Knowledge

Smart Transport Report

Contents

Introduction

Smart transport is a key area of activity for standardization now and for the foreseeable future. The digitalization of our transport networks, for people and freight, is progressing apace and must be underpinned by the appropriate, accessible, and latest standards. This presents a key opportunity: by strengthening interoperability, adopting common data exchange protocols, and aligning terminology and testing practices, we can remove barriers, drive innovation, and fast-track the development of smarter, more connected transport systems.

Processes must be simplified and automated if we are to realize the potential of a fully digitalized, integrated smart transport system. This could deliver a better user experience, make our transport networks safer and more equitable, reduce congestion, optimize transport systems, and encourage modal shift making roads and public transport more efficient and sustainable.

With the emergence and advancements in AI, smart transport systems can be enhanced by optimizing traffic flow, predicting congestion, and enabling real-time decision-making to improve safety, efficiency, and sustainability.

Why smart transport?

Smart transport, also known as Intelligent Transport Systems (ITS) involves the application of IT and communications technologies to surface transport. It has gradually transformed the way we manage, design, and use our transport services.

Smart transport delivers business benefits through supporting essential transport in a timely and reliable way, enhancing traffic management, improving safety and by opening up new opportunities for innovative and forward-thinking organizations.

We are now at a point where full digitalization of our transport network is within reach, and digital infrastructure should be considered as important as traditional engineering. A smart transport network enables us to support the shift to more sustainable transport modes to benefit both the environment and public health.

The role of standards in smart transport

Smart transport relies on high-quality, accessible data to operate integrated, efficient networks. Standards and infrastructure play a critical role by enabling interoperability, data consistency, and timely communication. These standards support areas such as automated transport, road user charging, and ticketing, and address data quality, format, latency, and security. Like standards for street lighting or pavements, they underpin reliable systems, foster innovation, and encourage widespread adoption.

The UK, alongside the US and Japan, has led in smart transport innovation and standardization. UK experts have long contributed to international efforts, helping intelligent transport systems (ITS) benefit society, business, and the environment. However, achieving a fully integrated digital network requires continued commitment to standardization.

Key standards are developed by ISO, CEN, and ETSI, with contributions from IEEE, W3C, IETF, and SAE globally.

To help explore the role of standards, we've broken it down into key applications or use cases. These often overlap - for example, the same data may support both information services and connected vehicles, while integrated solutions like mobility-as-a-service (MaaS) cut across multiple areas.

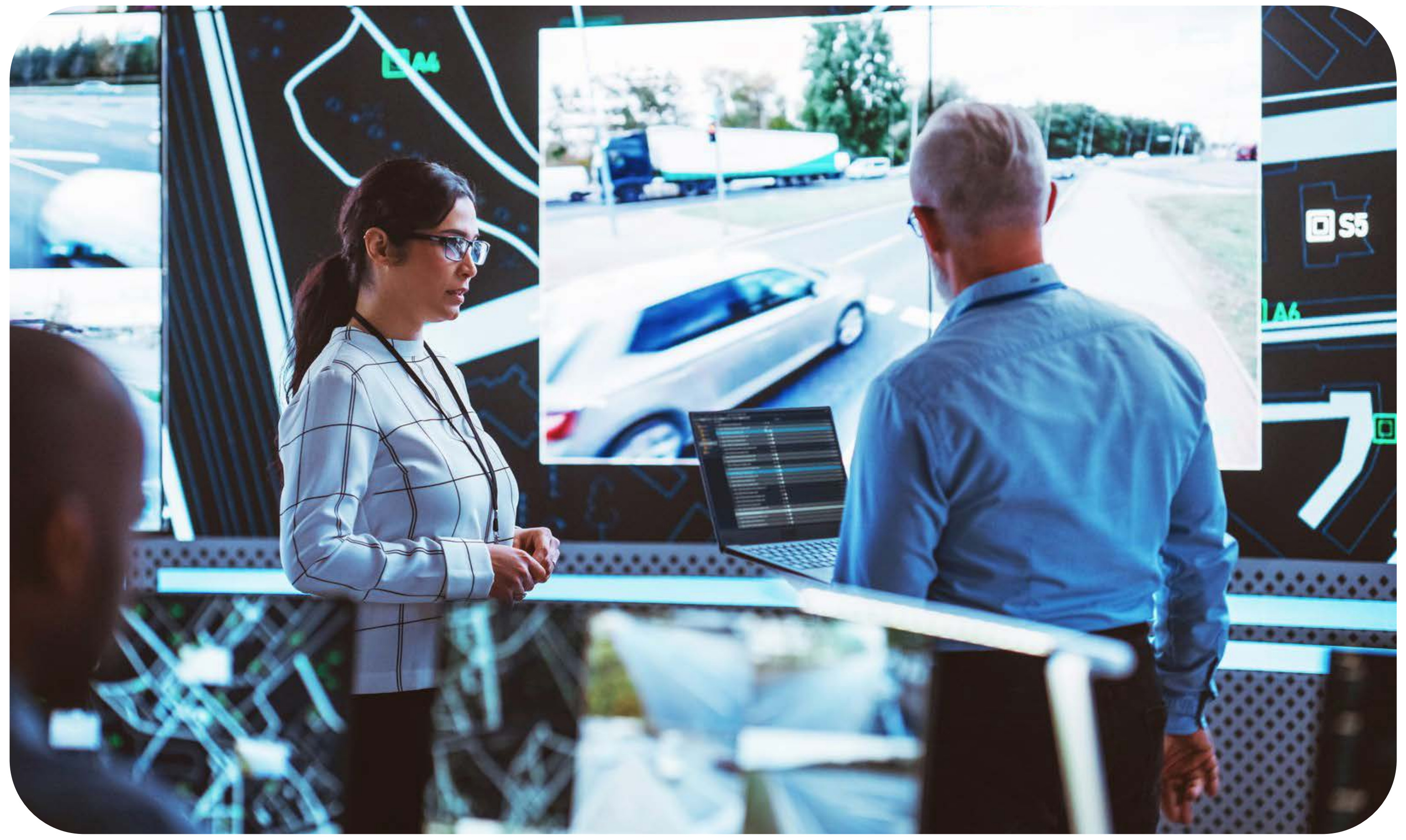
For each application, we highlight some relevant standards. The list is a useful starting point for anyone exploring or working in smart transport.

Key applications and case studies

A. Transport network management services

A key standard here is **BS ISO 14813-1:2024** Intelligent transport systems. Reference model architecture(s) for the ITS sector - ITS service domains, service groups and services, which defines ITS services.

The term "digital roads" now encompasses more than just daily transport network operations - it also includes incident management, maintenance, asset management, design and construction, and the customer interface.



Common Highways Agency Rijkswaterstaat Model programme

An interesting example of smart transport in traffic management is the **Common Highways Agency Rijkswaterstaat Model (CHARM) programme**[1], a joint project between National Highways (NH) and their Dutch colleagues at Rijkswaterstaat to create the next generation network and traffic management systems. CHARM is essentially a data platform which can be used both in a control centre setting and partially by operatives out on the network. When fully rolled out, CHARM will integrate information from the road authority's various data feeds and present it in a user-friendly way for those charged with managing the network, wherever they are operationally. The platform offers increased flexibility and efficiency and promises reductions in management as well as maintenance costs. It is easily scalable and will make it simpler to apply innovations in traffic management into the future.

1 https://www.rijkswaterstaat.nl/en/mobility/projects/charm-programme

In implementing CHARM and similar intelligent transport systems, other key standards to consider include:

- **BS EN 16157-1:2018** Intelligent transport systems. DATEX II data exchange specifications for traffic management and information - Context and framework.
- **BS ISO 14827 series** on Traffic Information Control on Traffic Information Control
- **PD CEN ISO/TS 19468:2022** Intelligent transport systems - Data interfaces between centres for transport information and control systems.
- **PD CEN/TS 17466:2020** Intelligent transport systems. Urban ITS. Communication interfaces and profiles for traffic management.

Additionally, these standards provide guidance on integrating a variety of traffic management tools:

- **PD CEN/TS 17400:2020** Mixed vendor environments, methodologies & translators.
- **PD CEN/TR 17401:2020** Mixed vendor environment guide.
- **PD CEN/TS 17402:2020** Use of regional traffic standards in a mixed vendor environment.
- **PD CEN ISO/TS 24315-1:2025** Intelligent transport systems. Management of electronic traffic regulations (METR) - Vocabulary

B. Parking information management services

The importance of accurate and timely information services related to parking has long been recognized. Poor or non-existent parking information leads to congestion, reduced air quality as drivers seek spaces, and has a negative impact on local economies. Simplifying payment for parking is also a priority. **The Alliance for Parking Data Standards (APDS)** was set up in 2018 by the International Parking and Mobility Institute (IPMI), the British Parking Association (BPA), and the European Parking Association (EPA) to produce and promote the required standards to tackle these issues.

APDS

The APDS covers the full range of parking data elements, including parking location information and transactions, pricing, and occupancy/utilization. The APDS' mission is to create a consensus-built international standard, which will establish a common language for data elements and definitions in the parking, transportation, and mobility sector that facilitates seamless integration, compatibility, and communication between parking entities, the automotive industry, IT developers, map and app providers, as well as other stakeholders.[2]

The APDS is an excellent example of an effective multi-organization collaboration in smart transport, identifying a pressing need and taking a standards-based approach to meeting it. The outcome will be less congestion, lower emissions, more predictable journeys and economic benefits to locations where parking becomes a quick and simple activity to undertake.

2 https://www.allianceforparkingdatastandards.org/

Key standards include:

- **Alliance for Parking Data Standards**.
- **PD ISO/TS 5206-1:2023** Intelligent transport systems. Parking - Core data model.
- **PD CEN/TS 16157-6:2022** Intelligent transport systems - DATEX II data exchange specifications for traffic management and information. Part 6: Parking publications.
- **BS EN 12896-1:2016** Public transport. Reference data model. Common concepts.

C. Electric vehicle charging services

Electric vehicles (EVs) are a key component of strategies for reducing emissions on the road network. They bring with them a new set of infrastructure and route planning/information requirements. Operators and procurers of charging infrastructure—such as charge-point operators, service providers, local authorities, car park owners, and landowners—must ensure the provision of charging points. Meanwhile, users need confidence that charge points are safe and secure and have clear information about their locations, vehicle compatibility, payment options, availability, and accessibility.

BSI is interested in working with the government and other stakeholders to further progress guidelines for the EV charging infrastructure by referencing standards and best practices.[3] Eastern Shires Purchasing Organization (ESPO) offers a framework for procuring EV infrastructure.[4] UK Government has issued relevant regulations on electric vehicle smart charge points, which can be found **here**.

Standard BS EN ISO 15118 enables secure, intelligent, and automated communication between EVs and Electric Vehicle Supply Equipment (EVSE). It supports both AC and DC charging, and includes features like bidirectional charging and smart charging.

From January 2026 all publicly accessible charging stations in the EU must comply with EN ISO 15118 and by January 2027 charging stations must implement EN ISO 15118-20.

Applicable standards to consider include:

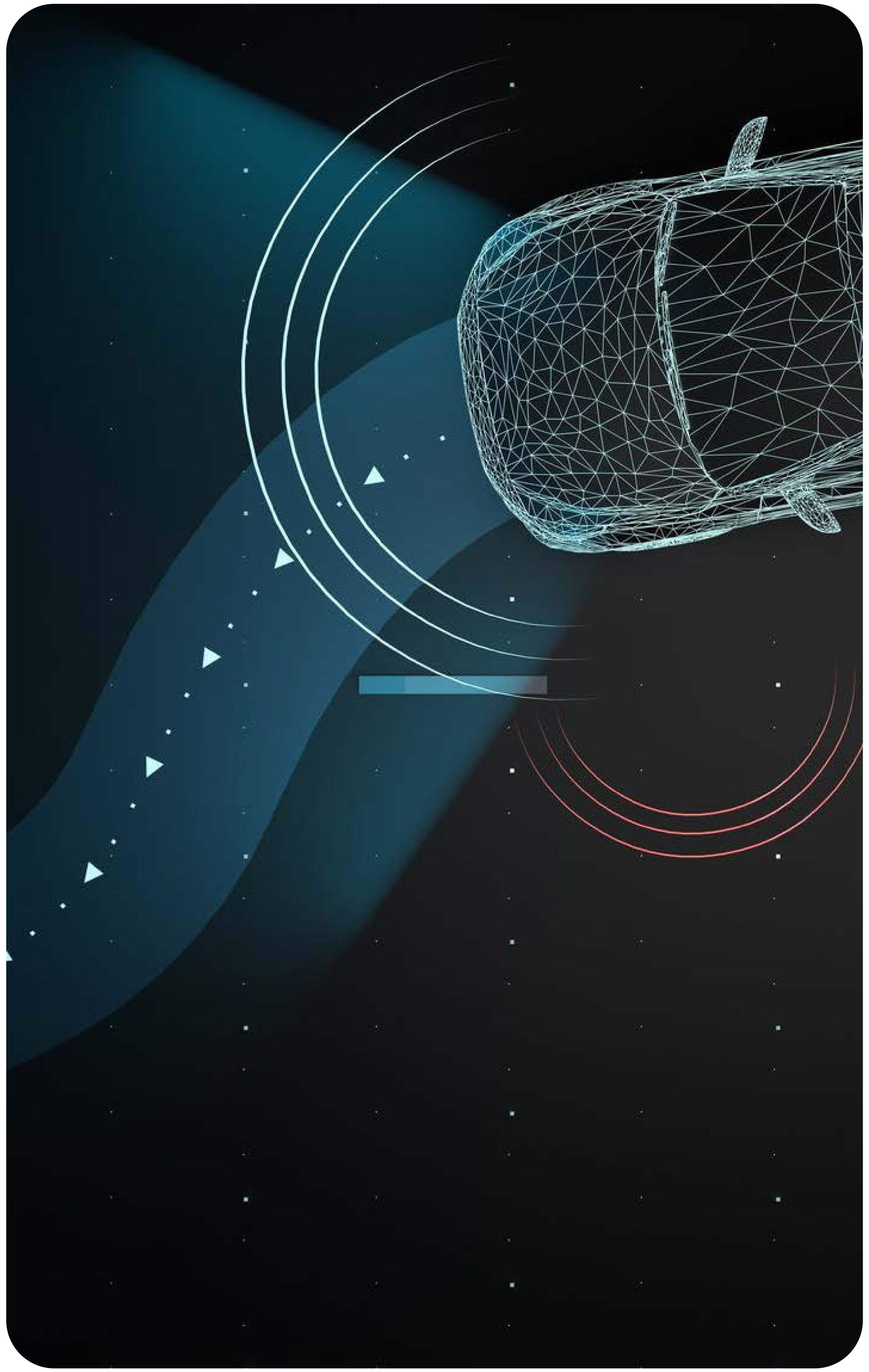
- **BS EN IEC 63110-1:2022** Protocol for management of electric vehicles charging and discharging infrastructures - Basic definitions, use cases and architectures.
- **BS EN IEC 63119** series Information exchange for electric vehicle charging roaming service.
- **BS EN ISO 15118 series** Road vehicles - Vehicle to grid communication interface. Road vehicles - Vehicle to grid communication interface
- **PAS 1899:2022** Electric vehicles - Accessible EV charging points. Specification.
- **BS EN IEC 61980-1:2021** Electric vehicle wireless power transfer (WPT) systems - General requirements.

3 https://ttf.uk.net/wp-content/uploads/2022/11/TTF-Starter-Guide-15.11.22.pdf
4 https://www.espo.org/vehicle-charging-infrastructure-2-vci-2-636-21.html

D. Connected and automated mobility

Modern vehicles already feature advanced technologies such as connectivity, sensors, and driver-assist systems. Experts increasingly agree that we are experiencing a gradual evolution toward higher levels of automation, rather than anticipating a sudden leap to full autonomy.

The successful deployment of connected and autonomous mobility relies on a comprehensive set of standards that ensure safe and effective adoption. Standards are required to ensure integration and enable interactions between vehicles and infrastructure. While connected technologies are essential for enabling self-driving capabilities, they also support a broader range of vehicle functions and interactions.



D1. Connected mobility

Connected vehicles focus on communications systems which share information with other vehicles as well as physical and digital infrastructure. Vehicle communications can be classified as the following:

- Vehicle to Vehicle (V2V) - This allows vehicles to communicate with one another other about speed, direction, location, and braking which can help to prevent collisions, control speed, and brake in emergencies.
- Vehicle to Infrastructure (V2I) - Vehicles can communicate with nearby infrastructure to detect road signs and traffic signals and monitoring which can improve safety and traffic.
- Vehicle to Everything (V2X) - means the vehicle can connect wirelessly to various types of networks including other vehicles, infrastructures, homes, emergency services, pedestrians, cyclists etc. The aim of this technology is to improve road safety, improve efficiency, reduce traffic and congestion, and minimize negative environmental impacts (e.g. GLOSA, see next page).

Connected mobility - where vehicles, drivers, infrastructure, and operators communicate continuously - offers significant benefits across safety, accessibility, convenience, efficiency, and sustainability. To enable safe and effective operations, the complex collection, processing, and sharing of data must follow detailed, widely adopted standards and protocols.

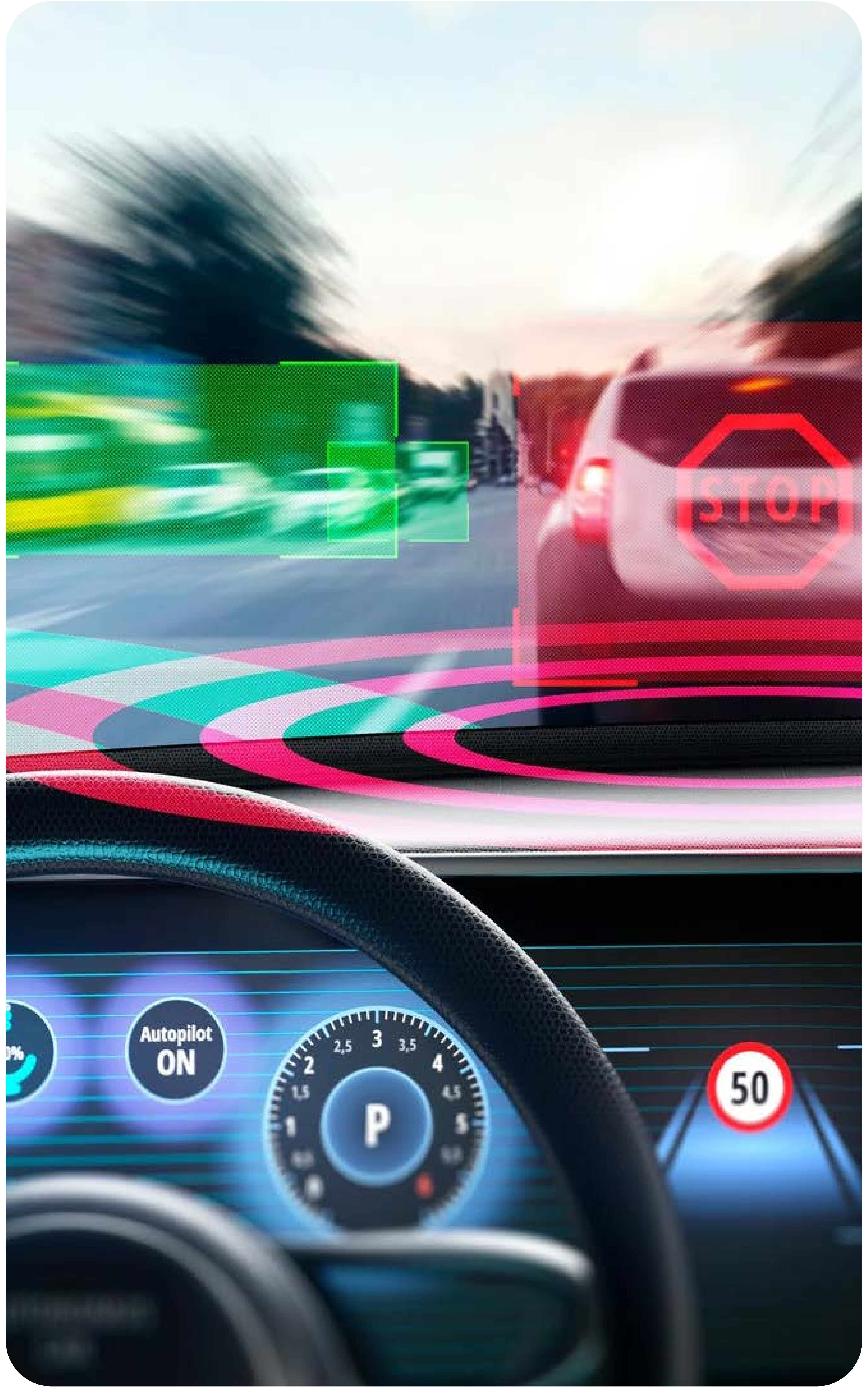
Green Light Optimized Speed Advisory

A good example of a mature (technically proven but not yet commercially widely available) connected mobility application is Green Light Optimized Speed Advisory (GLOSA). GLOSA collects traffic signal timings and calculates the right speed to be travelling at for drivers to avoid coming to a stop at a red light. It presents its guidance visually and audibly through an app. If a driver does have to stop at a red light, it gives a countdown to green.

This scheme was trialled by NH and Transport for Greater Manchester in 2021 on two slip roads off motorways in Oldham and Bury. GLOSA provides an in-vehicle recommendation of the speed at which drivers should approach a set of traffic signals to ensure they arrive when lights are green. This and other trials have shown that the technology significantly reduces vehicle emissions. The Transport Technology Forum's (TTF) SPATULA (Signal Phase and Timing Users and Local Authorities) group has analysis which shows that GLOSA can lead to a cut of more than a quarter in CO_2 emissions, and nearly a fifth in NOx from heavy goods vehicles, as they leave a motorway.

The most impressive results were for larger vehicles. It is estimated that freight vehicles save on average 12.5p in fuel (at 2021 prices), in not stopping on a slip road, suggesting significant financial, as well as environmental, benefits will add up. The environmental benefits will be even greater than this, when the lack of tyre and brake dust due to braking is considered.

- **PD CEN ISO/TS 21176:2020** Cooperative intelligent transport systems (C-ITS). Position, velocity and time functionality in the ITS station.
- **PD CEN ISO/TS 21184:2021** Cooperative intelligent transport systems (C-ITS). Global transport data management (GTDM) framework.
- **ISO/TS 21185:2019** Intelligent transport systems. Communication profiles for secure connections between trusted devices.
- **PD CEN ISO/TR 21186** series on Cooperative intelligent transport systems. Guidelines on the usage of standards.
- There are also standards focused on smart community infrastructure:
- **BS ISO 37161:2020** Guidance on smart transportation for energy saving in transportation services.
- **BS ISO 37162:2023** Smart transportation for newly developing areas.
- **BS EN ISO 15118-20:2022** Road vehicles. Vehicle to grid communication interface - 2nd generation network layer and application layer requirements.

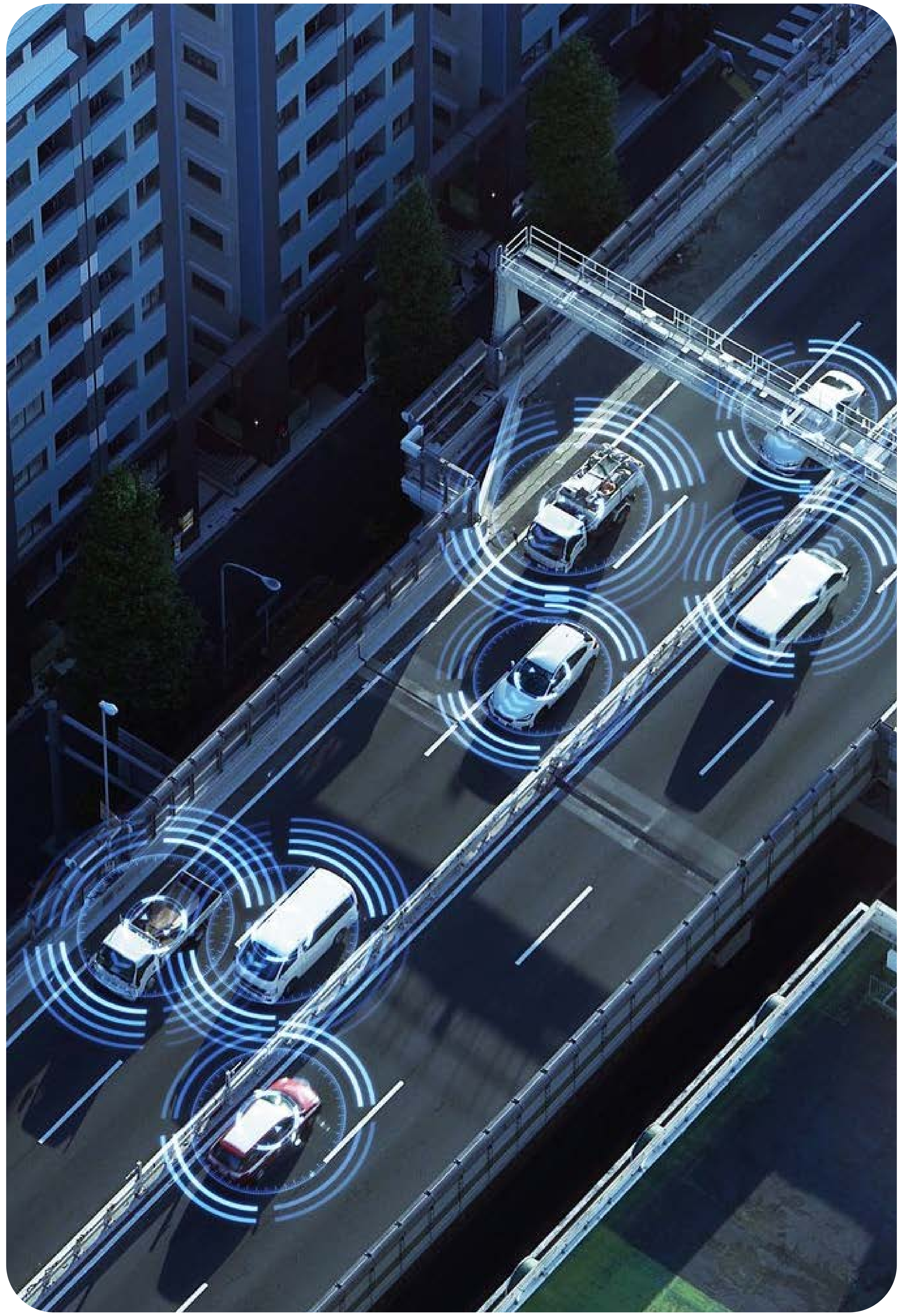


D2. Automated mobility

Automated vehicles use advanced technologies alongside connected technologies to perform the driving task with little or no intervention from the driver. Technologies include systems such as LIDAR, radar, cameras, and AI to aid self-driving capabilities. There are currently different levels of automation in vehicles which range from level 1 where basic driver input is required, to level 5 where no driver intervention is required.

The challenge of introducing automated or self driving vehicles (private, collective, or shared) on our roads is clear, with some doubts as to whether 100% automation will ever occur on our road networks.

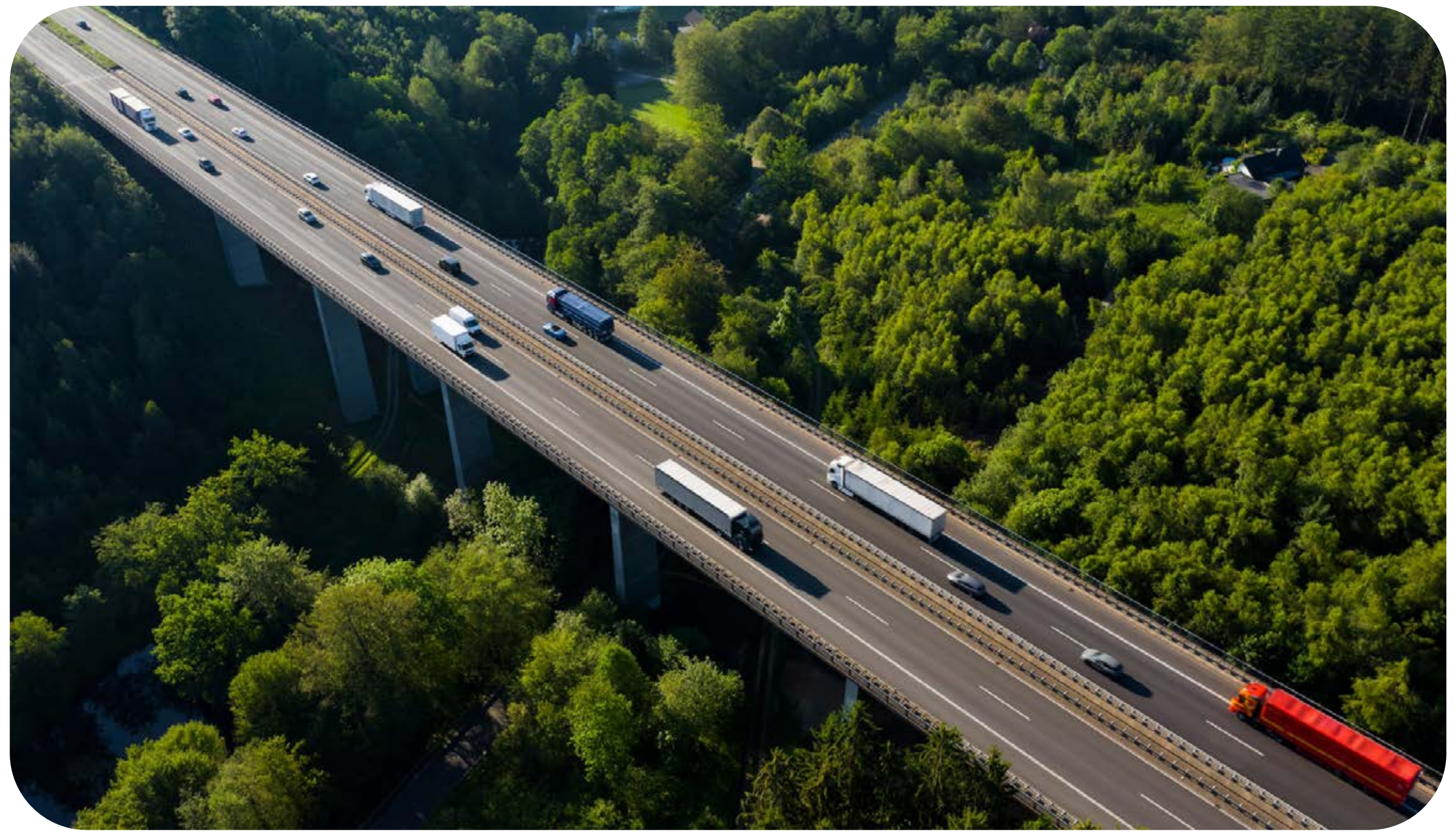
However, the potential benefits of automated or self driving technologies may include improving road safety, inclusion, and productivity gains.



Standards for automated mobility have focused on supporting safe development and trialling but are now starting to look ahead towards wider deployment with the emergence of standards to support automated driving systems design, validation and verification, testing, communication with other road users.

BSI, in conjunction with the Centre for Connected and Autonomous Vehicles (CCAV) and the DfT, has developed a suite of standards covering safety cases, operating environments and scenarios, data and safety operations:

- BSI's **Connected and automated mobility (CAM) standards programme**.
- **BS ISO/SAE 21434:2021** Road vehicles. Cybersecurity engineering.
- **BS ISO 34503:2023** Road Vehicles. Test scenarios for automated driving systems. Specification for operational design domain.



E. Information services for road users and for road operators

As we touched on above, it is now possible to provide high-quality, low latency information services both to those operating the road network and to its users. The data required and used is largely the same, but the interfaces, delivery mechanisms and content of course differs depending on the use case. Advances in the automation of control (centre) tasks help tackle challenges with human attention spans and capacity for constant attention to detail.

The field of data analytics has matured quickly, but data quality and latency, and possible errors and bias in the analytics algorithms themselves, mean there is still need for improvement and innovation.

National Traffic Information Service

NH describe their approach to digital roads as covering design and construction, digital operations, and digital for customers.[5] The National Traffic Information Service (NTIS) by NH connects and collects data from systems which exist to support the Regional Operations Centres such as:

- Loop-based traffic data
- CCTV data
- Variable Message Signs (VMS) settings
- Weather data
- Travel time data derived from Automatic Number Plate Recognition (ANPR) systems
- Planned events such as roadworks
- Unplanned events such as spillages and crashes

The data is available to NH and its contractors to support the effective management of the network and appropriate information services to users. It is also offered to external users who subscribe to the data feeds and use them to create products of their own, such as route planning and travel information.[6] All this is enabled mainly by using the DATEX II[7] suite of standards, which cover a wide range of areas from context and framework to location, data, parking and more. **The National Data Strategy** published in 2019 has an important role to play here.

5 https://nationalhighways.co.uk/our-work/digital-data-and-technology/digital-roads/
6 https://www.trafficengland.com/resources/cms-docs/overview.pdf
7 https://datex2.eu/datex2/specifications

INRIX

INRIX, an American company with a major UK presence, uses convolutional neural networks to produce higher quality output from data. The INRIX algorithms use floating car data to obtain real-time counts and speeds. An added advantage is that the entire network can be measured, since locations without loop detectors, such as roads of lower classification, in rural areas, with less instrumentation, are also included. The data is stored and archived per one minute interval, making it possible for future applications to be trained with this data. INRIX's technology can be used to, for example, develop an application for queue tail warning or other safety warnings about speed changes.[8]

The data collected and made available is also repurposed to provide travel information services direct to users, for example, via apps, websites and traffic radio, and at least for the time being, via roadside equipment such as VMS. For online examples, see **Transport Scotland** and **NH**.

8 www.inrix.com, https://www.traffic-quest.nl/downloads/2021-10_report_challenge_ai_in_traffic_management_v1.0.pdf

Department for Transport

The Department for Transport (DfT) published a Manual for Smart Streets (MFSS), developed by Connected Places Catapult through a 12-month project, to help stakeholders effectively utilize data and emerging technologies for streets and highways. MFSS enables the creation of improved and innovative information services to users, as well as support network operators.

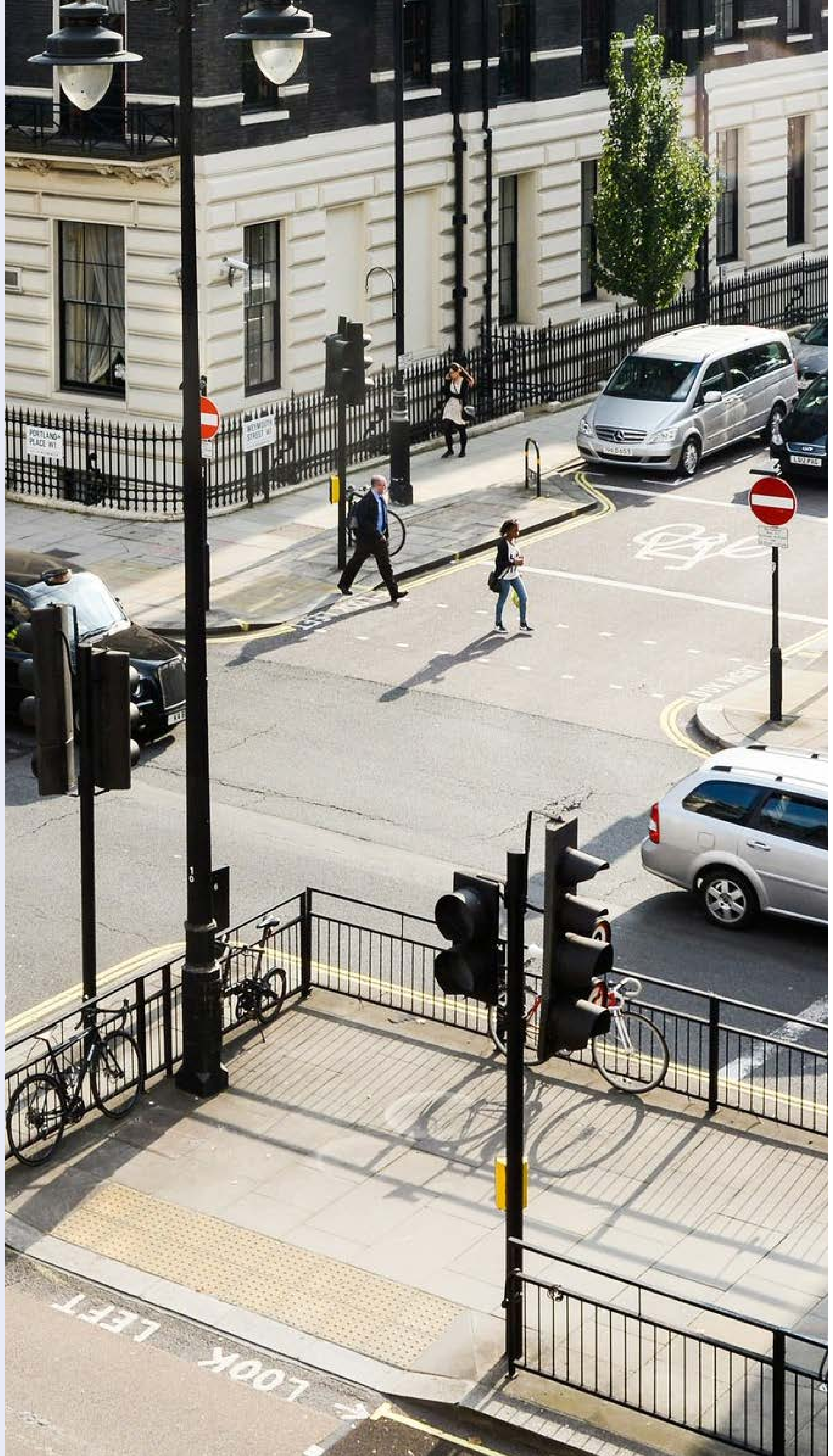
Key standards to look at include:

- **BS EN ISO 14819 series** on Traffic and travel information messages via traffic message coding.
- **BS EN 16157-1:2018** Intelligent transport systems. DATEX II data exchange specifications for traffic management and information - Context and framework.
- **BS EN 16157-2:2019** Intelligent transport systems. DATEX II data exchange specifications for traffic management and information - Location referencing.

F. Road user charging

The UK currently has a limited number of road user charging (RUC) schemes, such as the London Congestion Charge, certain bridges and tunnels, and low-emission zones that charge higher-polluting vehicles. In contrast, many other countries make broader use of RUC, and the technology in this field is well established.

As a result, a wide range of standards already exists and could be adopted if UK policy shifts in this direction. The European Electronic Tolling Service (EETS), which aims to ensure full interoperability of RUC across Europe, offers a strong starting point for those interested in this area.[9]



There are a number of standards covering electronic tolling services including:

- **EETS European Electronic Tolling Service standards**
- **BS EN 15509:2023** Electronic fee collection - Interoperability application profile for DSRC.
- **PD CEN ISO/TR 6026:2022** Electronic fee collection. Pre-study on the use of vehicle licence plate information and automatic number plate recognition (ANPR) technologies.
- **BS EN ISO 13140-1:2016** Electronic fee collection. Evaluation of on-board and roadside equipment for conformity to EN ISO 13143.
- **BS EN ISO 14906:2023** Electronic fee collection. Application interface definition for dedicated short-range communication.
- **BS EN ISO 14907-1:2020**, Electronic fee collection. Test procedures for user and fixed equipment. Description of test procedures.
- **BS EN ISO 19299:2020**, Electronic fee collection. Security framework.
- **BS EN 16986:2024** Electronic fee collection. Interoperable application profiles for information exchange between service provision and toll charging.
- **PD CEN/TS 17154-1:2019** Electronic fee collection. Evaluation of implementation for conformity to CEN/TS 16986. Test suite structure and purposes.

9 https://joinup.ec.europa.eu/collection/ict-standards-procurement/eets-european-electronic-tolling-service

G. Freight management services

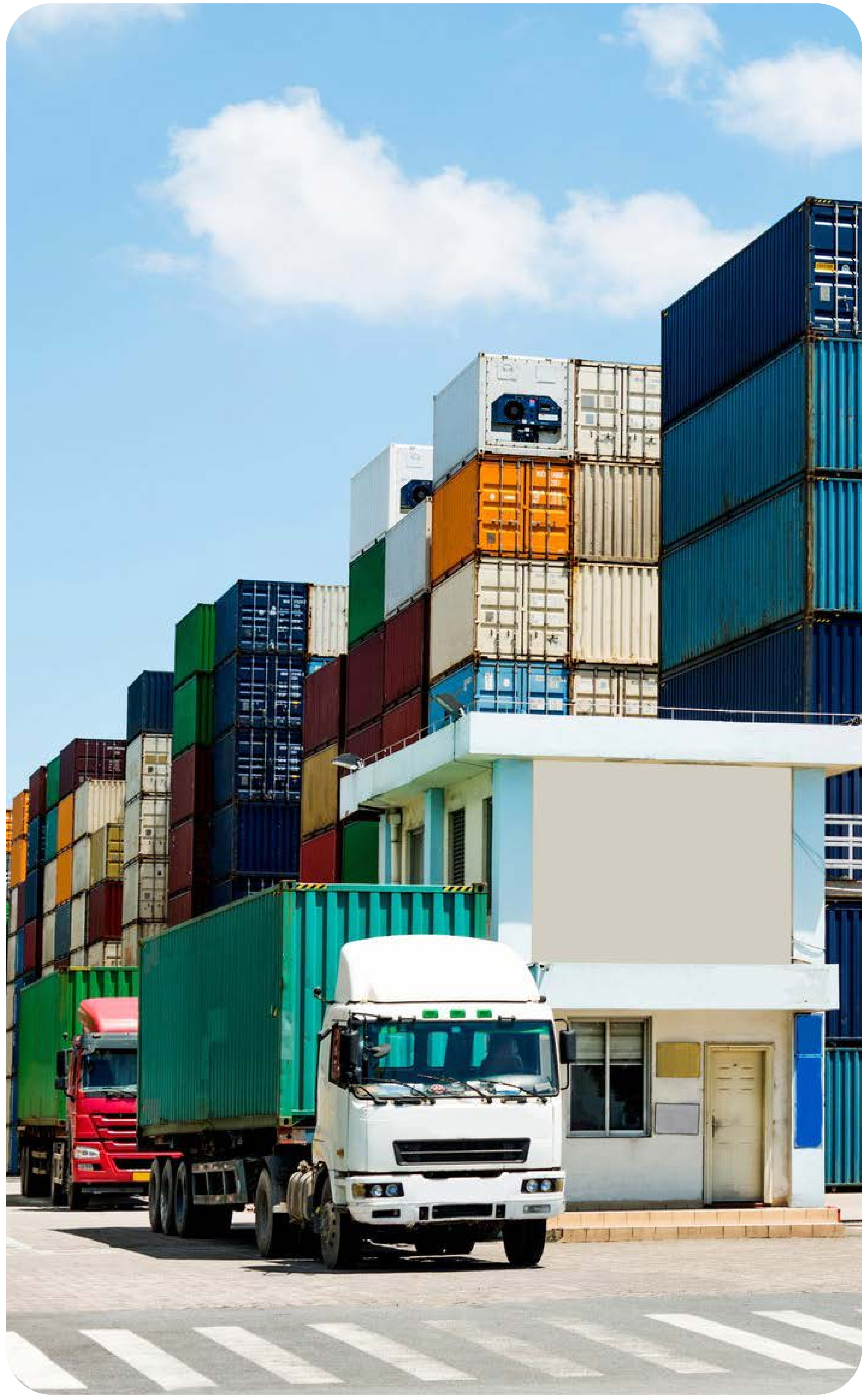
Smart transport includes freight, which is as vital as passenger movement. Despite the sector's complexity, regulation at national and European levels supports safer, more efficient, and sustainable goods transport. Digitalization is transforming freight, enabling more effective supply chains, new business models, and data-driven services across all modes.

As the ability to manage freight movements in near-real time becomes feasible, infrastructure can be better utilized and cross-modal freight becomes a more accessible option. Cross border movements can also be streamlined by taking a fully digital approach.[10] Creating a secure and trusted shared data space is essential to achieving truly smart freight. The EU Digital Transport and Logistics Forum (DTLF) is a valuable resource for learning more about this.[11]

10 https://www.goswift.eu/
11 https://transport.ec.europa.eu/transport-themes/digital-transport-and-logistics-forum-dtlf_en#about-the-dtlf

Relevant standards to consider includes:

- EU-ICIP freight and fleet standards.
- **BS ISO 26683 series** on Intelligent transport systems - Freight land conveyance content identification and communication (FLC-CIC).
- **BS ISO 24533-2:2022** Intelligent transport systems. Electronic information exchange to facilitate the movement of freight and its intermodal transfer - Common reporting system.
- **BS ISO 15638 series** on Intelligent transport systems. Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV).



H. Public transport systems

Smart public transport is essential to encouraging a shift toward more sustainable, healthy travel. Since the early 2000s, systems have evolved from basic smartcards to integrated platforms that manage fleets, routes, payments, and real-time passenger information. Advanced systems also support revenue sharing across operators, enhance security through CCTV, and prioritize public transport via traffic signal control and dedicated infrastructure access.

The sharing of bus, rail and ferry timetable data is now common and indeed mandated for certain bus data by the DfT's Bus Open Data Service (BODS).[12] There is a long-established dataset of all national transport access points (stops and stations) called NaPTAN which led to the creation of journey planners, further enhanced by the introduction of real time passenger information (RTPI).

The focus is now on making public transport payments simpler and more user-friendly. Despite advances, ticketing can still be complex and deter new users. Contactless payments via bank cards, mobile apps, or QR codes are more accessible and reduce dwell times and fraud risks. Trip planning is also improving, with greater integration, personalisation based on user priorities (e.g. journey time, emissions, safety), and better real-time support when disruptions occur.

12 Bus open data policy - GOV.UK (www.gov.uk)

Transport for London

The introduction of contactless payments by bank card or mobile device began in London in 2012 and now makes up over 60% of all transactions. It removed an entire step from the interaction between users and TfL – eliminating the need to purchase a specific ticket or carry the Oyster smart card. It even saves the user money, since the Oyster cards carry a deposit. For TfL, it removed a large amount of administrative burden which more than offsets the cost of dealing with millions of small, daily bank transactions. The trust between provider and user around fare capping had already been established via Oyster pay-as-you go, and users had a reasonable amount of trust from experience that their bank would charge them correctly too.[13]

13 https://www.ukfinance.org.uk/system/files/Contactless%20Transit_v4_FINAL.pdf, https://tfl.gov.uk/fares/how-to-pay-and-where-to-buy-tickets-and-oyster/pay-as-you-go/contactless-and-mobile-pay-as-you-go

Here are some key standards:

- **BS EN 12896 series** on Public transport. Reference data model.
- **PD CEN/TS 16614-1:2020** Public transport. Network and Timetable Exchange (NeTEx). Public transport network topology exchange format.
- **BS EN ISO 24014-1:2021** Public transport. Interoperable fare management system - Architecture.
- **BS EN 15531 series** on Public transport. Service interface for real-time information relating to public transport operations.
- **PD ISO/IEC TS 24192 series** on Cards and security devices for personal identification. Communication between contactless readers and fare media used in public transport.
- **EU-ICIP public transport standards.**
- **NeTEx standards.**
- **SIRI standards.**

I. Mobility as a Service (MaaS)

Mobility as a Service (MaaS) integrates multiple transport modes - such as public transport, walking, cycling, ride-sharing, taxis, and rentals - into a single platform for planning, booking, and payment. According to the MaaS Alliance, the aim is to deliver seamless, on-demand mobility through one app and one payment system, offering convenience to users and benefits to society and the environment.

Though still relatively new, MaaS has gained momentum, often more in concept than execution. In practice, it typically combines services like buses, trains, micromobility, and car hire. While most transport modes are now digitalized and the necessary data is largely available, MaaS highlights the ongoing challenges of achieving truly integrated, user-centric transport systems.

However, the past decade has shown that digitalization alone isn't enough. Data is often incompatible, low quality, or delayed - requiring major effort to integrate. Owners may also be reluctant to share it due to concerns over sensitivity or commercial value. Beyond technical challenges, legal barriers such as competition law, ticket resale regulations, and data protection, along with brand and customer relationship concerns, can further hinder progress.

There is no doubt that MaaS has the potential to be an important support in moving journeys from private car to shared transit modes with better environmental and public health outcomes. So far it seems that public authority-led MaaS initiatives have a better success rate than purely commercial ones. Although MaaS is still in its early stages, the future holds exciting possibilities, with diverse outcomes likely across different regions. It's clear that there won't be a one-size-fits-all solution; MaaS in the UK will evolve uniquely, distinct from its origins in Finland, reflecting local needs and innovation. In the UK, the DfT has published a Code of Practice for MaaS following a public consultation. MaaS can also be an important tool in schemes which incentivize "smarter choices" by providing rewards such as discounts and car scrappage schemes.

Since MaaS is a new concept in standardization terms, it is mainly covered by existing public transport standards such as:

- **PD ISO/TR 4447:2022** Intelligent transport systems. Mobility integration. Comparison of two mainstream Integrated mobility concepts.
- **PD ISO/TR 7878:2023** Intelligent transport systems. Mobility integration. Enterprise view.

Standardization efforts for MaaS are currently underway. For example,

- **CEN/TC 278 N 4391, Decision 007-2021 Public transport Distribution APIs for MaaS**.

J. The Digital Connectivity Infrastructure Accelerator (DCIA)

The Future Telecoms Infrastructure Review (FTIR) concerns the government's commitment to high quality mobile connectivity where people live, work and travel. Advanced wireless networks (including 5G) will entail greater deployment of digital infrastructure, including on publicly available assets (such as land, buildings and street furniture) to provide extra capacity in specific locations.

The Department for Digital, Culture, Media and Sport (DCMS), now falling under the responsibility of the Department for Science, Innovation and Technology (DSIT), in collaboration with DfT, set up the Digital Connectivity Infrastructure Accelerator (DCIA) to help accelerate both investment in and the deployment of advanced wireless networks. It will create efficiencies for local authorities and network providers by using publicly available assets such as lighting columns to support digital infrastructure.

These multifunctional lighting columns can support smart transport by providing wireless infrastructure, support CCTV, IoT sensors and EV charging. This provides improved connectivity with vehicles, passengers, pedestrians and environmental sensors.[14]

Standards in this area include:

- **PAS 190:2023** Existing lighting and CCTV columns. Assessment for multi-functional use. Code of practice.
- **PAS 191:2023** Multifunctional columns. Design. Specification.

14 https://www.gov.uk/guidance/digital-connectivity-infrastructure-accelerator-dcia

What next for smart transport standardization?

Smart transport is advancing rapidly, driven by goals around net zero, active travel, road safety, and public health - as well as public expectations for seamless digital services. New transport modes are also emerging, such as the rise of urban cycling and the recent introduction of micromobility options.

Standards will remain essential in shaping smart transport by enabling innovation, interoperability, and security across systems and supply chains. Existing ITS standards must be maintained and expanded to support the development of integrated services for operators and users - helping to create a more connected, efficient, sustainable, and safe transport network.

Government and Local Government Transport Priorities

A continually changing landscape in the UK politically, economically, and socially, as well as the requirement to reach Net Zero by 2050 (Net Zero Strategy, UK Government, 2021) means there are challenges ahead for how we maintain and improve the transport network, and how this will be funded.

In 2024, the new UK government set out key transport priorities to deliver on, and it will be important that standards are utilised to support current, revised and new national policies and goals which support smart transport innovations. These policies and goals are likely to also be reflected in local government policy goals and strategies.

The Transport Secretary set out five key priorities to deliver the biggest overhaul to transport in a generation:

- Improve performance on the railways and driving forward rail reform.
- Improve bus services and growing usage across the country.
- Transform infrastructure to work for the whole country, promoting social mobility, and tackling regional inequality.
- Deliver greener transport.
- Better integrate transport networks.

While outside the scope of this report, standards can play a key role in rail reform by promoting data sharing, improving scheduling, real-time information, and enhancing ticketing and payment systems.

Emerging smart transport standards - such as those for AI - also offer potential to boost safety through best practices in predictive maintenance, operations, and automated control systems. There are similar opportunities in bus services, where better data sharing and higher data quality can enhance real-time updates, journey planning, and multi-modal travel.

The DfT's Transport Data Strategy and AI Action Plan set out a vision to use data and embed AI into the UK's transport system to help boost innovation, and deliver a safer, cheaper, more sustainable and efficient transport network.

Local authorities utilize smart transport strategies and plans to improve road network safety, mobility, and efficiency by integrating technology and innovation. With the introduction of new and innovational technologies, it is essential local authorities ensure these are accepted by the public and obtains their trust which standards can help facilitate.

Standards can support local governments future road traffic management systems, automated connected vehicle systems, and other innovational transport to operate reliably and reduce risks to users.

The UK’s Industrial Strategy (2025) is a 10-year plan designed to drive long-term economic growth, innovation, and resilience by focusing on eight high-growth sectors which cut across transportation. Whilst transport is not a foundational sector in the plan, it plays a vital role in infrastructure development, efficient logistics and supply chains which contribute to decarbonization and economic growth. Smart transport in particular supports enhancing connectivity, productivity, sustainability and innovation which aligns and strengthens the Industrial Strategy.

Integrated Transport Strategy

The DfT announced the development of an Integrated Transport Strategy[15] in Nov 2024. This strategy aims to create a more unified and efficient transport system, prioritizing passenger needs and empowering local authorities to design region-specific solutions. The strategy seeks to connect different modes of transport seamlessly, promoting a user-centric approach to planning, building, and operating transport systems. As highlighted in this paper, standards will be key in helping to connect and integrate different transport modes by creating a common framework that allows systems to work together smoothly.

Supporting the ITS UK Manifesto

It is important standards continue to help the transport industry implement innovations across the intelligent transport ecosystem. ITS UK highlights future recommendations in its Manifesto for the Future of Transport[16], which focus around four key areas: 1) connectivity and autonomy, 2) integration, 3) sustainability and society, and 4) industry growth.

ITS UK recommendations and focus areas	BSI Standardization Objectives
Connectivity and Autonomy	• Support safe, secure trials and integration of connected/autonomous mobility. • Align with the Automated Vehicle Act 2024 and deployment of connected tech. • Collaborate with CCAV and DfT on standards (e.g. remote ops, risk manoeuvres).
Integration	• Support a UK-wide MaaS strategy with data-related standards. • Review and develop standards for smart ticketing and smart cards. • Enable safe, secure, interoperable, and user-friendly payment systems. • Promote fare parity and accessibility in transport systems. • Support regulatory frameworks for e-scooters and micro-mobility. • Address safety/operational issues (e.g. battery safety) with government/industry. • Form micro-mobility standards committee (PEL/69/1).
Sustainability, Society and Safety	• Support mobility pricing roadmap with standards for fair, sustainable transport (e.g. ANPR, fee collection). • Enable national mobility pricing systems through standardization. • Advance safety standards that reduce congestion and accident risk. • Improve vehicle-infrastructure communication and smart traffic systems. • Promote standards that boost user safety and confidence. • Develop 2025 road safety report focused on standardization.
Industry Growth	• Lower smart transport costs by promoting standardization in tech procurement. • Foster standard frameworks to ensure product compatibility and cost savings. • Use standards to drive innovation and market competitiveness. • Help local authorities adopt standards in procurement and supplier practices. • Support UK-led smart transport as a strategic export. • Enhance access to global standards to boost growth and trade. • Continue input to ISO/TC 204 for intelligent transport systems.

15 https://www.gov.uk/government/speeches/integrated-national-transport-strategy-for-england
16 ITS UK, June 2024 - https://www.its-uk.org/publications/manifesto/

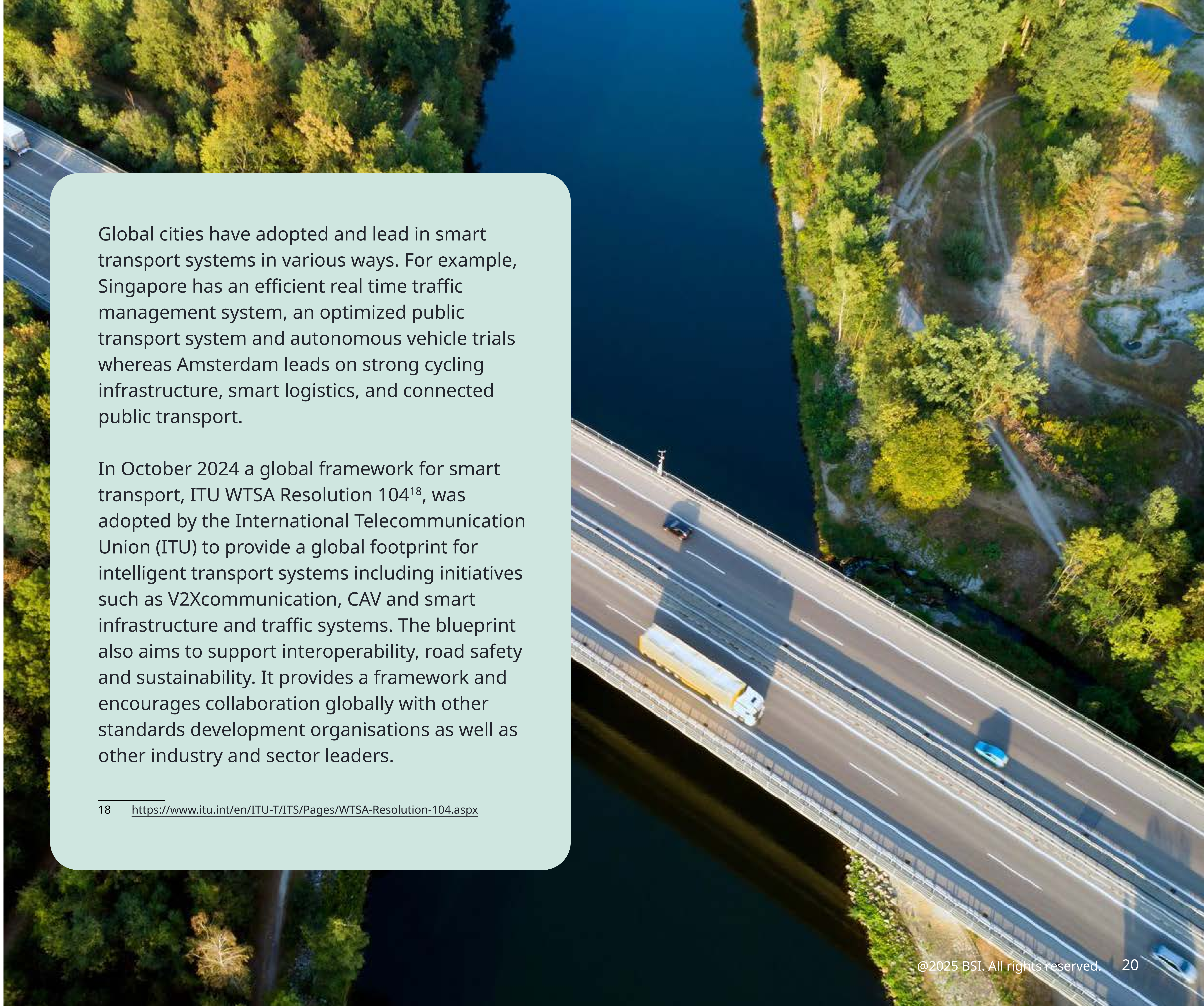
Global Smart Transport

It will remain important in the future that international standards are considered for global harmonization of smart transport. This will include interoperability for systems from different countries and manufacturers to work together, establishing minimum safety benchmarks for emerging technologies, and providing stable foundations for developing new and innovational mobility solutions.

ITS/TC 204[17] is the technical committee under the International Organization for Standardization (ISO) that is responsible for developing international standards for smart transport with key focus areas like those mentioned above such as traffic management, data exchange, travel information, public transport, vehicle/grid communications.

We facilitates access to international standards and plays a significant role in shaping and contributing to international standards, inputting into ISO/TC 204. This provides opportunities to influence international smart transport standards which is beneficial in boosting industry growth for the UK and globally.

17 https://www.iso.org/contents/data/committee/05/47/54706.html



Global cities have adopted and lead in smart transport systems in various ways. For example, Singapore has an efficient real time traffic management system, an optimized public transport system and autonomous vehicle trials whereas Amsterdam leads on strong cycling infrastructure, smart logistics, and connected public transport.

In October 2024 a global framework for smart transport, ITU WTSA Resolution 104[18], was adopted by the International Telecommunication Union (ITU) to provide a global footprint for intelligent transport systems including initiatives such as V2Xcommunication, CAV and smart infrastructure and traffic systems. The blueprint also aims to support interoperability, road safety and sustainability. It provides a framework and encourages collaboration globally with other standards development organisations as well as other industry and sector leaders.

18 https://www.itu.int/en/ITU-T/ITS/Pages/WTSA-Resolution-104.aspx

Focus Areas – Future of Smart Transport

Based on the research and discussions covered in this report, there are several focus areas which should be prioritized in standards for the future of smart transport. Some of the key areas are listed below:

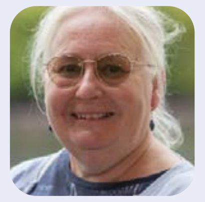
- Net Zero/Decarbonization: Accelerate EV adoption, charging infrastructure, and smart traffic systems to cut congestion and emissions.
- Emerging Tech: Ensure standards keep pace with rapid innovation in CAVs and AI.
- Skills & Training: Develop standards to address workforce skill gaps in smart transport.
- International Standards: Promote global harmonization to avoid barriers to growth.
- Cyber Security: Establish strong standards to protect data and guard against cyber threats.
- Interoperability: Evolve standards to ensure systems and data remain seamlessly connected.

To address these focus areas and gaps, collaborative engagement is required between industry stakeholders, governments, and standardization bodies to help enhance smart transport systems and solutions and realize the benefits of more effective transport systems.

We are actively engaged in smart transport, leading major government-sponsored standardization programmes, and working with industry stakeholders to develop consensus-based standards. Our services support a safe, sustainable mobility today and tomorrow, and we provide convenient, online, access to a wide range of existing standards.

Find out more and get involved

This BSI report has been developed with expert contributions from:



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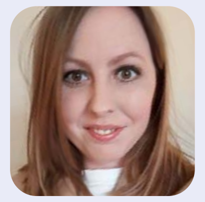

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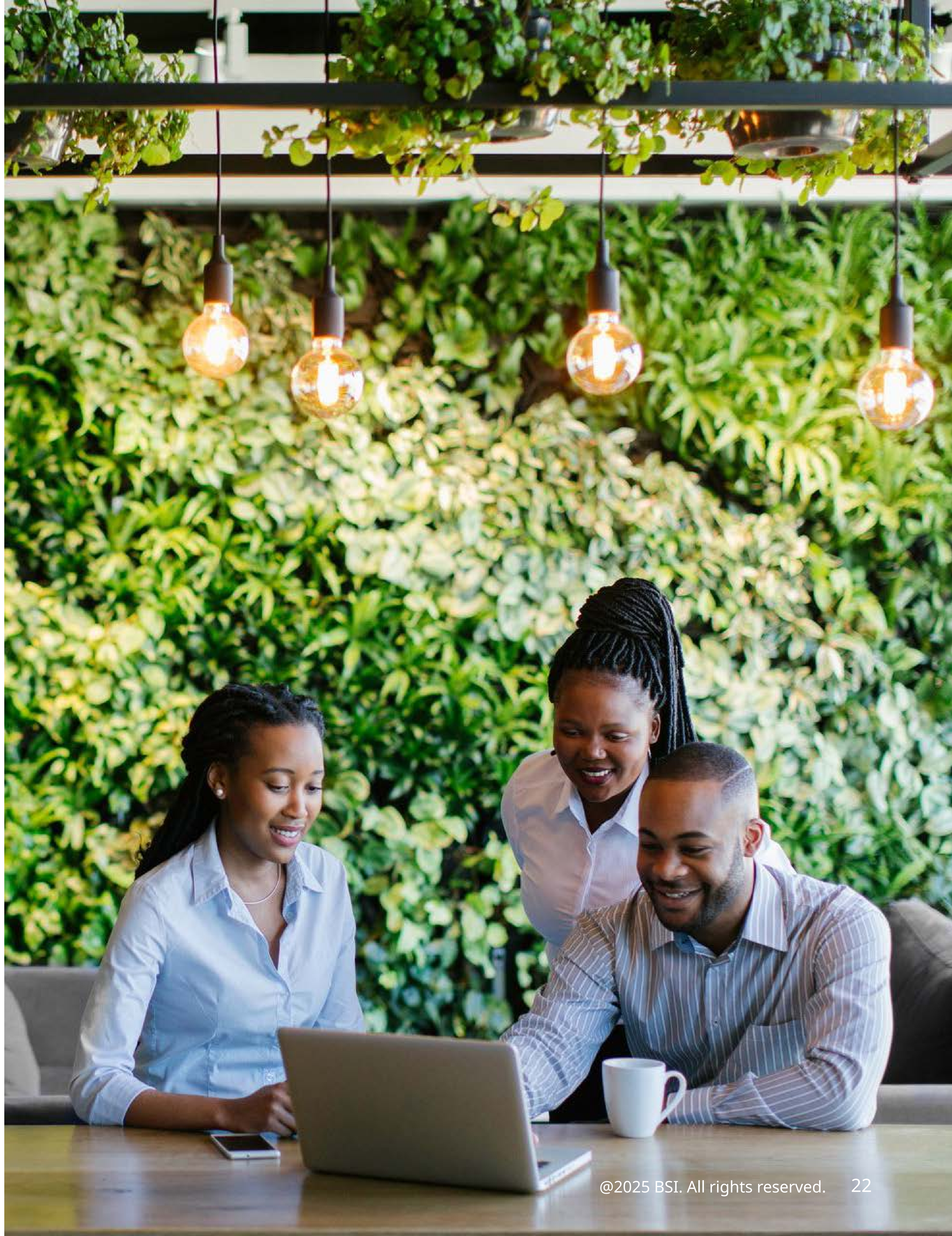

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