Placing customers 'at the heart' of the industry: technology

Stephenson Harwood Partner **Tammy Samuel** and Associate **Bobbie Bickerton** explore the impact of promises and challenges of new technology

One of the emerging messages from the Williams Review is that the industry needs to re-focus on its customers. Trust is low amongst passengers because there is a perception that the industry is incompetent and lacks the motivation to run a quality service. According to the review, the top passenger priorities are reliability, safety and security, value for money, consistency, transparency and accessibility. The rail industry will need to continue to improve all of these aspects if it is to rebuild passenger trust and this is where technology can help.

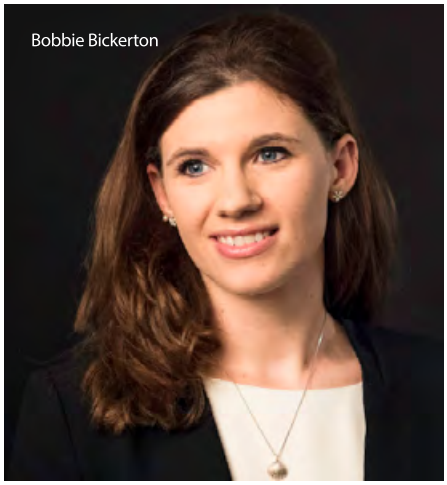
We are already seeing innovation across the industry, but it is clear that more needs to be done in this area. As technology becomes more and more integrated in our society, we have seen improvements across all aspects of daily life including transport. Passengers now expect this, and the rail industry needs to keep up with the fast-paced development of the 21st century if it is going to compete with the likes of driverless cars and lorries. There are many exciting new developments that have the potential to improve passenger experience immeasurably.

> A further development in the use of technology to help maintain the integrity of the rail infrastructure is the development of a digital twin model of the entire Crossrail network alongside the physical railway line

In our article from the September edition 'Smart-ticketing – staying 'smart'' we discussed the advent of smart ticketing and how it can make the passenger experience smoother, faster and easier. However, making changes and improvements across the industry, and on the scale required, brings with it certain challenges. Creating a modern, customer-focused railway will require more integrated transport networks, smarter ways of working and significant investment.

Promising developments in technology

In addition to the smart-ticketing project mentioned above, the industry is taking positive steps towards greater cooperation and collaboration with other networks and transport systems in order to provide customers with seamless end-to-end journeys. The idea is to make the entire journey, across different modes of transport, as hassle-free as possible for passengers, often with one payment covering the whole trip. There are a few examples of this happening already. Virgin Trains has recently partnered with Uber to assist passengers with booking a car to align with the start and end of their rail journey. Transport for West Midlands is working to integrate the rail services with bus, tram, cycling and walking options. In London, users can access unlimited Underground, Overground, bus, bike and shared cab services through one integrated card and app using the CityMapper Pass.


Bobbie Bickerton


Tammy Samuel

A further development in the use of technology to help maintain the integrity of the rail infrastructure is the development of a digital twin model of the entire Crossrail network alongside the physical railway line. The digital twin version can be used to analyse and replicate operating conditions making it much easier for engineers and

data scientists to gain an understanding of the complete network. It also allows teams to see what the actual physical system is doing and respond to changes before they happen thus increasing efficiency and reducing disruption.

Whilst implementing innovative technology on new routes like Crossrail is expected, it is somewhat more difficult to implement on legacy rail networks and systems. However it does happen and a good example is the deployment of 5G sensors alongside tracks to monitor track temperatures. Such technology should allow for a faster response time to heat-related faults ultimately reducing the length of disruption to a service (and to customers). Sensors have been deployed in the past but new developments have brought down the cost and 5G technology allows for many more devices to be connected per square kilometre than for the same area on the existing 4G networks.

The internet of things (IoT) is an interesting development that is helping many industries to run more smoothly and effectively, including the rail industry. The technology essentially seeks to make devices 'smart' such as a thermostat or a kettle, by connecting it to the internet. Such technology can be used to make legacy rail infrastructure 'smart' though the use of sensors and software e.g. connecting sensors to train seats to inform passengers where there are available seats. As more train operating companies (TOCs) deploy IoT technology throughout their network, passenger experience can be improved by providing information such as: whether a toilet is working and accessible, which carriages are the most crowded, where to stand on the platform, and alternative routes during disruption.

It is not just passenger experience and rail infrastructure that is benefiting from new technology, as augmented and virtual reality (AR/VR) techniques are being used to enhance training sessions for rail staff. HS2 is using AR to train the future staff of Old Oak Common station, a station due to serve both HS2 and Crossrail which hasn't been built yet. Staff are able to see a digital replica of the station which has the dual benefit of assisting staff to develop the skills needed to effectively manage the station whilst allowing them to provide feedback to the station designers on their experience so that plans can be honed before it is built. We are also seeing VR being used to show passengers what new or refurbished trains could look like without the need for TOCs to invest in potentially expensive and bulky simulators.

Challenges in implementing new technology

Whilst the technological opportunities in the rail industry are boundless, there are certain barriers which may slow down implementation across the rail industry.

First: cost. Transforming the entire industry is an expensive undertaking both in terms of initial investment and maintenance. Keeping up to date with new developments is an ongoing task that will require constant injection of money. The challenge for the rail industry is to do this without passing too much of the additional cost on to its customers. Interestingly, Williams has argued that the industry will also benefit from the government taking a step back from the railway and allowing the growth to stem from the regions and communities.

However, if the government takes a step back from the rail industry, there is a risk that this could mean less public funding being made available to the rail industry. Currently the government provides approximately £5 billion per year (excluding loans to Network Rail) in funding to the railway industry for operating, maintaining, renewing and enhancing the railway. Less government funding would inevitably mean higher ticket prices for passengers and higher fees for freight companies. Additionally, whilst we hesitate to mention the 'B' word in these uncertain times, depending on the outcome of Brexit there is a chance that the UK will lose any EU funding it has secured for innovation in the rail industry.

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Another challenge will be cooperation between the TOCs and networks for consistency across different lines. Due to the franchise structure of the rail industry it is difficult for TOCs to provide a harmonious service to passengers who use more than one network in one journey. Innovation at different times on different lines may result in a fractious experience for customers, which will undermine many of the potential benefits.

For example, customers using smart-ticketing or facial recognition ticketing will only see benefits if the TOCs cooperate to ensure that they are implementing technology and using systems and infrastructure that work well together and communicate with each other. Where the business model has previously been rigid, rail operators and authorities now need to develop an entirely new mind-set for digitalisation to be successful. The industry must embrace a more dynamic network, which connects TOCs, FOCs, suppliers, technology platforms, mobility providers and customers together.

The renewal of a franchise is a good time for new technology to be introduced with bidders being incentivised to come up with new and innovative ways to use technology for the benefit of customers. However, the franchise system is currently paused and this may delay the implementation of some vital new technologies.

Technological advancements also bring with them increased risk and exposure to cyber-crime. The security landscape is constantly changing, with more complicated attacks being developed all the time and it is imperative that the rail industry keeps pace with these developments to protect their data and critical infrastructure. The more the industry relies on digitalisation, the bigger the attack surface and the higher the risk to passenger safety and security of rail assets. Breakdowns, signal failures, operating software failures, and passenger data breaches are all potential consequences of a cyber-attack. This is a very real risk for TOCs as Great Western Railway discovered when its accounts were hacked in April last year. No financial information was compromised in the attack but approximately 1,000 GWR accounts were accessed using an automated system which harvested password details from other areas of the web.

Conclusion

The benefits that technology can bring to customers of the rail industry are innumerable. We work with many parties in the rail industry to help them surmount a number of obstacles to bring these benefits to its customers. The industry needs to be ready to embrace a significant shift in focus and priorities if it is to keep up with technological advancements, compete with other modes of transport and most importantly bring these benefits to their customers.

Tammy Samuel is a Partner and Bobbie Bickerton is an Associate at Stephenson Harwood