TRANSPORT AND AI:
BREAKING FREE

SYSTRA

As the
Government is
poised to unleash AI
across the UK to boost
growth, productivity and deliver
public services more efficiently, SYSTRA's
Martin Campbell, Associate Director Digital and
Llewelyn Morgan, Head of Innovation, set out how we can
accelerate the benefits of using AI-based tools in transport.

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The UK is at a critical point in its deployment of AI. On 13 January 2025, it was the British Prime Minister himself who set out the Government's plans for the UK to become an AI superpower, demonstrating the importance of AI to the wider economy.

The transport sector already has some small but encouraging success stories, and we can see how tools from other sectors could help drive advances, however we also need some significant changes if we are to make the most of the opportunities on the horizon.

Transport professionals must adopt a more open mindset to allow them to break free of current constraints, not least the perception of guidance as regulation. And, at a national level, an open but standardised approach to data, such as that deployed in the Netherlands, would see a step-change in the way that AI is applied.

AI today
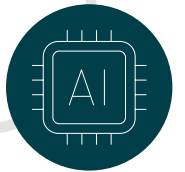
Considering AI in its widest definition, there are already pockets of the UK transport sector that are reaping the benefits of its use. Road haulage and distribution firms are using machine learning and deep learning models to optimise route planning and delivery of goods and services which is leading to fewer vehicle kilometres, reduced fuel bills and lower carbon emissions.

The industry has developed close-to-real-time productivity models based on machine learning. These have been deployed in major cities, such as London and Oxford, for traffic management systems to help keep traffic flowing and reduce congestion. Looking globally, cities such as Singapore and Los Angeles have moved far further, incorporating AI into their intelligent transport systems to predict real-time traffic conditions and manage road congestion.

AI-based tools are also helping to improve road safety. SYSTRA has developed a system that uses mass data sets and Vision AI to look at the layouts of junctions and the patterns of accidents that occur at them which can be used to inform the design of new junctions or to modify existing ones to make them safer.

Improving road safety using AI

Following on from this, last year SYSTRA's growing AI team secured a £43.5k Transport Research and Innovation Grant (TRIG) to investigate how AI can improve road safety using AI to classify the physical environment surrounding all road collisions, using OS data, Earth Observation and CAD drawings. This will help to identify how we can change the physical environment to ultimately save lives.

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SYSTRA AI DEVELOPMENT

Our engineers are also finding ways to automate time-consuming tasks, vastly reducing the resource needed. For instance, using our own large language model (LLM), we interrogated data to understand bus reliability and accessibility for a major UK transport authority. With the results presented visually, the tool predicts how various changes in land use will impact bus services.

Another tool, developed by SYSTRA for a major rail project and now used on several subsequent projects, uses AI to read multiple datasets to give an accurate single reference point for the location of all underground utilities and then complies the relevant information for each project. As well as reducing the time taken for this process by between 80 and 90%, the tool delivers a higher degree of accuracy which means that there is a lower risk of mistakes that could lead to a service strike.

Looking to other sectors

With large financial incentives for automating processes and for advanced modelling, the financial and bioscience sectors are far ahead of transport in their deployment of AI-based tools. The energy sector, which was at one time less advanced in its use of AI than transport, has also edged ahead as the Government has forced the sector to invest and to align its standards and data.

The good news is that some of the tools developed in other sectors can now be used for transport applications. For instance, AI is already helping to generate synthetic data in the fintech and retail sectors to provide much faster testing and iteration of consumer-focused services, while maintaining privacy. We think learning from this method could help accelerate an agent-based approach in transport modelling, which simulates the behaviour of individuals potentially leading to more accurate prediction and analysis of future needs and demands.

AI has the potential to make transport more accessible to a wider range of people and to make it more equitable. Journey planning, ticket pricing and even road pricing could be individualised; land and transport planning could be optimised to deliver benefits such as transport equity, environmental improvements, or better health and wellbeing outcomes.

There are hurdles to clear if transport is to catch up with other sectors. Regulations must be updated and translated to allow innovation through AI to happen. Transport professionals have a tendency to treat guidance as if it were regulation, which can limit exploration on how new datasets could be used.

And then there is the thorny issue of how the development of AI-based tools will be funded. Quantum computing throws more uncertainty into the mix: we know we will need it to process the massive amounts of data involved, but we don't know yet how much that will cost.

AI Implementation

The fragmented nature of transport delivery in the UK is another barrier to faster uptake of AI-based tools. Successful implementation of AI relies on large amounts of robust data, yet that isn't possible since there is no standardisation between local authorities. Applying national standards would encourage more tech start-ups since they could scale their businesses across the country.

We also need to think carefully about ethics when we are writing our algorithms. We have already seen existing biases being baked into AI-based applications in other industries. The risk for transport is that disadvantaged communities and demographic groups become further disadvantaged – rather than seeing improvements in accessibility and affordability.

LOOKING
TO THE FUTURE

With hurdles cleared, we can envisage a time where AI is supporting the operation of our surface transport network including autonomous vehicles. Benefits seen today through the discrete deployment of AI tools – fewer accidents, reduced journey times, less congestion and healthier cities – would be exponentially greater. If the UK is to realise its AI superpower, the UK transport sector must catch up and start showcasing the enormous rewards AI can bring to the world.

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Martin Campbell and Llewelyn Morgan are part of SYSTRA's AI Steering Group which was established to formulate the company's AI strategy in the UK & Ireland and to develop AI models and tools as well as AI training and guidance.

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Find out how SYSTRA can assist you in AI Technology:

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