



Chartered Institution of Highways & Transportation (CIHT) response to the National Infrastructure Commission (NIC) – New Technology Study (deadline 15 September 2017)

CIHT is a charity, learned society and membership body with over 14,000 members spread across 12 UK regions and a number of international groups. We represent and qualify professionals who plan, design, build, manage and operate transport and infrastructure networks. Part of our vision is to demonstrate transport infrastructure's contribution to a prosperous economy and a healthy and inclusive society. Our values are to be Professional, Inclusive, Collaborative and Progressive.

CIHT welcomes the opportunity to respond to the National Infrastructure Commission New Technology Study Call. CIHT has a range of resources that might be beneficial in assessing organisations at the cutting edge of this arena and would recommend that the Commission would benefit in looking at previous CIHT Award winners – particularly in categories that look at technology, innovation and asset management [www.ciht.org.uk/awards].

One area on which CIHT has particularly focused with its members is the consideration of the security aspects in the uptake and deployment of new technology e.g. Building Information Modelling (BIM), LIDAR and sensors on infrastructure. This is important when it comes to technology and consideration of this must underpin all work in this field. CIHT produced a podcast on this ['How to be security minded' www.ciht.org.uk/podcasts] and this provides a range of useful issues relevant to this area – from issues around the use of BIM and Lidar to potential risks for sensor data.

Another important area to consider and where CIHT is making an important contribution is the need to ensure that the sector has the right skills to keep pace with the evolution of technology and its widening application. For example more ICT and systems engineering skills will be required in future, as well as more traditional engineering and planning disciplines.

BETTER ASSET MANAGEMENT

There are a wide range of new technology initiatives underway to collect, collate and analyse data on infrastructure assets and the transport sector is already making use of these e.g. through the use of LIDAR, BIM, SCANNER, Video/Artificial Intelligence (AI) capture, sensors (e.g. for gully cleansing or monitoring bridge condition), drones, to augmented reality (for asset management). The concept of 'self-repairing' roads using small robots to detect and repair defects in city infrastructure is being researched, virtual reality technology is advancing quickly and in future could significantly enhance the way transport provision is designed and planned.

The immediate priorities must be to ensure asset resilience. This means both that assets are managed effectively (to ensure they meet safety standards and service levels) but also that they are also resilient to a huge range of disruptions (e.g. severe weather). Additional factors that should be considered include making better use of existing data (repurposing it where necessary) and the use of asset management data to inform better predictive models and strategic decision support tools.

The barriers to rolling out technology could be through a reluctance from organisations to take a risk in trialing new technologies, lack of funding, or technologies not confirming to

current standards – to name a few key ones. An additional issue is that new technologies could just produce further work for authorities and this could be seen as a burden to organisations always experiencing pressures with resource constraints. For example images captured by high resolution cameras from drones inspecting bridges will require resources to analyse the recorded information. The more that machine learning and AI can be used to automate defect detection and deterioration would be most beneficial.

There is therefore a role for the government – from the client side – to help work with industry to achieve an increased use of new technologies. This should involve:

- *Vision* – there is a need across the client side of the infrastructure community to establish both *how* and *why* it will benefit from new technology.
- *Communication* – there is a need for the sector to share the experience of lessons from the application of technology. CIHT has, for example, highlighted how drones can be used to manage resilience challenges and for bridge inspections.
- *Supporting trials and initiatives* - The role of Government can be to support new initiatives to trial new technologies. For instance the Thurrock & York pothole spotter trial is a great initiative that uses a combination of digital scanning with machine learning.
- *Standard setting* – With regards to the Pothole Spotter trial this might be viewed as a disruptive technology and as such does not comply with current standards. The role of government will therefore need to ensure the compatibility of new technology (for measuring road condition) within existing standards (in this case for reporting road condition).

Government can provide a facilitation and co-ordination role between the many different technology and innovation projects and activities, helping reduce duplication of effort, harmonise standards, and share purpose and learning in an open way. They can also intervene where standardisation/resolution of problems (like TRO digitisation, and Street works notifications) are common to all of the 153 English local highways authorities, and it is not in the market interest to solve nationally.

There is a role for Government and infrastructure owners/operators to encourage and facilitate innovation with new technologies through procurement processes.

Good examples exist, for example Transport for West Midlands (TfWM) and Innovation Birmingham are supporting a new style of collaboration between infrastructure providers, researchers and SME's to help solve their significant network resilience challenges. This is being developed and delivered by an SME working closely with TfWM, Birmingham City Council, and Innovation Birmingham. It involves repurposing of the Transport Systems Catapult (TSC)/West Midlands Combined Authority Intelligent Mobility incubator in iCentrum, to bring industry partners, universities SME's, TSC, Birmingham City Council, TfWM, Amey, Open Data Institute and others together to deliver a new style of collaborative working. By providing access to existing datasets and exploration/analysis/visualisation tools, plus staff from all these areas, the space enables prototype innovation of solutions immersed in a deeper understanding of public sector needs. The longer term intention is that collaborative units such as this can bid for work as a collective, enabling SME's to access wider market opportunities, and clients to benefit from collaborative, experienced support.

The Government is also supporting the industry with connected and autonomous vehicles and the UK is establishing itself as one of the leading countries in the world on this. One



issue with this is that as vehicles will collect more and more data on road networks condition (through sensors, image capture and so on), there is a question of how this data could be shared with road administrations for asset management.

SMART TRAFFIC MANAGEMENT

The UK has been one of the leading countries in using data to optimise capacity – for example through Smart Motorways. This allows up to a third more capacity on a road by introducing hard shoulder running in peak hours and having variable speed control throughout the smart motorway. This regulates traffic flow, removing or reducing the stop start effect that you get often on roads operating at or beyond capacity. There is significant monitoring and supervision from Highways England's control centres, so that if there's any sort of disruption or accident they can get people to the site and close off lanes more or less immediately.

Recent developments in intelligent traffic systems include the interface of real time data (e.g. SCOOT systems) against historic data trends to optimise efficiency on the network. Urban Traffic Monitoring Control (UTMC) systems enable sharing of journey time monitoring, public transport information, fault monitoring, VMS, CCTV, car park guidance etc. for local highways authorities to manage their networks. Much of the data is standardised, but not yet fully open. The UTMC community is exploring how to connect, share and open up their data consistently for reading and use by connected and autonomous vehicles. One area of innovation is translating SCOOT data into traffic signal timing information in-cab for drivers ([Greenwave project, Birmingham](#))

WATER EFFICIENCY

CIHT would note the importance of coordinating works by water companies (and other utilities) to ensure a reduction in interventions on the road network.

BIG DATA

Any physical infrastructure that is built has to be planned for and must conform to standards. CIHT think of data in exactly the same way.

CIHT strongly support the use of Application Programming Interfaces (API) are a means of way of making data accessible to networks. The benefits of pushing forward with API is that this would seek to establish a framework and method by which data is structured and this could then be fed into a national system. The whole system could be open and on a shared platform. To get this to work would require a lot of collaboration and coordination by authorities and would also require robust testing. There is some interest in this work following initiatives in the West Midlands.

We must consider data as infrastructure just as we consider our roads and rail networks infrastructure. Just like our road network, the data associated with them is a great national asset – the quality and availability of data – is therefore vitally important. Data can help with capacity planning, maintenance and routing – a wide range of elements needed to run our transport networks effectively. Creating the data and making it open (accessible) is therefore crucial.

There are a number of potential barriers to sharing data for commercial reasons, contractual limitations or resource constraints. TfL has demonstrated that unlocking open data can create opportunities for app developers to deliver new services, but there is much progress to be made across the UK.

There are a number of brief observations CIHT would like to note on this:

- In principal looks to be a good idea.
- Must cover resilience interdependencies.
- Should involve scenario planning to forecast different potential events.
- Considering of climatic modelling would be helpful.

OTHER COMMENTS

The Transport Systems Catapult (TSC) report 'Benefits of Shared Data' March 2017 looks at barriers to sharing data and recommends a Policy Advisory Group to set out the agenda, roles and responsibilities of a Mobile Data Hub. The report estimates if nothing is done to improve access to data and break barriers the UK stands to lose £15bn in mobility solution benefits by 2025 than if data were effectively shared.

Security considerations are vital to all of this, but the Centre for the Protection of National Infrastructure (CPNI) provides a range of useful resources for the infrastructure sector. The NIC, CIHT expects, will work closely with the CPNI but would urge the NIC to increase general awareness within the sector on the need for everyone to be security-minded.