



Unlocking the Future of Mobility with European Data Spaces

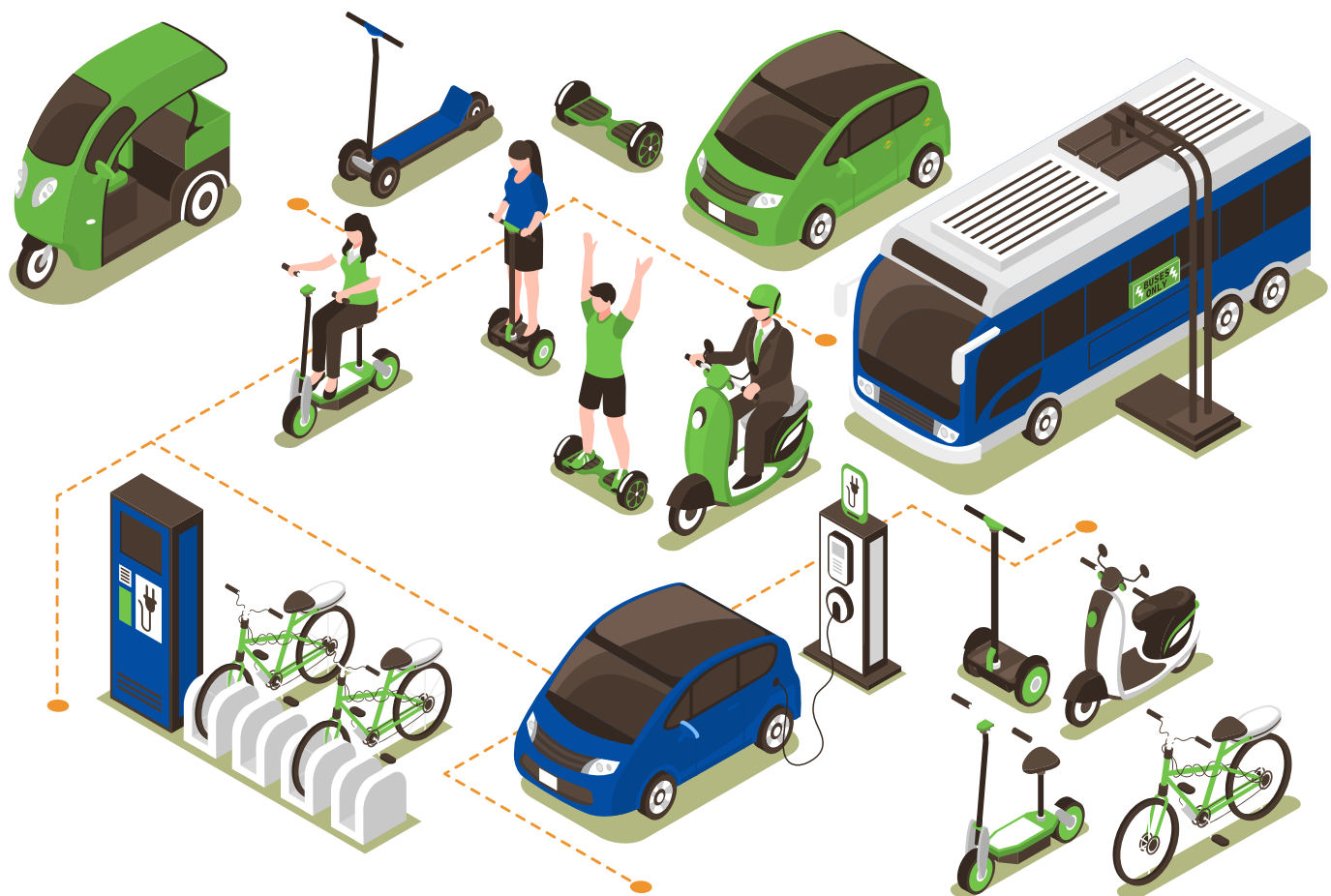
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Executive Summary, Takeaways and Recommendations



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Additional references from events, reports and shared insights included in the full report.

Executive Summary

Data is a key strategic asset in the framework of the European Strategy for Sustainable and Smart Mobility. Leveraging it will support priorities such as improving road safety, promoting alternative or complementary modes to private cars, mitigating the negative externalities of transport, as well as boosting advanced and personalised mobility services based on digitalisation, such as demand-responsive transport or the application of algorithms based on artificial intelligence.

To move towards this vision, it is essential to prioritise greater availability and accessibility to data, and to promote trusted environments for secure data sharing.

With this in mind, the European Commission’s European Data Strategy backs the nascent concept of data spaces that complements a new generation of regulation that will facilitate these goals. Data spaces are ecosystems that facilitate the voluntary, sovereign and secure sharing of data. Both in mobility and in other strategic sectors (tourism, energy, health, agri-food, etc.), data spaces promise to enable new public and commercial business models and services by unlocking access and availability to existing data while respecting usage control and privacy for data owners.

The ‘hype’ around this novel concept is therefore understandable, with analysts already placing mobility data spaces on the renowned Gartner Hype Cycle curve. This is representative of the increasing awareness and understanding of mobility data spaces, but more importantly it suggests that this technology is still in the early innovation phase and is expected to evolve rapidly in the next 10 years.

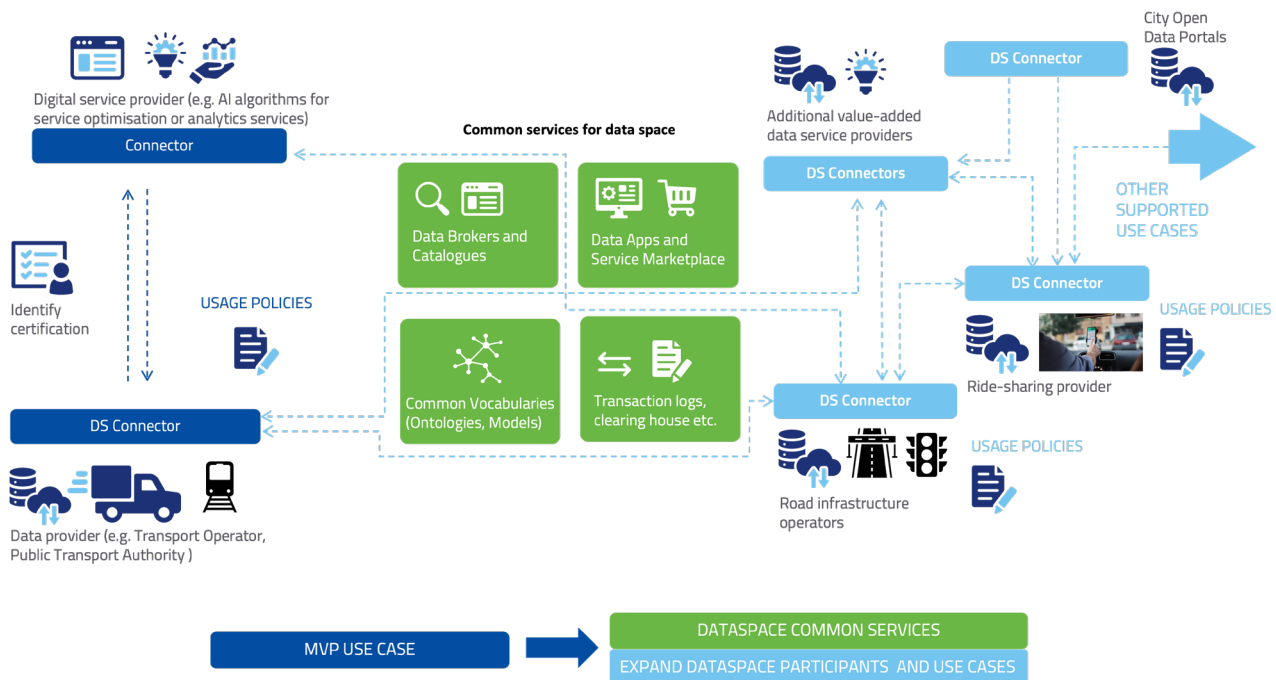


Figure 1: A conceptual visualisation of an evolving data space for mobility

That said, it is true that transformative technologies rarely follow such a common trajectory and in reality it is much harder to assess the rate of mass adoption. What this iteration of the Gartner Hype Cycle does show, however, is that mobility data spaces are not going unnoticed, and that it is fair to question whether all of their promised potential will be reached. This is why this study explores the foreseen challenges in developing, deploying and operating mobility data spaces in more detail, analysing the commercialisation aspects of transitioning from conceptual design, to piloted innovation, to sustainable, in-production service model. The technology itself is homegrown in Europe through various initiatives, forums and standardisation groups. It is now in an accelerated development and convergence phase between complementary and overlapping visions, coupled with the piloting of new governance models that are key to a data space's operation encompassing public and private sector actors in mobility value chains.

As with most technological advances, this stage in product development is where attracting private sector interest and investment is the most critical. From MaaS solution providers to freight operators to large OEMs, businesses in the mobility sector are generating and aggregating increasingly large volumes of proprietary data. In these new trusted environments that data space can provide, win-win business models with clear incentives will have to be defined to help overcome resistance to change in a historically conservative and data-protective industry culture, as well as provide a sufficiently attractive 'carrot' - the ROI (economic and strategic) to warrant such investment.

It is also important to remember the role of the 'stick' - in this case, regulation. The European Commission has taken an ambitious approach to a future data economy and has already introduced important transversal regulation such as the Data Governance Act and Data Act, providing an urgent and potentially costly adaptation of platforms, services and business models towards compliance (and one that data spaces can help facilitate). Meanwhile, delegated regulations under the Intelligent Transport Systems (ITS) Directive aim to drive the development of high quality mobility data at a national level through a network of interoperable National Access Points (NAPs). However, the full potential of NAPs has a long way to go, with significantly different levels of maturity between Member States in their current form. Data spaces stand to play an important role in supporting their development, especially in terms of data quality and traceability.

To summarise, mobility data spaces are a concept backed by the European Union to have the potential to positively disrupt the mobility sector towards a more efficient, sustainable and safe transport system. But will more local public and private sector actors buy into this vision? And will mobility data spaces live up to the hype? This report addresses these questions and provides a set of key recommendations for cities and businesses to assess the application of data spaces for their respective needs.

Key Takeaways

Opportunities for the private sector

As transport systems and mobility services become increasingly data-driven, the private sector stands to benefit significantly from deploying use cases and participating in mobility data spaces. The following conclusions can be drawn from the opportunities identified in this study:

- Beyond its core value proposition of creating trusted environments for secure and sovereign data sharing in business cases, data spaces will facilitate the monetisation of mobility and transport data. This is currently a key challenge for data owners who, although recognise their data as a key intangible asset, still find it very difficult to assess its value in a consistent manner.
- Likewise, data spaces provide attractive markets for mobility service providers where they can find quality data, clear conditions of use and streamlined mechanisms to acquire and consume such data to develop new, innovative services. This ecosystem effect is at the core of many use cases, especially in the MaaS segment.
- Mobility data spaces will accelerate multimodal integration projects by providing the necessary confidence to service providers participating in the MaaS value chain through robust business processes (in terms of security and privacy). This in turn will allow the efficient, traceable and flexible control of access and use of data in the different sub-processes of MaaS (information, planning, booking, ticketing, payment and management of subsidies and incentives).
- Data spaces have great potential to transform the rail sector from the current fragmentation at a national or regional level towards a future European railway system that is highly digitalised and interoperable across borders. This is arguably the market sector with the greatest need and potential in achieving a unified European mobility data space. It is also important to highlight the opportunity to integrate a more demand-responsive railway system in the urban mobility tissue of cities to complement services such as MaaS and last mile operations.
- The decentralised architecture and core functionality of data spaces provides the mechanisms and framework for a more controllable and traceable data-driven service ecosystem between data owners, providers, intermediaries and consumers. This will become more and more critical for the private sector in meeting complex data-related regulations and standards, especially in regulations related to the transparency of supply chains and life cycle emissions that impact the entire freight and logistics value chain. Data spaces will promote and facilitate the harmonisation and standardisation of access to data, and in turn make compliance across multiple supply chain actors much more cost and time effective for all.

- Several mobility and logistics domains are already in a transition to upgrading infrastructure, and incorporating data space approaches in their specifications (e.g. additional connector-based interfaces) will prolong investment lifecycle. For example, freight transport operators will have to upgrade their technological infrastructure to, among other objectives, enable interoperability with third-party systems, such as eFTI and e-CRM. Data spaces have great potential to facilitate this digital transition. The DTLF's freight data space project is well underway and looks to provide clarity on how this sector can leverage its benefits.
- IT solution providers, service providers and system integrators have begun a first generation of offerings, from large IT incumbents to new Connector-as-a-Service (CaaS) models from SMEs. This is echoed in data space standardisation groups and forums, with active participation from the European IT services market as the technology and architecture begins to converge. As data space pilot implementation ramps up, so will the market of solution providers to enable them. Although data space technologies and architectures will continue evolving, there is a clear trend and demand for increasingly more dynamic data and service ecosystems. Data owners and providers will be able to trace and manage their data through their respective value chains, with significantly more control over its usage. Trialling this first generation of data space technology is a key preparatory step for organisations that want to access and exploit these new markets, as well as harness these approaches to develop the required business and data governance processes to adapt to new regulations.

Recommendations for developing mobility data spaces and use cases

There are a handful of lighthouse mobility data space initiatives across Europe that are already piloting mobility use cases (see Section 1). To accelerate the progression of these and future mobility data spaces, this study identifies the following recommendations for future owners and operators:

- **Priority needed for “Minimal Viable Data Space” piloting, with emphasis on the governance approaches.** It is important that any scalable use case is structured into MVP implementation phases that act as short and mid-term demonstrators to start iterating its business scope, technical approach and governance model. This will add clarity to the business case and incentivise the right level of investment from interested public and private sector participants. Although the technical specifications of European standards are still being refined, this should not hold back the deployment of early mobility use case pilots, as the core concepts and functionality will be consistent with new regulation and a market need for more control in the hands of data owners. Therefore, the focus of pilots should not be limited to the business case and technical approach, but also on trialling new governance models and organisational changes.
- **Standardise and improve metadata catalogues.** More needs to be done in standardising and increasing the quality of data and service descriptions to help prospective use case participants build an investment case. This is also an opportunity for such catalogue and onboarding services to be developed and provided for data spaces.

- **Avoid the temptation to re-centralise a data space into a conventional data and service platform.** As the first generation of mobility data space pilots are deployed and the IT market matures in providing supporting components and implementation services, consolidating such offerings into a central platform can be viewed as a more familiar and feasible option. However, although data space ecosystems provide common governance (e.g. rules and regulation) and services (e.g. metadata catalogue, clearing house services, etc.), the key differentiating factor of a data space is its decentralised implementation and operation, which enables the core benefits of data sovereignty.
- **Ensure alignment and connection to the relevant NAP(s) as early as possible in the development stages of the mobility data space.** The mobility data that will be available through NAPs to meet the ITS Directive can be invaluable for a large set of use cases. Furthermore, data spaces can help provide usage visibility and quality control to a NAP's data sources, as well as help integrate it into a wider data sharing ecosystem.
- **Follow a comprehensive commercial impact framework based on ROI so the private sector can better-understand the potential financial gains of mobility use cases and create robust investment cases for long-term use case deployment.** This will also help track and measure the impact of the services developed, piloted or improved through mobility use cases. In turn, this impact data can and should be advertised through the data space to attract further investment in scaling up the use cases or generating new use cases based on the successes. While pilot and live mobility use cases are most likely already generating some form of measurable impact, there is currently very limited (if any) evidence in the public domain of use cases actually delivering this.
- **Develop a roadmap for future service offerings and pricing options that incentivise private sector participation.** For example, offering a PAYG service to new entrants who have asymmetric information on potential use cases. It is important to improve and expand the service offering within the available solutions and architectures beyond the basic CaaS model. This can include services such as data catalogues, app/service marketplaces, independent data quality audits, use case validation and matchmaking services among others that generate value-add for incumbent and prospective use case participants. Initial examples, such as Cofinity-X, a joint venture to bring marketplace and onboarding services to the automotive data space Catena-X, or the metadata catalogues of the German *Mobility Data Space* and Eona-X are early examples. Best practices in multifaceted marketplaces will apply. The role of AI in streamlining these services should also be explored further.
- **Account for the integration and interoperability of existing mobility data repositories and legacy systems with the new data space architectures.** This has the potential to lower the investment barriers to entry significantly for both businesses and cities that store high quality mobility data in older data management systems and are looking to join a mobility data space. CaaS models and other approaches can facilitate this onboarding.

Further recommendations for cities and regions

In cities, an effective mobility data space will bring structure and transparency in understanding the behaviour and needs of citizens. This data forms the foundation for more efficient mobility models such as Mobility as a Service (MaaS) and smart logistics, which have so far seen their progress inhibited by fragmented data sharing between value chain actors in the mobility sector. In addition to the aforementioned recommendations, to accelerate the deployment of mobility use cases and data spaces, cities can:

- Integrate mobility data spaces with advanced digital twins of the city to maximise the potential impact of both technologies.** Data spaces are the connection between real-world data sources (input), digital twins, and a market of mobility solutions and services (output). Mobility, logistics and infrastructure data can be channelled and updated through the data space to continually refine the digital twin and predictive models. This circular data flow will drive continuous improvement in the accuracy of digital infrastructures of cities, streamline the planning and execution of urban mobility projects and maximise their positive impact on citizens.

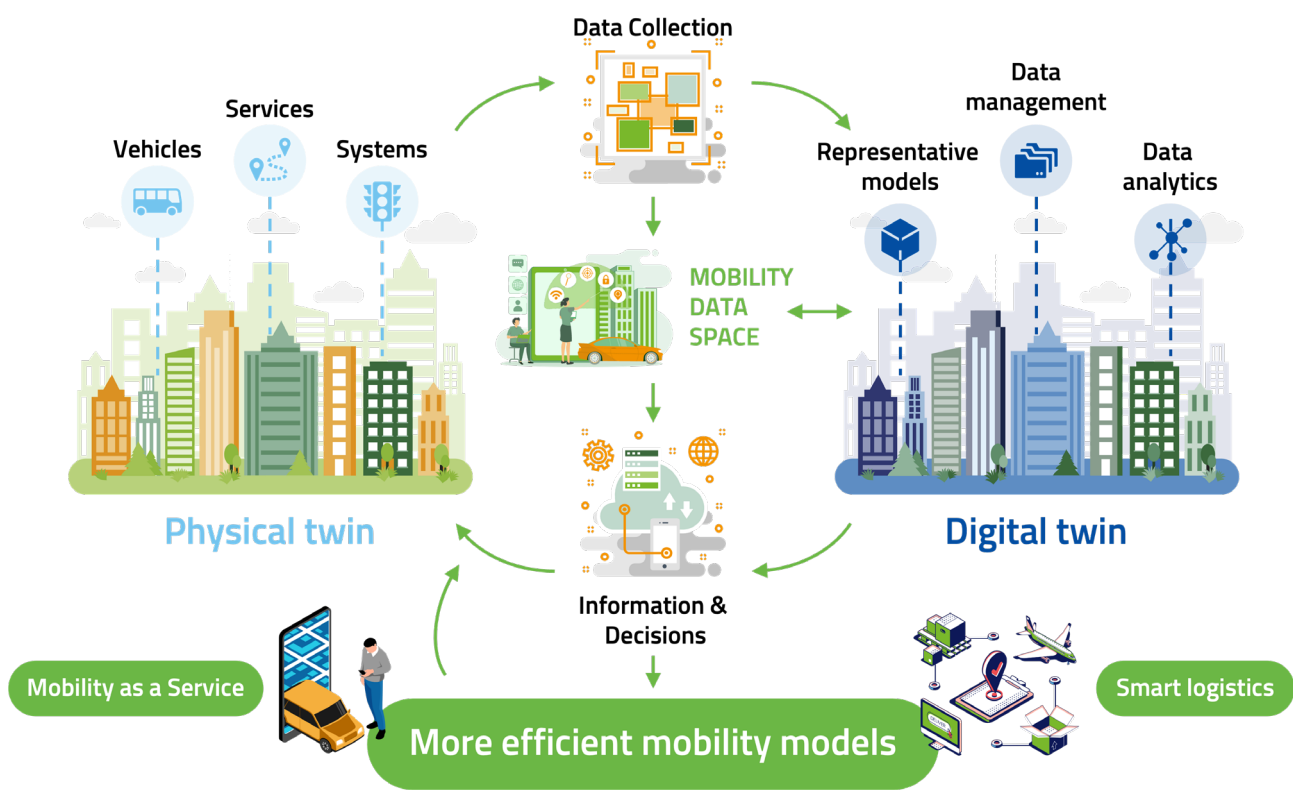


Figure 2: Conceptual model of a 'Smart City mobility data space'

- **Define the roles and responsibilities of the municipality departments, PTAs and PTOs in implementing mobility data spaces and use cases.** Each city will have a unique combination of private and publicly owned transport services, therefore the public sector should take a leading role in mapping the stakeholders involved to create a city mobility data space ecosystem and governance framework. This exercise can help identify the public-private partnerships that are needed to ensure an active role from the private sector, and define which entities are best positioned to act as neutral agents in the governance of mobility data spaces.
- **Learn from the open data community.** On the city and regional level, public administrations responsible for open data have extensive experience in data publishing, metadata management, data quality, dataset discovery and data federation, as well as standards and technologies. They can provide a source of good practices for ensuring quality and veracity of data in a wider data governance.
- **Leverage the LCA methodology to measure potential and real emission displacement from modal shifts as a result of new and improved mobility and logistics services resulting from mobility data space use cases.** Fostering a greater data flow to enable and better monitor more sustainable mobility modes can be a driver for implementing data spaces. A digital LCA methodology can also be connected with the digital twin and mobility data space to visualise use cases and their impact, even as a decision-support tool.
- **Invest in bottom-up regional and city efforts to evolve existing data exchange assets and help local private and public sector stakeholders understand the transformative nature of data spaces** (e.g. data usage control, new governance models and traceability in the value chain) including use case co-design, demonstrator development and more. Another key part of this is to support the integration of complementary mobility and logistics data exchanges that already exist as commercial offerings, re-focusing existing assets into European standards instead of a costly green-field approach.

A pragmatic transition to data spaces is an iterative evolution of these existing centralised exchanges to the more decentralised approach that the benefits of data spaces are derived from. Such activity can complement continued investment by the EC in programmes such as the Digital Europe Programme to advance the European Mobility Data Space.

These actions will enable cities to take the lead in identifying use cases that can have the greatest impact on citizens and look to incentivise private sector participation, as well as help evolve existing data exchange initiatives towards the European Mobility Data Space vision.

Recommendations relevant to National and European approaches

Member states and the European Commission play a central role in defining and implementing the mobility data space vision. The below recommendations provide some actions to support this:

- Although their role is still evolving across Member States, **NAPs should be included in early mobility data space piloting to evaluate scenarios of such extended data and service ecosystems can help facilitate and extend their function in consolidating and providing static and dynamic data.** The emphasis should be to incentivise the provision of high quality dynamic data within the MMTIS and other delegations, as this is critical to mobility services such as MaaS.
- **Data spaces should be promoted as the technical approach and governance framework to facilitate the implementation of mobility data regulations such as those within the ITS Directive at an operational level for the public and private sector alike.** For example, mobility data spaces can facilitate the implementation of the MDMS initiative's proposed revision to the MMTIS regulation (ITS Directive) to enable the opening of transport ticketing to third parties such as MaaS providers. Mobility data spaces can ensure that this revision will improve the confidence mobility service operators have in opening their ticketing resale to third parties, a game-changer for MaaS business models.
- **Increase coordination efforts between the different member states of the European Union through initiatives such as NAPCORE in terms of implementing the different EC regulations and directives related to NAPs, eFTI and ITS.** This coordination will ensure interoperability between the different national initiatives and facilitate the sharing of best practice and lessons learned to speed up the implementation of the aforementioned European regulations. As transport systems are increasingly interwoven, it is also necessary to increase the interoperability of data coming from different mobility actors and sub-sectors to develop more holistic and innovative services. Different regulations focusing on passenger mobility (ITS Directive) and freight (eFTI) should align on data standards to enable future interoperability in a common mobility data space.
- **Maximise the global impact of mobility data spaces through international collaboration.** While Europe is leading the development of data spaces, it is important to remember that mobility and freight value chains (and supporting data flows) are global. The international expansion of mobility data spaces is the next step in achieving their potential.



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