockets of great practice out there, and many successful 'proof of concepts'. Yet whether it is TOCs, FOCs, ROSCOs, Network Rail or the wider supply chain, rail organisations are failing to turn them into success at scale.

So, when it comes to taking advantage of new technologies, what barriers do these companies face?

Navigating technology selection and implementation processes can prove hugely challenging, and there are a range of questions to consider. With constrained budgets for investing in new technologies, how do you establish which solutions will best deliver the desired outcomes? What will give the best 'bang for buck' in terms of better-serving passengers and freight customers, while reducing infrastructure costs? Some organisations may invest in smart assets, but struggle to interpret the data they produce. Others successfully deploy technology in one area of the business but are unable to roll it out across multiple departments. And integrating disparate systems across multiple assets, geographies and stakeholders presents a fundamental challenge.

Suppliers are struggling too. While it's relatively easy to secure funding for a proof of concept, scaling up – and producing industry-ready concepts – can prove challenging. Unlucky SMEs often find themselves languishing in the 'tech valley of death' . The investment required to turn the proof of concept into a solution that complies to industry standards is difficult to secure without the promise of future orders. In the absence of a compliant product, the rail industry isn't able to promise the orders. So, once again, timing is critical – if returns cannot be generated quickly enough, the SME struggles to secure investment and be forced to target industries with lower barriers to entry. GBR has the potential to provide a solution here. As a co-ordinator of national research and development it can underwrite a pipeline of investment where a proof of concept has been successful.

These issues are compounded by the siloed nature of the rail industry, which prevents organisations from sharing knowledge and best practice. UK rail is fragmented – and, when it comes to establishing Great British Railways, we need to learn lessons from successful technology deployment overseas. In Australia, for example, smaller transport authorities have made significant strides, developing digital twins of local networks and pulling together information feeds.

Accelerating efficiency

The technologies are here, and solutions are cheaper and more accessible. For example, infrastructure operators both in the UK and overseas are already seeing the benefits of using simple camera-based solutions to monitor tracks in lieu of expensive measurement trains, for example.

The industry is rightly excited about tech that gets boots off ballast, reducing the time workers must spend

in dangerous operational environments. And where we do still need to send people to build and maintain assets and infrastructure, wearables can provide live feeds that mean they do so safely and securely. Real-time alerts can also protect people in need.

Other innovations make it easier to manage and report on infrastructure: drones can now scan areas that engineers previously struggled to access, with computer-vision-based AI (artificial intelligence) technology capable of translating these scans into asset models and condition assessments at pace. Sensors and testing equipment are becoming more portable, so they can be deployed on assets when needed. Once again, timing is key; assets no longer need to be fully instrumented all the time at excessive cost, and we can instead target time-critical decisions. In the water industry, we are seeing these portable sensors being used (and then re-used) to target parts of the network that are underperforming, overlaying the data from traditional fully instrumented areas.

And what about ESG (environmental, social and governance), which has become a board agenda item in every sector? New technology can support the in-depth reporting it involves, making it easier to measure the impact of mega-projects like HS2, and to share information across complex supply chains. This can improve reporting across the project, and help target areas where practices can be made more sustainable. Identifying sources of waste across the supply chain can improve cost efficiency as well as reducing carbon footprints.

With the right modelling tech, organisations could even simulate the effects of climate change, ensuring that new assets are robust enough to withstand changing weather conditions.

The key dimension is time

And better models of networks, assets and operations, in the form of ‘digital twins’, have the potential to unlock further efficiencies. Once a model has been built, teams can explore a range of different scenarios in an entirely digital environment. It’s a low-carbon, relatively low-cost way of evaluating every option before spades are in the ground and puts the right data into the hands of decision-makers, at the right time.

The key parameter in the model is time. How up to date does your data need to be to make a robust, risk-based decision? Live operational decisions require near real-time information, but longer-term strategic planning needs trended historic data over time to inform models and forecasts.

The right solution, at the right time

It’s important to recognise that these technologies are not a silver bullet. Organisations must take a timely and considered approach to tech deployment, investing in solutions that will help them to address challenges and deliver better outcomes.

It’s also about laying the right foundations, particularly in areas like data management. Currently spread across different servers, key industry data could be connected more effectively – helping, in turn, to unlock the true potential of AI tools. Imagine if ChatGPT could access the industry’s O&M manuals, using them to write detailed maintenance regimes.

Ultimately, rail organisations need agnostic advice – about which technologies to invest in, which suppliers to partner with, how best to capitalise on their existing capabilities, and when to act. That's where specialists like InfraTech come in, helping them to navigate the process, rather than selling solutions that may prove unsuitable.

With an understanding of the rail industry and one eye on other sectors, our team develops tech strategies and supports clients as they deploy third-party solutions. And the right technologies can be transformative, delivering benefits, not just operationally, but for society as a whole. The result is a brighter future for everyone.

KPMG's InfraTech strategy combines data analytics and ground-breaking technologies to provide new insights and platforms tailored to the infrastructure sector.

Find out more about how InfraTech can help guide you through the technological revolution in infrastructure here: https://kpmg.com/xx/en/home/industries/infrastructure/infratech.html

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