FUTURE OF TRANSPORT DATA

ACE Submission

ABOUT ACE

The Association for Consultancy and Engineering (ACE) is the association for the UK's professional consultancies and engineering companies operating in the social and economic infrastructure sectors.

The ACE champions infrastructure and the built environment to government and other stakeholders, representing the views of around 400 members. Our members employ over 60,000 in the UK and 250,000 worldwide, contributing more than £15 billion to the UK economy. However, the buildings they create actively contribute over £570 billion a year of GVA.

Our **vision** is for a safe, innovative, resilient, and globally competitive UK built environment sector driving economic growth by delivering well-connected, socially valuable and environmentally sustainable places. Our **mission** is to advocate, anticipate, and educate on behalf of our members. That means proactively engaging with government and stakeholders about challenges and opportunities, ensuring members of all sizes have a voice.

INTRODUCTION

The Association for Consultancy and Engineering (ACE) welcomes the opportunity to contribute to the Transport Committee's inquiry into the potential uses of data to enhance the planning, delivery, and management of transport services. In an era where data-driven technologies are transforming industries and economies, the inquiry's focus on harnessing the power of data to revolutionise transport networks aligns with our commitment to advancing engineering excellence and innovation.

The Government's Transport Data Strategy, issued in March 2023, aptly recognises data's status as a new form of infrastructure that has the capacity to reshape transportation systems and the user experience. We commend the strategy's emphasis on data's transformative potential when integrated with technologies like artificial intelligence, digital twins, and sensor networks. This convergence holds promise for enhancing journey efficiency, safety, infrastructure management, and overall mobility experiences.

In our submission, we draw from the collective expertise of the ACE community to address the inquiry's key themes, including the future trajectory of transport networks, the role of data in infrastructure management, safety improvements, and potential challenges. We explore how data, when utilised to its full potential, can catalyse better infrastructure planning, optimise resource allocation, and usher in novel mobility solutions. Additionally, we assess the privacy, security, ethical, and regulatory dimensions that must be navigated to ensure responsible data utilisation.

Furthermore, we examine international best practices in the realm of data sharing, standards, and innovation, highlighting opportunities for the United Kingdom to collaborate, lead, and influence global discourse in data-driven transport advancements. Our submission aims to provide insights into how the government can enhance data utilization strategies, foster industry collaboration, and position the UK as a driving force in shaping international standards.

The Association is committed to promoting a sustainable, efficient, and connected transport ecosystem that benefits both society and the economy. As we delve into the inquiry's topics, we seek to contribute informed perspectives, data-driven insights, and forward-thinking recommendations that align with our mission to deliver excellence in engineering solutions. We thank the Transport Committee for the opportunity to engage in this vital dialogue and contribute to shaping the future of transportation through data innovation.

ACE SUBMISSION

How might planning and delivery of transport infrastructure and services be changed by greater sharing and use of transport data over the medium and long terms?

From the perspective of ACE members, the greater sharing and use of transport data over the medium and long terms can have significant implications for the planning and delivery of transport infrastructure and services. Here are several ways in which data could transform the field:

Informed Decision-Making: Access to comprehensive and real-time transport data can help ACE members make more informed decisions during the planning and design phases. This data can include information about traffic flow, usage patterns, environmental factors, and more. With accurate data, engineers can design infrastructure that meets actual needs and optimises resource allocation.

Predictive Maintenance: Transport assets such as roads, bridges, tunnels, and public transportation systems can be monitored using sensor technologies and data analytics. This enables predictive maintenance, helping engineers detect potential issues before they become critical. Timely maintenance not only enhances safety but also extends the lifespan of infrastructure, reducing long-term costs.

Efficient Resource Allocation: Data-driven insights can aid ACE members in optimising the allocation of resources, whether these resources are labour, materials, or budget. By analysing data on usage patterns, demand fluctuations, and peak hours, engineers can allocate resources where they are most needed, ensuring efficient service delivery and minimising disruptions.

Smart Infrastructure: The concept of "smart infrastructure" involves integrating data collection sensors into transportation systems to gather real-time information about traffic flow, congestion, and other variables. ACE members can use this data to dynamically manage traffic signals, adjust routes, and optimise overall transportation efficiency.

Digital Twins: The use of digital twin technology involves creating virtual replicas of physical infrastructure. These digital twins can be used to simulate different scenarios, test modifications, and predict potential issues. This technology allows engineers to experiment and fine-tune their designs before implementation, reducing the risk of costly errors.

Optimised Urban Planning: Transport data can be integrated with other urban planning data to create comprehensive insights into how transportation interacts with other aspects of urban life, such as land use, demographics, and economic activity. This holistic view can lead to better urban planning decisions that promote sustainable development and improved quality of life.

User-Centric Solutions: With access to data on user behavior and preferences, ACE members can develop transportation solutions that are tailored to the needs of the community. This could include designing routes and services that align with travel patterns and user preferences, ultimately enhancing user satisfaction.

Collaborative Planning: Greater data sharing can facilitate collaboration between different stakeholders, including government agencies, private sector entities, and the public. Engineers can work together with these stakeholders to gather diverse perspectives and create more holistic and effective transportation solutions.

Risk Mitigation: Data can provide valuable insights into potential risks, such as accident-prone areas or vulnerable infrastructure. ACE members can use this information to design safety measures and redundancy systems that mitigate risks and improve overall transportation safety.

Regulations and Standards: As data becomes a more critical component of transportation planning and management, ACE members will likely play a role in developing and adhering to data-related regulations and standards. This ensures data privacy, security, and ethical use while fostering interoperability among different systems.

However, it is important to acknowledge the challenges and risks associated with increased data usage, such as data privacy concerns, cybersecurity threats, and the need for effective data governance. ACE

members will need to work closely with relevant stakeholders to address these challenges and strike a balance between data-driven innovation and responsible practices.

How might the travelling public, and local communities, experience the benefits of better use of transport data? What unintended consequences might there be?

From the perspective of ACE members, the better use of transport data can have several positive impacts on the travelling public and local communities. However, along with the benefits, there are also potential unintended consequences that need to be considered. The following takes a closer look at both aspects:

Benefits for the Travelling Public and Local Communities:

Enhanced User Experience: Data-driven solutions can lead to smoother and more efficient travel experiences for the public. Real-time traffic updates, optimised route recommendations, and accurate public transportation schedules can help travellers make informed decisions, leading to reduced travel times and less frustration.

Improved Safety: Utilising data for predictive maintenance and real-time monitoring can lead to safer infrastructure. For example, engineers can identify potential hazards on roads or railways and take proactive measures to prevent accidents.

Personalised Services: Transport data can be used to offer personalised travel options to individuals. Commuters can receive tailored recommendations for modes of transportation, routes, and departure times that best suit their preferences and needs.

Reduced Congestion: With data-driven traffic management systems, ACE members can implement dynamic traffic control measures to alleviate congestion in real-time. This not only benefits travellers by reducing delays, but also contributes to lower carbon emissions and improved air quality in local communities.

Environmental Benefits: The use of data can encourage the adoption of sustainable transportation modes. Travellers can receive information about eco-friendly transport options, leading to reduced vehicle emissions and a more environmentally conscious travel culture.

Accessibility Improvements: Transport data can be leveraged to enhance accessibility for people with disabilities. Real-time updates on accessible routes, available facilities, and optimised services can empower individuals with disabilities to navigate transportation networks more easily.

Community Engagement: ACE members can develop interactive platforms that engage local communities in transport planning and decision-making processes. Gathering input from residents can lead to infrastructure designs that align with community needs and preferences.

Economic Opportunities: Improved transport infrastructure can stimulate economic growth in local communities. Efficient transport networks attract businesses, create jobs, and promote local commerce.

Unintended Consequences and Challenges:

Digital Divide: Relying heavily on data-driven solutions may exacerbate the digital divide, as individuals without access to smartphones or reliable internet connectivity might be left out of the benefits.

Data Privacy Concerns: Gathering and sharing large amounts of personal data for travel optimisation can raise privacy concerns. Proper safeguards are needed to ensure that sensitive data is handled responsibly and transparently.

Dependency on Technology: An over-reliance on technology can result in vulnerabilities. If systems fail or data becomes corrupted, it could lead to disruptions in travel and safety issues.

Loss of Human Element: As systems become more automated, there is a risk of losing the “human touch” in transportation services. Some travellers may prefer/feel more comfortable with human interactions for support or assistance.

Equity and Accessibility: Data-driven solutions might inadvertently favour certain demographics or areas, leaving marginalised communities with inadequate access to improved transportation services.

Regulatory and Legal Challenges: The introduction of new technologies and data-sharing practices may require updated regulations and standards to address liability, data ownership, and cybersecurity concerns.

Job Displacement: As automation and AI become more prevalent in transport management, certain job roles might be displaced, potentially impacting the workforce in some communities, and affecting wellbeing.

To mitigate unintended consequences, it is essential for ACE members, policymakers, and stakeholders to collaborate in designing solutions that prioritise equity, accessibility, and responsible data usage. Regulations and standards must be developed to ensure ethical practices, data security, and privacy protections while harnessing the transformative potential of transport data for the benefit of both the travelling public and local communities.

How will it benefit the freight sector and the supply chain?

From the perspective of ACE members, the utilisation of data in the transport sector, as outlined in the Transport Committee's inquiry and the Government's Transport Data Strategy, can bring substantial benefits to the freight sector and the supply chain. The following describes how:

Optimised Routing and Logistics: Data-driven insights can enable ACE members to develop advanced routing algorithms and logistics solutions for freight transportation. By analysing real-time traffic data, road conditions, and demand patterns, engineers can design more efficient routes that minimise travel times, reduce fuel consumption, and lower operational costs.

Predictive Maintenance for Vehicles: In the freight sector, where downtime can result in substantial financial losses, data can be used to predict maintenance needs for trucks and other vehicles. Sensor data can provide information about the health of vehicle components, enabling proactive maintenance scheduling to prevent breakdowns and disruptions to the supply chain.

Inventory Management: Real-time data on shipments and inventory levels can be integrated into supply chain management systems. This allows ACE members to optimise inventory levels, reduce excess stock, and ensure timely replenishment, leading to smoother operations and reduced carrying costs.

Enhanced Supply Chain Visibility: Data sharing and collaboration among different actors in the supply chain can lead to enhanced visibility and traceability. This can help ACE members design systems that provide real-time updates to stakeholders, allowing them to track the movement of goods and respond to any disruptions more effectively.

Load Optimisation: ACE members can use data to develop load optimisation strategies, ensuring that vehicles are filled to capacity without exceeding weight limits. This not only maximises the use of transportation resources but also reduces the number of trips required for delivery.

Intermodal Transportation: Data can facilitate the integration of different modes of transportation (e.g., road, rail, air, sea) in the supply chain. ACE members can design systems that seamlessly switch between modes based on real-time conditions, reducing costs and improving efficiency.

Risk Mitigation: Data can help identify potential risks in the supply chain, such as disruptions due to weather events, labour strikes, or geopolitical issues. ACE members can develop contingency plans and alternative routes to mitigate these risks and maintain the flow of goods.

Demand Forecasting: Advanced data analytics can provide insights into demand patterns, enabling more accurate demand forecasting. This helps supply chain stakeholders anticipate fluctuations in demand and adjust their operations accordingly.

Reduced Environmental Impact: By optimising routes, load distribution, and transportation modes, ACE members can contribute to reducing the carbon footprint of the freight sector. Data-driven decisions can lead to more eco-friendly transportation practices.

Collaborative Ecosystems: The sharing of data within the supply chain ecosystem can lead to closer collaboration among different stakeholders, including manufacturers, distributors, carriers, and retailers. ACE members can design platforms that enable seamless data exchange, fostering better communication and coordination.

While the benefits are substantial, challenges such as data privacy, security, interoperability, and data ownership need to be addressed. ACE members will play a crucial role in ensuring that data-driven solutions in the freight sector adhere to regulatory frameworks, industry standards, and ethical considerations. Additionally, collaboration among engineers, policymakers, industry players, and technology experts will be essential to harness the full potential of data for transforming the freight sector and the supply chain.

What are the potential uses of data for understanding usage and condition of assets like roads, rail track, charging points, vehicles, and the kerbside?

From the perspective of ACE members, the potential uses of data for understanding the usage and condition of various transport assets, such as roads, rail tracks, charging points, vehicles, and the kerbside, are vast and transformative. Leveraging data in these areas can lead to improved maintenance, enhanced safety, and more efficient resource allocation. Here are some potential uses:

Predictive Maintenance: Data collected from sensors embedded in infrastructure can provide real-time insights into the condition of roads and rail tracks. ACE members can analyse this data to predict maintenance needs, allowing for proactive repairs before issues become critical. This minimises disruptions to transportation networks and extends the lifespan of assets.

Asset Performance Monitoring: Monitoring data can be used to track the performance of assets over time. Engineers can identify patterns of wear and tear, assess the impact of heavy traffic or adverse weather conditions, and make data-informed decisions on current and future repair or replacement strategies.

Load and Usage Analysis: Data can be collected to understand the loads and stresses that different sections of road or rail tracks endure. This information helps engineers design assets that can handle anticipated usage levels and optimise asset lifespan.

Charging Point Management: Data from charging points for electric vehicles can be analysed to optimise their location, usage, and maintenance. Engineers can identify high-demand areas, plan for charging infrastructure expansion, and manage power distribution efficiently.

Vehicle Fleet Management: By integrating data from vehicles, ACE members can monitor their health and performance. This enables proactive maintenance scheduling and reduces the risk of long periods of downtime and breakdowns, ensuring reliable transport services.

Traffic Flow and Congestion Analysis: Data from various sources, including GPS devices and traffic cameras, can be used to analyse traffic flow and congestion patterns. Engineers can identify bottlenecks, optimise signal timings, and design efficient traffic management systems.

Safety Enhancements: Data from sensors on vehicles and infrastructure can help identify potential safety hazards. Engineers can design interventions to address accident-prone areas or situations, improving overall road and rail safety.

Kerbside Management: Data on parking and loading/unloading activities at the kerbside can assist engineers in designing more efficient parking systems, managing kerbside congestion, and optimising space allocation.

Environmental Impact Assessment: Data can be used to assess the environmental impact of transport assets. Engineers can analyse emissions data, noise levels, and other environmental factors to develop more sustainable infrastructure solutions.

Optimised Resource Allocation: Data-driven insights can help allocate resources such as maintenance crews, repair materials, and equipment more effectively, resulting in cost savings and improved asset management.

Data-Driven Design: ACE members can use historical usage data to inform the design of new assets. For example, analysing traffic patterns can lead to road designs that accommodate anticipated future traffic loads.

To fully harness the potential of data for asset understanding, ACE members need robust data collection systems, advanced analytics tools, and integration capabilities. Additionally, addressing privacy, security, and data ownership concerns is crucial to ensure responsible and ethical use of data. Standardisation of data formats and communication protocols will be important to ensure interoperability among various data sources. Effective collaboration between engineers, technology experts, policymakers, and industry stakeholders will be essential to maximise the benefits of data in understanding and managing transport assets.

What privacy, ethical, security, resilience and intellectual property issues arise in relation to gathering and sharing transport data, including location-based data about journeys and data with commercial value? How should the Government seek to manage and regulate these?

From the perspective of ACE members, the use of transport data presents a range of privacy, ethical, security, resilience, and intellectual property issues that need to be carefully addressed to ensure responsible and beneficial utilisation of data. Here are some of the key issues and considerations, along with suggestions for how the government could manage and regulate them:

<u>Privacy and Ethical Issues:</u>

Data Anonymisation: Gathering and sharing data, especially location-based journey data, can raise privacy concerns. Personal identifiers must be removed or anonymised to protect individuals' privacy while still allowing for useful insights.

Informed Consent: Individuals should be informed about the data being collected, how it will be used, and have the ability to provide explicit consent. Transparency is crucial to establish trust between data collectors and the public.

Data Ownership: Determining who owns the data and how it can be used is important. Clear guidelines on data ownership, especially when data is collected by public entities or private companies, are necessary to prevent misuse.

Ethical Data Use: Data should be used in ways that respect individuals' rights and uphold ethical principles. The Government could establish ethical guidelines and frameworks for data usage to ensure that data-driven decisions prioritise public interest and welfare.

<u>Security and Resilience:</u>

Data Protection: Ensuring the security of data from cyberattacks and unauthorised access is crucial. Robust encryption and cybersecurity measures should be in place to protect sensitive data.

Resilience to Failures: Systems for data collection and sharing should be designed with redundancy and fail-safe mechanisms to ensure that critical infrastructure remains operational even in the face of disruptions.

Intellectual Property and Commercial Value:

Commercial Data Exploitation: Transport data, especially data with commercial value, might be exploited by private companies for profit. Clear regulations are needed to ensure that data ownership and usage rights are defined and protected.

Data Monetisation: The Government could explore models for data monetisation that benefit the public while safeguarding against data being used solely for private gain.

Regulation and Management:

Data Governance Framework: The Government should establish a comprehensive data governance framework that outlines how data will be collected, managed, shared, and used. This framework should address data ownership, usage rights, privacy protection, and ethical considerations.

Standards and Interoperability: Establishing data standards and protocols ensures that data from different sources can be integrated and analysed effectively. This promotes interoperability and prevents data silos.

Data Sharing Agreements: Agreements for data sharing between public and private entities should clearly define the terms, purposes, and limitations of data sharing. These agreements should also outline mechanisms for oversight and accountability.

Privacy Regulations: Develop and enforce regulations that safeguard personal data, ensure informed consent, and establish penalties for violations of privacy rights.

Ethical Guidelines: Develop and promote ethical guidelines for the responsible use of data, ensuring that data-driven decisions prioritise societal benefits and avoid harm.

Cybersecurity Standards: Implement cybersecurity standards and regulations to protect against data breaches and unauthorised access.

Public Consultation: Engage the public in discussions about data usage, privacy, and related regulations to ensure that policies align with public interests and concerns.

Balancing innovation, public benefit, and individual rights requires a multi-faceted approach involving collaboration among government bodies, technology experts, legal professionals, ACE members, and civil society organisations. The Government's approach should be adaptable to emerging challenges and responsive to evolving technology and societal norms.

What are the biggest gaps in available data about transport networks and travel? What kinds of policy, planning or maintenance questions cannot currently be answered that we could answer with new, or more accessible, data?

From the perspective of ACE members, there are several gaps in available data about transport networks and travel that, if addressed, could significantly enhance policy, planning, and maintenance efforts. These gaps represent areas where new or more accessible data could provide valuable insights and answers to crucial questions.

Real-Time Traffic Flow: While traffic data is available through various sources, real-time and high-resolution traffic flow data for all modes of transportation (including public transport, bicycles, and pedestrians) is often lacking. Comprehensive real-time data would enable engineers to optimise traffic signal timings, reroute vehicles in congested areas, and improve overall traffic management.

Multimodal Journeys: Data that captures the entire journey of a traveler using different modes of transport (e.g., walking, cycling, public transit, ridesharing) is limited. Comprehensive multimodal data would enable engineers to better understand traveler behavior, preferences, and challenges across various modes.

Infrastructure Condition Monitoring: Detailed and up-to-date data on the condition of infrastructure such as roads, bridges, tunnels, and rail tracks is essential for proactive maintenance. Continuous monitoring data can help engineers identify degradation trends and prioritise repairs.

Environmental Impact Data: Data on the environmental impact of transport networks, including emissions, noise pollution, and air quality, is often incomplete. Improved data in this area would aid in designing more sustainable and eco-friendly transportation solutions.

Demand and Usage Patterns: Detailed data on travel demand and usage patterns, especially for off-peak hours and less commonly used routes, is lacking. Such data would support efficient resource allocation, route optimisation, and responsive transport services.

Accessibility Data: Data about accessibility for people with disabilities and mobility challenges, including detailed information on infrastructure (such as ramps, elevators, and tactile paving), is often incomplete. Enhanced accessibility data would aid in designing inclusive transportation systems.

Impact of Special Events: Data on the impact of special events, road closures, and detours on traffic flow and public transportation is limited. Having this data would enable better planning and coordination for such events.

Integrated Freight Data: Comprehensive data on freight movements, including information on loading/unloading zones, route preferences, and delivery schedules, is often fragmented. Integrated freight data could optimise logistics, reduce congestion, and enhance supply chain management.

Behavioral Insights: Detailed behavioral data about how people make transportation choices (e.g., factors influencing mode choice, route preferences) is often lacking. Such insights could help engineers design strategies that encourage sustainable and efficient travel behaviors.

Addressing these data gaps requires a multi-pronged approach:

Data Collection and Sharing: Develop and implement data collection strategies that cover all transportation modes and capture various aspects of travel behavior, infrastructure conditions, and environmental impacts.

Technological Innovation: Leverage emerging technologies such as IoT devices, mobile apps, and crowd-sourced data to fill data gaps and provide real-time information.

Data Standardisation: Establish data standards and protocols to ensure consistency and interoperability across various data sources and platforms.

Collaboration: Foster collaboration between government agencies, private sector entities, academia, and the public to collect, share, and analyse data collaboratively.

Regulation and Governance: Develop regulations that encourage responsible data sharing while addressing privacy and security concerns.

Public Engagement: Involve the public in data collection efforts and policy discussions to ensure that data solutions align with community needs and preferences.

By addressing these data gaps and adopting a comprehensive data strategy, ACE members can gain more accurate insights, make informed decisions, and contribute to the development of efficient, safe, and sustainable transport networks for the future.

How can the UK scale up from pilots, pockets of innovation and existing single-mode data sets towards an integrated, comprehensive landscape for transport data?

From the perspective of ACE members, scaling up from individual pilots and isolated data sets to an integrated and comprehensive landscape for transport data in the UK requires a strategic and collaborative approach. Here are several steps that can help achieve this transformation:

Develop a Unified Vision and Strategy:

- Establish a clear vision for an integrated transport data landscape that encompasses multiple modes of transportation, stakeholders, and data sources.
- Create a comprehensive strategy that outlines the goals, priorities, and key milestones for achieving an integrated data ecosystem.

Data Sharing and Collaboration:

- Encourage collaboration between government agencies, private sector entities, academia, and local communities to share data and insights.
- Develop data-sharing agreements and protocols that facilitate secure and standardised data exchange while addressing privacy and security concerns.

Open Data Initiatives:

- Promote open data initiatives that make non-sensitive and non-proprietary transport data publicly accessible. This encourages innovation, research, and the development of new solutions.

Standardisation and Interoperability:

- Establish data standards and formats that enable different data sources to communicate and integrate seamlessly.
- Create interoperability frameworks that allow data from various sources and modes of transportation to be combined and analysed effectively.

Invest in Infrastructure and Technology:

- Invest in the necessary technology infrastructure, including IoT devices, sensors, communication networks, and data storage solutions.
- Implement advanced analytics platforms and artificial intelligence tools to process and derive insights from large datasets.

Data Governance and Regulation:

- Develop a regulatory framework that governs data collection, sharing, usage, privacy, security, and ownership.
- Establish a data oversight body or regulatory agency to ensure compliance and enforce data-related regulations.

Data Collection and Quality Assurance:

- Expand data collection efforts to cover all modes of transportation and gather comprehensive insights.
- Implement data quality assurance processes to ensure accuracy, reliability, and consistency of collected data.

Public Engagement and Education:

- Educate the public about the benefits of integrated transport data and encourage participation in data collection and sharing initiatives.
- Use public engagement to gather input on data priorities, privacy concerns, and community-specific needs.

Incentives for Innovation:
- Provide incentives for private sector companies to contribute data and collaborate on data-driven solutions.
- Offer grants, funding, and recognition to encourage innovation in the transport data space.

Long-Term Funding and Sustainability:
- Secure long-term funding for the development and maintenance of the integrated data landscape.
- Ensure sustainability by involving a mix of public and private funding sources.

Capacity Building and Skill Development:
- Invest in training and skill development programs to ensure that the skills pool is large enough and that existing engineers, data scientists, and other professionals have the expertise needed to leverage data effectively.

Pilot Projects and Testbeds:
- Implement pilot projects and testbeds that demonstrate the benefits of integrated data and serve as models for scaling up across different regions.

Scaling up to an integrated and comprehensive transport data landscape requires commitment from all stakeholders, including government, industry, academia, and the public. By fostering collaboration, investing in technology and infrastructure, and addressing regulatory and ethical considerations, the UK can pave the way for a data-driven future that revolutionises transportation planning, delivery, and management.

How should data availability, and sharing by transport operators, suppliers and other bodies, be encouraged, facilitated and regulated?

Encouraging, facilitating, and regulating data availability and sharing by transport operators, suppliers, and other relevant bodies is essential to realising the full potential of data-driven improvements in the transport sector. From the perspective of ACE members, the following are some strategies for achieving these goals:

<u>Encouraging Data Availability and Sharing:</u>

Incentives: Provide incentives for data sharing, such as access to aggregated insights, collaboration opportunities, or preferential treatment in certain processes.

Transparency: Ensure transparency about the benefits of data sharing, emphasising how it can lead to better services, infrastructure, and customer experiences.

Demonstrated Value: Showcase successful use cases of data sharing that have led to tangible improvements in transport operations and user experiences.

Public-Private Partnerships: Foster partnerships between public and private entities to jointly develop data-sharing initiatives and projects.

Data Collaboratives: Encourage the formation of data collaboratives, where multiple stakeholders contribute and access data for common goals while adhering to data privacy and security guidelines.

Data Marketplaces: Establish platforms where data owners can offer their datasets and data consumers can access them, fostering a marketplace for transport-related data.

Facilitating Data Availability and Sharing:

Data Standardisation: Promote the adoption of common data standards and formats across the industry to enable seamless data exchange.

APIs and Interoperability: Develop standardised application programming interfaces (APIs) that allow systems to communicate and share data effectively.

Data Governance Framework: Create a framework that outlines the rights, responsibilities, and obligations of data sharers and consumers, including data usage policies and agreements.

Data Catalogs: Maintain centralised data catalogs that provide information about available datasets, making it easier for potential users to discover and access relevant data.

Data Access Agreements: Establish clear data access agreements that define the terms of data sharing, usage, and privacy protections.

Data Quality Assurance: Implement mechanisms to ensure that shared data meets specific quality standards, enhancing its reliability and usefulness.

Regulating Data Availability and Sharing:

Data Sharing Mandates: Introduce regulations that mandate certain types of transport data to be shared for public benefit, especially data that contributes to safety and system efficiency.

Privacy Protection: Enforce privacy regulations that safeguard sensitive personal information while allowing for the sharing of anonymised and aggregated data.

Data Ownership: Establish clear guidelines on data ownership and rights, especially when data is collected by public entities or through partnerships.

Liability and Accountability: Define liability and accountability frameworks to address issues that may arise from the use of shared data, including data inaccuracies or breaches.

Security Measures: Set requirements for data security and cybersecurity to protect against data breaches and unauthorised access.

Oversight and Regulation: Create a regulatory body or authority responsible for overseeing data sharing practices, ensuring compliance with regulations, and resolving disputes.

Public Consultation: Involve the public in discussions about data sharing regulations, gathering input on privacy concerns and the broader societal impact.

Balancing the need for data sharing with privacy, security, and ethical considerations requires a collaborative effort among government, industry stakeholders, technology experts, and the public. The regulations and standards put in place should foster an environment of responsible data sharing that maximises the benefits for all stakeholders while mitigating potential risks.

What skills and capacity do operators, infrastructure providers and local transport authorities need in order to manage their own data well and get the most value out of available data? What help do they need to anticipate and cater for future requirements?

From the perspective of ACE members, operators, infrastructure providers, and local transport authorities require specific skills and capacity to effectively manage their data and extract maximum value from available data. The following are the skills and assistance they need to manage their data and prepare for future requirements:

Data Management and Governance:

- Data Collection and Integration: Skills to collect and integrate data from diverse sources, including sensors, IoT devices, and third-party systems.
- Data Quality Assurance: Ability to ensure data accuracy, completeness, and reliability through validation and cleansing processes.
- Data Governance: Expertise in establishing data governance frameworks, including data ownership, access controls, and privacy policies.

Data Analysis and Interpretation:

- Data Analytics: Proficiency in data analysis techniques, statistical tools, and software for deriving insights from raw data.
- Data Visualisation: Skills to create meaningful visualisations and dashboards to communicate insights effectively to stakeholders.
- Predictive Modeling: Knowledge of predictive analytics and machine learning techniques to anticipate future trends and events.

Technical Expertise:

- Database Management: Competence in managing and maintaining databases that store and manage large volumes of data.
- Programming Skills: Proficiency in programming languages (e.g., Python, R) to manipulate, process, and analyse data.
- Cloud Computing: Familiarity with cloud platforms for data storage, processing, and scalability.

Collaboration and Stakeholder Engagement:

- Communication Skills: Ability to communicate technical insights to non-technical stakeholders and collaborate effectively across departments and organisations.
- Partnership Building: Skills to foster collaborations with technology providers, data aggregators, and other stakeholders for data sharing and integration.

Privacy and Security:

- Data Privacy and Ethics: Understanding of data privacy regulations and ethical considerations to ensure responsible data handling and protection of sensitive information.
- Cybersecurity: Knowledge of cybersecurity best practices to safeguard data against breaches and unauthorised access.

Future-Readiness:

- Adaptability: Ability to keep up with evolving technology trends, data sources, and analytics methods to remain effective in a rapidly changing landscape.
- Scalability Planning: Capacity to anticipate future data requirements and plan for data infrastructure scalability.

Assistance Needed:

- Training and Skill Development: Operators, providers, and authorities need training programs to enhance their data management and analysis skills.
- Consulting and Expert Guidance: ACE members can provide guidance on best practices, technology selection, and data strategy development.
- Technology Implementation Support: Help in implementing data management tools, analytics platforms, and integrating data from various sources.
- Regulatory Compliance Assistance: Guidance on adhering to data privacy regulations, security standards, and ethical considerations.

- Collaboration Platforms: Platforms that facilitate collaboration and data sharing among different stakeholders.
- Predictive Modeling and AI: Support in implementing predictive models and AI algorithms to anticipate future needs and optimise operations.

By acquiring these skills and receiving the necessary assistance, operators, infrastructure providers, and local transport authorities can effectively manage their data, harness its potential, and make informed decisions that drive improvements in transport planning, delivery, maintenance, and user experience. ACE members can play a crucial role in providing expertise, guidance, and support throughout this process.

Is the UK's digital infrastructure sufficient to allow the greatest value to be derived from transport data?

From the perspective of ACE members, the adequacy of the UK's digital infrastructure is a crucial factor in realising the full potential of transport data. The ability to gather, manage, analyse, and interpret data effectively relies on a robust and capable digital infrastructure. The following are some considerations regarding the UK's digital infrastructure and how it can increase its readiness to derive maximum value from transport data:

Connectivity and Data Accessibility:
- High-Speed Internet: The availability of high-speed and reliable internet connectivity is essential for real-time data collection, analysis, transmission, and sharing.
- Broadband Coverage: Comprehensive broadband coverage, especially in rural and remote areas, is necessary to ensure that data is accessible from diverse locations.

Data Storage and Processing:
- Cloud Computing: Utilising cloud computing services can offer scalable data storage and processing capabilities, allowing for efficient handling of large volumes of data.
- Data Centers: A well-distributed network of data centers is crucial for secure and accessible data storage, especially when dealing with sensitive information.

Data Security and Privacy:
- Cybersecurity Measures: A strong cybersecurity framework is essential to protect transport data from unauthorised access, breaches, and cyber threats.
- Privacy Infrastructure: Adequate privacy measures, including encryption and data anonymisation, are required to ensure compliance with data protection regulations.

Interoperability and Standardisation:
- Data Standards: A standardised approach to data formats, APIs, and protocols enhances interoperability and enables seamless data exchange between different systems and stakeholders.

Scalability and Flexibility:
- Scalable Architecture: The infrastructure should be designed to accommodate the increasing volume of data generated by various transport sources and new technologies.
- Flexibility for Innovation: The digital infrastructure should be adaptable to emerging technologies and accommodate future innovations in transport data collection and utilisation.

Data Sharing and Collaboration:
- Collaboration Platforms: Digital platforms that facilitate data sharing and collaboration among different stakeholders, including government, industry, and research organisations, are essential.

Accessibility and Inclusivity:
- Accessibility Standards: Ensuring that digital tools and platforms are accessible to individuals with disabilities promotes inclusivity in data sharing and usage.

Redundancy and Resilience:

- Backup and Redundancy: A resilient infrastructure includes backup systems and redundancy measures to prevent data loss, data corruption and downtime.

Future-Proofing:

- Adaptability: All digital infrastructure should be designed with the flexibility to incorporate new technologies and accommodate future growth in data sources and volumes.

Assessing the sufficiency of the UK's digital infrastructure involves evaluating the extent to which it can support the scale, speed, security, and complexity of data generated by various transport modes and sources. Addressing any gaps or limitations in the digital infrastructure is critical to unlocking the full potential of transport data and achieving the objectives outlined in the Transport Data Strategy. This could involve targeted investments, policy updates, and collaboration between government, technology providers, and industry stakeholders to ensure that the digital infrastructure is aligned with the demands of an increasingly data-driven transport ecosystem.

How effectively does the Government use data in appraising and prioritising transport investment?

From the perspective of ACE members, the effective use of data by the Government in appraising and prioritising transport investment is a critical factor in ensuring that resources are allocated efficiently and infrastructure projects deliver the intended benefits.

Data-Driven Decision Making:

- Comprehensive Data: The Government should have access to a wide range of accurate and up-to-date data, including transportation demand, traffic patterns, population growth projections, economic indicators, and environmental factors.
- Multi-Modal Insights: Data should cover various modes of transportation, including roads, public transit, cycling, and walking, to provide a holistic view of transportation needs.

Predictive Analytics and Modelling:

- Transportation Models: Advanced transportation models that use data to simulate and predict the impact of various investment scenarios can help prioritise projects that offer the greatest return on investment.
- Economic and Social Impact: Data-driven modelling can assess the potential economic and social benefits of investments, considering factors such as reduced congestion, improved safety, and increased accessibility.

Performance Metrics and KPIs:

- Key Performance Indicators (KPIs): Define clear KPIs to measure the performance of existing infrastructure and potential investment projects. Data should be used to track progress towards meeting these KPIs.
- Outcome-Focused: Use data to ensure that investment decisions are tied to desired outcomes, such as reduced travel times, increased capacity, and enhanced user experience.

Stakeholder Engagement:

- Public Input Data: Incorporate data collected through public consultations, surveys, and feedback mechanisms to understand the needs and preferences of transportation users and communities.
- Local Expertise: Leverage local data and insights from engineers, planners, and transportation professionals who have a deep understanding of regional transportation challenges and opportunities.

Continuous Monitoring and Evaluation:

- Data Feedback Loop: Implement a feedback loop that monitors the actual performance of projects after implementation and evaluates it, comparing it to projected outcomes. This allows for effective adjustments and improvements based on real-world data.

Risk Assessment and Mitigation:

- Risk Data: Use data to assess potential risks associated with investment projects, such as cost overruns, schedule delays, and unforeseen challenges.
- Scenario Analysis: Data-driven scenario analysis can help identify potential risks and develop mitigation strategies.

Integration of New Technologies:

- Emerging Technologies: Incorporate data on emerging technologies, such as electric and autonomous vehicles, to anticipate their impacts, such as on transportation demand and infrastructure requirements.

Policy Alignment:

- Alignment with Policy Goals: Ensure that data analysis and investment decisions align with broader transportation and sustainability policies and goals.

Data Transparency and Sharing:

- Accessible Data: Ensure that relevant data is accessible and transparent to all stakeholders involved in the investment process, promoting accountability and informed decision making.

To enhance the Government's use of data in appraising and prioritising transport investment, it is important to foster collaboration between government agencies, ACE members, researchers, and the private sector. By leveraging data-driven insights, the Government can make more informed decisions, maximise the impact of transportation investments, and ensure that the country's transport network is efficient, safe, and responsive to the evolving needs of its citizens.

What milestones and ambitions should the Government set in this area? How effectively has the Government's Transport Data Strategy identified barriers to sharing and getting value from transport data, and the actions needed to overcome those barriers?

From the perspective of ACE members, setting appropriate milestones and ambitions for utilising transport data is essential to drive progress and ensure successful implementation. Additionally, evaluating the effectiveness of the Government's Transport Data Strategy in identifying barriers and proposing solutions is crucial for addressing challenges and achieving desired outcomes.

<u>Setting Milestones and Ambitions:</u>

Data Integration and Interoperability:

- Milestone: Achieve seamless integration of data across different transport modes and agencies, allowing for holistic analysis and decision-making.
- Ambition: Create an integrated data ecosystem that enables a comprehensive view of transportation networks and user experiences.

Predictive Maintenance and Management:

- Milestone: Develop predictive maintenance models for critical transport assets, minimising downtime and optimising resource allocation.
- Ambition: Establish a proactive maintenance approach driven by real-time data and predictive analytics, enhancing asset longevity.

Real-Time Traffic Management:

- Milestone: Implement real-time traffic management systems using data from sensors, vehicles, and infrastructure.
- Ambition: Achieve dynamic traffic management that optimises traffic flow, reduces congestion, and improves overall efficiency.

Multimodal Journey Planning:

- Milestone: Offer seamless multimodal journey planning and booking platforms that incorporate real-time data and user preferences.
- Ambition: Provide users with integrated transportation options that enhance convenience and encourage sustainable modes of travel.

Safety Enhancement:
- Milestone: Develop data-driven safety measures that reduce accidents and improve pedestrian and cyclist safety.
- Ambition: Achieve a significant reduction in transportation-related accidents through data-backed interventions and infrastructure improvements.

What is the emerging best practice internationally, in terms both of developing standards and frameworks for sharing and using transport data, and supporting specific innovations? How does the UK compare, and how can it help to shape international standards?

From the perspective of ACE members, there are emerging best practices internationally that focus on developing standards, frameworks, and supporting innovations for sharing and using transport data. Comparing these practices with the UK's efforts can provide insights into how the country can shape international standards and enhance its own data utilisation strategies. Here are some considerations:

International Best Practices:

Data Standardisation and Interoperability:
- Common Data Formats: Countries are adopting standardised data formats, such as GTFS (General Transit Feed Specification) for public transit data, to facilitate data sharing and integration across different systems.
- Open APIs: Developing open APIs that allow different systems to communicate and exchange data seamlessly.

Collaborative Data Platforms:
- Data Marketplaces: Some countries are creating platforms where data providers can share and monetise their data while giving access to data consumers to drive innovation.
- Data Sharing Agreements: Establishing agreements that ensure data is shared in a standardised and secure manner among relevant stakeholders.

Innovative Mobility Solutions:
- Mobility-as-a-Service (MaaS): Many countries are exploring MaaS platforms that integrate various transportation modes and services into a single digital interface.
- Smart Parking: Implementing data-driven solutions for efficient parking management, including real-time availability information.

The UK's Position and Opportunities:

Data Sharing Initiatives:
- Data Sandbox: The UK's Transport Data Initiative aims to provide an environment for public and private stakeholders to experiment with data and create innovative solutions.
- Open Data: The UK has made significant strides in releasing transport data as open data, fostering innovation and collaboration.

Government Initiatives:
- Data Strategy: The UK's Transport Data Strategy aligns with international trends by recognizing data's transformative potential and fostering collaboration.

- Innovation Funding: Programs such as Innovate UK support research and innovation in transportation, encouraging new solutions fueled by data.

Shaping International Standards:

Collaboration and Advocacy:
- Partnerships: Collaborate with international organisations, industry bodies, and other governments to share best practices and shape data standards collectively.
- Global Forums: Participate in international forums and conferences focused on data sharing, mobility, and transportation innovation.

Leading by Example:
- Innovation Demonstrations: Showcase successful UK initiatives that utilise data for better transport planning, safety improvements, and sustainable mobility.
- Data Governance: Share experiences in establishing data governance frameworks that balance openness with privacy and security.

Policy Advocacy:
- Regulation and Standards: Participate in international discussions to influence the development of global standards for data sharing, interoperability, and privacy in the transport sector.
- Data Ethics: Advocate for ethical data use practices and responsible data sharing across borders.

Research and Collaboration:
- Research Collaboration: Engage with international research institutions and experts to share findings and insights on effective data utilisation for transport.
- Case Studies: Share case studies of UK data-driven transport projects that demonstrate successful outcomes and best practices.

By analysing international best practices, identifying areas where the UK can learn and collaborate, and actively participating in global discussions, the country can play a pivotal role in shaping international standards for data sharing, supporting innovation, and driving the evolution of efficient, safe, and sustainable transport systems.