

The Future of Transport: system interoperability and standards



The future of transport will maximise convenience for travellers while minimising the impact on the environment and on our roads. A new BSI report highlights the role of transport data in achieving this vision and lays out a roadmap to how this can be achieved.

The Future of Transport (FoT) envisages transport users having their journey needs met by systems of interconnected transport modes that are accessible as a single product. FoT aims to maximise convenience while minimising carbon emissions, pollution and congestion. This will require transport providers and operators, service aggregators, payment agencies and local authorities to exchange accurate data in mutually intelligible formats. Standards have a key role to play here, as demonstrated by BSI's research, according to which organizational procedures can be a far more substantial obstacle to data exchange than technological factors.

Following the Department for Transport's (DfT's) consultation on FoT in 2018, BSI was commissioned to survey the current standards landscape in relation to FoT and to produce the report **The Future of Transport: system interoperability and standards**. BSI identified many existing standards that already have a bearing on promoting system interoperability and data exchange required for the development of FoT, although the report found further standards would be needed in the future to realise future transport goals. This does not include standards covering areas such as cyber security and data privacy, which have a bearing on FoT, but were not within the remit of the report. Furthermore, more awareness on how existing standards should be applied could help with adoption as not all of the standards identified are relevant in all contexts and there are overlaps in scope between them. Clearly, guidance is urgently required for FoT actors to navigate this landscape.

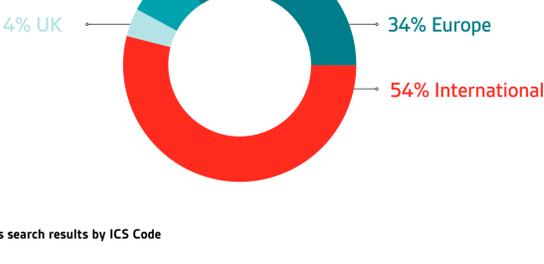
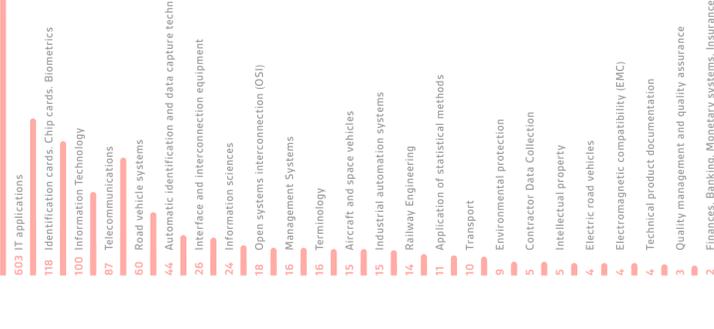
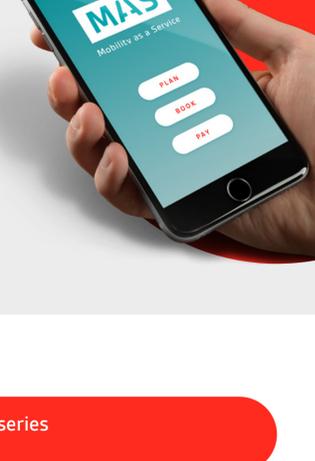


Figure 7 – Standards search results by ICS Code



The report discovered that system interoperability in the context of FoT is not primarily limited by the availability of technical data standards, but by the fragmentation of these standards between different functional areas. These silos of detailed expertise result in a lack of understanding of the full FoT picture.

Demand Responsive Transport (DRT) is a key part of FoT, allowing provision of services to adapt to the level of demand, maximising convenience and reliability for travellers while minimising cost and environmental impact. Within FoT there is a unifying movement towards Mobility as a Service (MaaS), which will allow users to plan, book and pay for a variety of services through a single digital channel. MaaS requires open and accurate data exchange between those delivering mobility services. The report found that data exchange in this context is limited by a lack of standardised datasets. Within FoT, there is no agreed definition of 'data quality' and data is not always published in accordance with any such definition, or worse still it is not published at all due to perceived commercial sensitivity, lack of resources or a lack of understanding of the demand. In this still-maturing sector, the rules of good practice are evolving, while the status of data as both a commodity and an infrastructure presents challenges for incumbent business models.



In response to these findings, the report made a series of recommendations for the development of FoT.

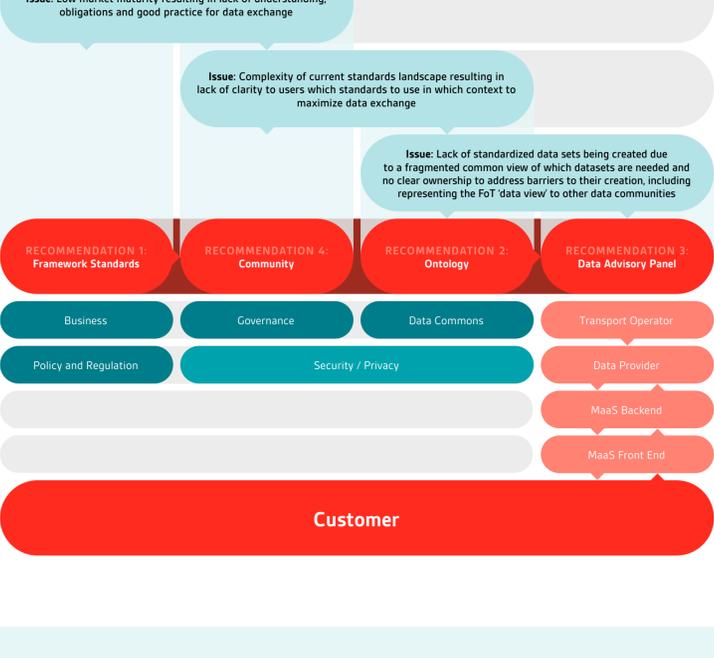
- 1** The first recommendation is that standards need to be developed for FoT, with an initial focus on actors' roles and responsibilities and their management of data. Such standards will address the principles of FoT operation; answering the question **what is FoT?** as well as addressing the principles of data commons management and the points of interaction between service suppliers and the customer.
- 2** This leads to the report's second recommendation; the development of a data ontology. This ontology will define a precise, shared understanding of the data being generated by different FoT actors. Such data addresses the **Where?** and **How?** of the journey as well as the payment and ticketing information associated with it. There are already activities being led by the FoT sector that consider data exchange standards, but these remain uncoordinated. Furthermore, a lack of a shared understanding of the data already available was cited in the report as a barrier in this area. The aim of the recommended data ontology is to develop understanding and to better coordinate work already being done. The report suggests that a formal standard may be too rigid a solution to this dynamic problem, whereas a BSI agile standard or DfT private standard might be a more suitable alternative. The report also recommends involving existing FoT actors in a consensus-led approach to the task of developing the data ontology.
- 3** Looking further ahead, more work will be required to explore how improved data collection standards can achieve mobility goals around environmental protection, social inclusion and passenger safety. The importance of passenger safety and security has been demonstrated in the past year by the challenge of providing reliable and secure transport during the Covid-19 pandemic.
- 4** In accordance with the aim of taking a consensus-led approach, the report's third recommendation is for the establishment of a FoT 'Data Advisory Panel' to build and maintain the infrastructure that underpins FoT. A lack of standardised datasets to support FoT and the current absence of a sustained approach to building a data infrastructure upon which FoT can operate - to which commercial sensitivity and lack of understanding of the benefits of data exchange are key barriers - will be among the topics addressed by this advisory panel.



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- 4** The report's final recommendation is the establishment of an authoritative FoT community. Communities already exist around FoT and they will be a valuable asset in future decision-making processes. However, existing FoT communities are siloed, and their efforts fragmented, whereas coordinated engagement will be essential in developing a roadmap to the delivery of FoT. The challenges faced here are similar to those previously seen by the financial services industry with the development of Fintech. BSI's report draws lessons from the Fintech experience, where the establishment of an industry-wide governance board helped to accelerate investment and growth in the sector.

Figure 1 – Recommendations in the context of the FoT value chain



An immediate priority will be the development of new standards covering FoT operations at a holistic level, defining how FoT actors should collaborate to deliver services and how data is managed and shared. In the longer term, there exist constraints on the delivery of future transport services that will require attention; one of the biggest stumbling blocks in developing an understanding of how transport service providers should cooperate will be addressing who holds liability for failures in an interconnected system. The report identifies that top-level guidance defining market operations is essential for the evolution of emerging markets such as FoT, whether this comes in the form of voluntary standards or regulation. Establishing consistent best practice across FoT will enable equitable sharing of the costs and benefits that come with interoperability and will help FoT meet its goals of better serving travellers in more sustainable ways.

An example of FoT being made reality has come with the government's national strategy **Bus Back Better**. The strategy takes advantage of the fact that relatively small amounts of spending can make a significant impact on bus services. **Bus Back Better** is an opportunity for the industry to reverse an ongoing decline in bus usage, improve accessibility and to introduce MaaS with seamless ticketing and journey planning. Simple optimisations like unifying bus maps between cities that currently operate in isolation from each other and introducing multi-operator ticketing will move this goal closer. Meanwhile, the strategy recommends 'Superbus Networks' which will improve coverage for areas that are neither fully urbanised nor completely rural and have therefore missed out on the advantages of metropolitan transport authorities. These small changes have the potential to make a big impact on removing transport users' reliance on cars. This, along with the forthcoming **Transport Decarbonisation Plan**, promises significant improvements in air quality.

Alongside strategies such as **Bus Back Better**, BSI's Future of Transport report demonstrates a well signposted route map to achieving a transformation in the way we travel.