THE GROWING EMPHASIS ON DATA AND AI

Data, analysis and the growing use of AI were hot topics at this year's UK Light Rail Conference – Richard Foster provides a summary.

▲ ABOVE: Rob Carroll, Principal Engineer, Light Rail for Mott MacDonald, questioned whether light-rail is really a solution for every need. The company has developed Tram-Train Implementation Support (T-TSIT), a program that provides a quick assessment of the suitability of using tram-train. All images by Neil Pulling

Data, data analysis and artificial intelligence: they may not be the first things that come to mind when you think of light rail operations. However the UK Light Rail Conference proved how such topics, including the use of AI, are helping make the industry more efficient and safer.

'Big Data' is becoming an important resource, as Andy Willetts, Principal Consultant for Amey Digital Consulting explained. 'Big Data' is generated through the interaction of mobile devices and phones with the internet and with each other. To give an idea of how much data is generated, Mr Willetts said that 188 million e-mails are sent globally every minute and that Facebook and YouTube receive one million and 4.5m hits every minute respectively.

Mr Willets explained how 'Big Data' can be used by transport operators to "help determine the condition of in-service equipment to predict when maintenance should be performed" or could be vital to asset planning so that "rail planners can plan works efficiently and reduce overheads".

Chris Bax, Head of Transport Advisory at Amey Consulting, took the potential for use of 'Big Data' even further. He explained how every interaction with the mobile network generates a 'data point'. From these data points, Mr Bax said that people can be located – anonymously and fully GDPR compliant – "in time and space" in order to create 'people movement analytics'. This enables an overview of how the population moves around.

Mr Bax said that Amey can study "the mode of transport that people use, the time of day and the frequency of their journeys, where they start and end, whether they stop for a coffee or change modes of travel".

"We can identify why people make those journeys and whether they're making a commuting trip, whether they're making a leisure trip, whether they are local or a tourist, whether they're making a journey from home and how often do they make that trip.

"We hold this data back as far as January 2019. Understanding how people travel the day before, the month before, the year before and how we're travelling now is really important."

Mr Bax explained how this data can be used to help build long term transport plans, to help improve timetabling or even to plan the movement of people through a station or interchange.

Answering every problem?
Some solutions seem like the answer to every problem. Tram-train is one. Or is it? Rob Carroll, Principal Engineer for Mott Macdonald argued:

"It's never going to be a solution for all your transport needs but it can meet a lot of different circumstances".

So, how do you find out?

Mott Macdonald has developed Tram-Train Implementation Support (T-TSIT), a program that provides a quick assessment of the suitability of using tram-train. The program is fed with data about the proposed use and then makes a calculation, ranking the results 'green', 'amber' or 'red'. For example, T-TSIT ranks both the Sheffield – Rotherham and Cardiff Core Valleys Line schemes green.

ABOVE: Chris Bax, Strategic Director, Citi Logik at Amey Consulting, spoke about using Big Data to improve the passenger experience.

➤ ABOVE RIGHT: Maxime Stagnitto, Traction Power Team Leader at Mott MacDonald, spoke on the subject of decarbonising railways with AI using Rail Decarb.

ABOVE: Mark Davis, General Manager of London Trams, praised the LRSSB risk model for its measurement and analysis of new safety measures.

THE MAINSPRING GLOBAL DATA PORTA

TAUT publisher Mainspring used the UK Light Rail conference to unveil its new Global Data Portal. This subscription service offers unparalleled insight into the global light rail market as it enables users to access information on existing systems, systems that are due to open and systems that are being planned.

Managing Director Matt Johnston explained the inspiration behind the new product: "We get asked for the same information: where are the systems, which ones are current, in construction, being proposed, what the distinctions are between the niches within tram, metro, Very Light Rail, Ultra Light Rail, what rolling stock is coming where, what routes, what lengths and so on. What we've tried to develop is a data portal to give the industry that information."

❯ *To find out more about the data portal, e-mail hello@mainspring.co.uk or call +44 (0)1733 367600.*

However, T-TSIT has been used to assess 40 potential schemes, including many supplied by Network Rail's Restoring Your Railway team, and found 17 that were not suitable for tram-train. Of the 23 'successful' schemes, a shortlist has been put together for more detailed assessment.

Artificial intelligence is playing a greater role in data analysis. Mott Macdonald's Maxime Stagnitto explained how its MM Rail Decarb system can be used to provide a detailed plan – including future-proofing – for electrification schemes long before ground is broken.

"We calculate a fitness score using data and costs – anything you have to go through to electrify through obstacles," he said, "that we run through the optimisation engine which is the AI bit."

What happens, said Mr Stagnitto, is akin to "natural selection".

Poor scoring candidates are taken out of the simulation. The best bits of high scoring candidates are merged together to create new candidates.

"You create a new generation," said Mr Stagnitto, "which goes through this loop over and over again, hundreds and thousands of times, until you converge at an optimal solution. Rather than going through trillions of candidates, it will only go through a few thousand to bring a result much faster."

The results generated by MM Rail Decarb can show whether bi-modes or battery power might be better than full electrification. It can also show where to place substations and the available capacity of the supply points and their distance from the railway.

"This is going to be useful for transport bodies and all the people involved in decision making," said Mr Stagnitto.

"We see this as a support to decision makers either by guiding them in the right direction or providing supporting evidence for the appraisal process."

Traditional routes

More traditional routes for data analysis and data modelling are still required, particularly when it comes to safety. Mark Davis, General Manager of London Trams, couldn't praise the Rail Safety & Standard Boards' Safety

Risk Model highly enough when it came to studying the results of its new safety measures. The risk of driver fatigue has been reduced by 95% and the risk of a tram overturning is down by 76%.

"That's not a guess and me picking numbers out of the air," he said.

"That is actually using the risk model to determine how we've managed to reduce risk."

However, Mr Davis also explained how London Trams has used geo-targeting to get across important safety messages. Geo-targeting, like the generation of 'Big Data', also uses the feedback generated by phones and mobile devices interacting with the internet and each other. London Trams needed to inform people about the hazards of not paying attention while crossing tramways after a rise in incidents of people being hit by trams or tram drivers making hazard brake applications as a result of inattentive car drivers.

"We needed to do something to change the way we deliver the safety message," he said.

"We didn't want to put a campaign on board a tram because that's not targeting the people whom we needed to target. We needed the people who aren't on the trams to keep their eyes about them."

A *Be Tram Aware* video was sent to people's devices on social media when they were within 2km (1.2 miles) of the tramway, specifically targeting 16-30 year olds. Using geo-targeting meant that it got 5.7m impressions.

"It's the first time we've done anything like that, targeting people who live and work around the tramway because we needed to get that message out," Mr Davis said.

Finally, Matt Johnston, Managing Director of Mainspring, explained how data can be used to measure the growth and confidence of the light rail industry.

"How can we measure confidence globally?" he said. "What we measure are things like tram orders. The market continues to grow in terms of orders and options for vehicles. You can see almost record numbers for 2023 across the globe and that's not unique to one particular continent. We are ordering more trams as a planet." **TAUT**