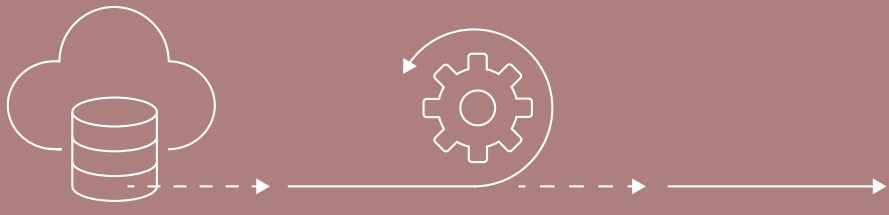
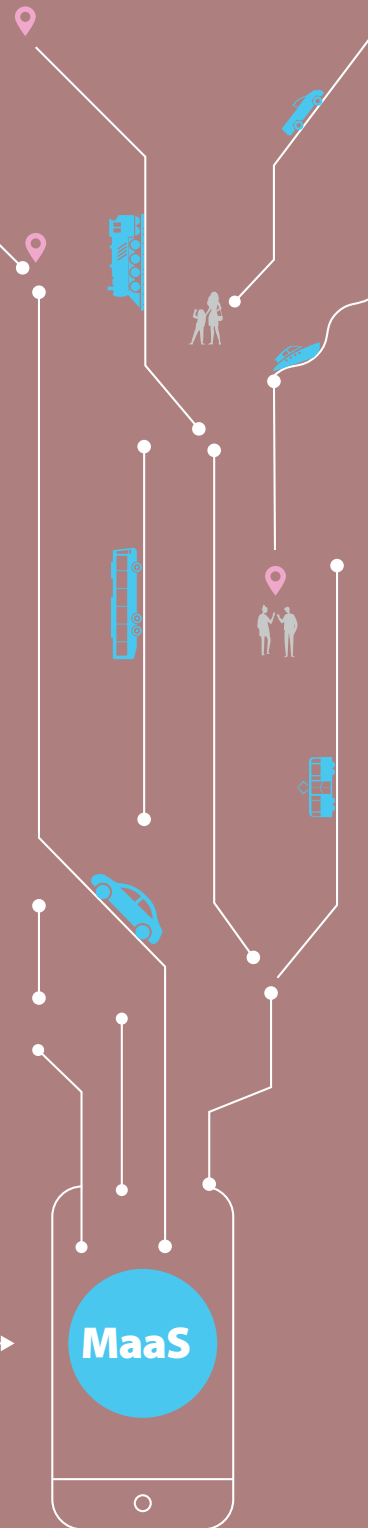


CREATING FRAMEWORK FOR MOBILITY AS A SERVICE (MaaS) IN INDIAN CITIES

URBAN MOBILITY DATA POLICY



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ABOUT THIS REPORT

This report has been prepared as a part of bilateral technical cooperation project “Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)” commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and jointly implemented by Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) GmbH and Ministry of Housing and Urban Affairs (MoHUA), Government of India. The objective of the project is to improve the planning and implementation of sustainable urban transport in selected Indian cities. The project also supports the Green Urban Mobility Partnership (GUMP) between the governments of India and Germany.

Indian cities selected under National Smart Cities Mission are planning, designing, developing, and implementing various urban mobility projects. All these projects, after implementation, produce a huge amount of data. Thus, the management of the mobility data is at centre of increasingly complex urban transport challenges in these cities. The mobility data generated from various sources and in various forms could be used for providing an integrated journey experience to the commuters which is known as ‘Mobility as a Service or MaaS’. Though providing such a service to commuters would require developing standard data collection and management protocols, strong institutional and regulatory framework, interventions related to urban mobility data policies and so on. With this objective in mind, SMART-SUT initiated the study titled “Creating Framework for MaaS in Indian Cities”.

The study aims to explore opportunities for implementing MaaS in Indian cities and identify a structured approach towards developing a smart mobility ecosystem which is required for developing such a solution by leveraging the real value of mobility data. The study outlines a stepwise approach and set of recommendations towards implementing a MaaS solution in the Indian context, a series of reports have been compiled as an output of this study covering various aspects of MaaS. The recommendations from these reports would assist Indian cities embarking on developing various data-driven mobility solutions like MaaS by integrating different transport modes.

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The team is hopeful of the study outcomes being a useful guide for deploying the MaaS ecosystem in Indian context.

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1. BACKGROUND

India is going through a rapid digital transformation in the transport and mobility sector. It is estimated that with the current pace of access to internet-enabled smartphones, the internet user base in the country will rise to 829 million people by 2022. Approximately, 97 percent of the internet users across India have access to internet through mobile devices. The user base for these smartphones is expected to cover almost 60% of the population ¹.

Smartphones with high-speed internet and various sensor technologies can now generate, record and store a high volume of useful data in phones and applications that feed on personal information. While this data can help solve many mobility problems, it builds on a high potential to overlook privacy issues and personal data exploitation, for commercial purposes.

Hence, it is essential to comprehend how this 'smart' transport data is being generated and managed and decide as to which data can be used to develop mobility solutions. Further, mechanisms for data sharing by the government and mobility companies need to be established so that this could be leveraged to provide innovative travel solutions. In this process, it is critical that the privacy of the users must be ensured under the existing legal frameworks.

Mobility as a Service (MaaS) is an emerging smart mobility service that provides access to integrated journey options across different transport modes in a city using a single travel booking and payment platform to its users. With multimodal transport system in the city, MaaS provides commuters with seamless travel options, ascertaining a comfortable journey. The key aspect that enables this solution is the data sharing between different modes and service providers. The study titled "Creating Framework for Mobility as a Service (MaaS) in Indian Cities" aims to identify measures that are required for developing a MaaS solution. The objective of the study is :

- To develop a framework for an effective implementation of "Mobility as a Service (MaaS)" in Indian cities.

- To recommend the requisite data and system specifications for implementing MaaS in Indian cities.
- To design an effective policy and a regulatory framework by contextualizing issues related to data sharing in India.
- To develop a capacity-building toolkit for a better understanding of MaaS and facilitating the decision-making process for its successful implementation in Indian cities

Following reports have been compiled and documented* as an output of this study covering various aspects of MaaS :

- i. Basics of MaaS and Learnings from Global Case Studies
- ii. MaaS Readiness Tool
- iii. Urban Mobility Data Policy**
- iv. Mobility Data Standards and Specifications
- v. Legal and Regulatory Framework
- vi. System Architecture and Technical Requirements
- vii. Reference 'Scope of Work' Document for MaaS Project

This report focuses on outlining an open mobility data policy to facilitate smart mobility solutions in urban areas. It identifies the key issues related to mobility data management in cities and recommends specific policy measures to foster data standardization, data storage, data retrieval and data sharing in a collaborative manner.

2. IMPORTANCE OF MOBILITY DATA

Transport data is crucial to help plan, operate and monitor the services delivered. Considering multidimensionality of transport and its relationship with landuse, intensity of development, environment, energy, safety, variety of datasets from different sources is required. Effective and timely access to data helps in understanding the transportation system as well as socio-economic and travel characteristics and choices of users. The traditional method of data collection is

¹ <https://icea.org.in/wp-content/uploads/2020/07/Contribution-of-Smartphones-to-Digital-Governance-in-India-09072020.pdf>

*All the reports can be accessed via <https://www.maastoolkit.org/> which has been developed as a web-based capacity building toolkit and an open source knowledge resource for all the stakeholders and government agencies planning to implement MaaS in Indian cities.

undertaking extensive surveys – road inventory, household surveys, road side interviews, traffic volume counts, speed surveys, etc. for every new transportation study or plan preparation. Most of the data collected in such manner is used for the respective studies and are not available for any subsequent study. This leads to multiplication of efforts and repetitive costs of data collection.

Urban mobility is now going through a phase of digital transformation. Recent advancements in traffic management and sensors, automatic vehicle location systems, junction cameras, tracking devices, smart cards, etc., have created the opportunity to generate diverse datasets. This mobility data, if collected and processed in a systematic manner, could reveal meaningful insights and provide policy directions to city administrators.

Analysis of this data can improve understanding of system performance and passenger travel patterns. This wealth of data is yet to be effectively leveraged to provide inputs to strategic network decisions, operational inputs and any other interventions which could be planned across different agencies. (figure 1)

3. BENEFITS OF MOBILITY DATA SHARING

The processed and analysed data can help transport authorities to better manage transport systems, monitor the system operations and analyse performance trends. This may also aid in bringing transparency and accountability in the operations. Data sharing between transport providers, operators is crucial for planning of integrated transport services. Data on service

provision can also be shared with the user groups to assist them in their travel choices. In many cases, data sharing with innovators and analysts have led to creation of mobility solutions for users and transport agencies while generating business opportunities for the digital sector.

Data sharing is mostly done through Open Data Platforms (ODP) from where data can be accessed by different agencies or user groups. The open data platform is a data dissemination platform hosted on the “cloud or server” which includes data dashboard along with download features and state-of-the-art visualization. Opening up of data is expected to have the following benefits:

- i. **Building transparency and accountability:** Presenting the transport statistics in the public domain would build transparency into the transport facilities and services provided, and further help create accountability for the service delivery.
- ii. **Availability of accurate and high-quality data:** Technological applications in transport has opened up possibilities for accessing and analysing enormous amounts of data which are detailed, high quality and accurate. Data sharing can reduce duplication in collecting information by other agencies and save costs.
- iii. **Facilitating innovations and employment in the digital sector:** The present status of technical capabilities, resources and infrastructure availability, and the giant gap in the knowledge base for data analytics constrains the ability of public agencies to use mobility data efficiently for better decision making. Data sharing and openly available datasets can encourage

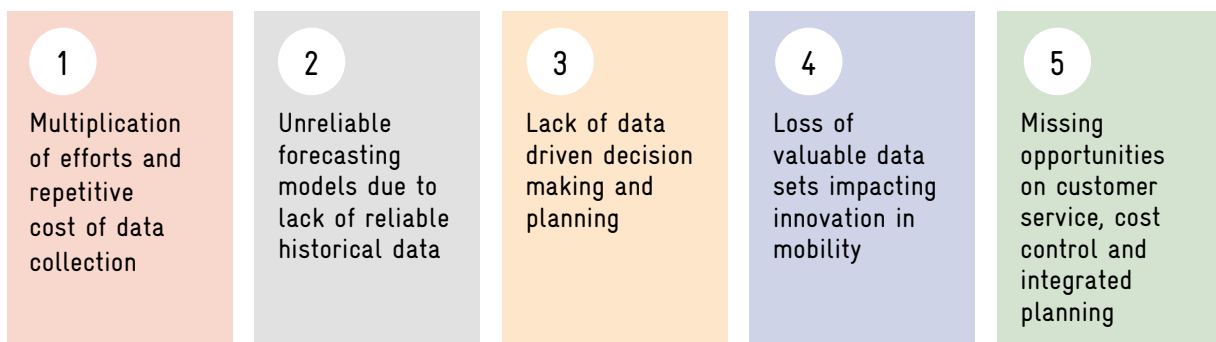


Figure 1: Data Challenges

collaboration among public and private mobility service providers and third-party operators to develop online platforms and/or applications for data collection and storage while promoting innovative mobility solutions. The involvement of independent developers can also lead to employment opportunities.

- iv. Improved travel experience for commuters: Journey planners and route guidance applications using accurate and real-time data feeds can provide information to the commuters' to better plan their travel with reduced travel time. Customised travel alerts during incidents or routine maintenance can also help commuters to pre-plan deviations in their travel. Solutions like 'Mobility as a Service' can also be developed based on the level of data shared, enabling booking options for end-to-end journey through smartphone applications.
- v. Evidence-based policymaking: Mobility data sharing can prove beneficial to the cities beyond the long term planning exercises. Transportation planners can use the shared data to improve public transport ridership, extend the provision of last-mile connectivity, and integrate active mobility in commuting journeys. Access to open mobility data can lead to altered and improved decision-making in aligning the transportation network with the city's urban fabric.
- vi. Aids in planning during emergencies: Open data also helps plan for services during incidents or emergencies like the COVID-19 pandemic and disaster management. Provisioning more responsive services and information on crowding levels help commuters make more informed decisions while selecting travel options.

There are numerous cases worldwide where data sharing and analytics have succeeded in providing better mobility services. Leveraging the data generated and its availability on an open data platform has enabled major disruptive businesses to emerge globally. Open data platform for mobility shares the customer information for public transport and individual mobility, it also allows the customers to view mobility data free of charge and access various

services. The data published on the open data platform is prepared for developers which can be reused for developing solutions. All the data shared on the open data platform is in machine-readable version. Indian cities, however, are still in the initial stage of development of data sharing ecosystem.²

What can data sharing facilitate?

- Analysis of the shared data can contribute to improved decision-making
- Data sharing can facilitate collaboration between operators and transport providers for offering integrated transportation services
- This can allow transparency between services and users in order to provide innovative solutions like Mobility as a Service with connected, monitored, and improved performance
- It can help in generating new business opportunities for innovators and support authorities in their efforts to resolve mobility challenges.



4 DATA SHARING INITIATIVES IN INDIA

The Government of India introduced the National Data Sharing and Accessibility Policy (NDSAP) in 2012. The policy focused on providing open access to non-sensitive government datasets, documents, tools, and applications collected by various ministries, departments, and organisations. The data is hosted on the government portal (data.gov) by National Informatics Centre. This has helped in creating a central open database for different agencies.

Under the Smart Cities Mission, several initiatives on creating data ecosystem, data sharing and exchange in cities have been taken (figure 2). An open data portal has been created on which 100 smart cities are publishing their data.

Most of the transportation data shared under these

² Sustainable Mobility: Policy Making for Data Sharing, SUM4ALL

DATA SMART CITIES STRATEGY	DATA MATURITY ASSESSMENT FRAMEWORK	SMART CITIES OPEN DATA PORTAL	INDIA URBAN DATA EXCHANGE(IUDX)
To help unleash potential of data for cities	Enable cities to evaluate their data ecosystems and assess data maturity with respect to a standardized framework	100 smart cities on a national open data portal where they can publish data regarding their cities in public domain	To enable cities and users to exchange data in real time
Lays down basic premise/foundation of people, process and platform	5 components (policy, people, process, technology and outcomes) and 26 indicators.	To promote data driven governance, engagement, innovation, reasearch etc.	Enable data exchange between various city departments, government agencies, citizens and private sector
Roadmap for use of data to tackle complex urban issues	Assesses how capable are cities at handling data.	Make the right data available to the right people at the right time to build solutions.	Open, neutral and secure platform facilitate its easy adoption across the digital ecosystem

Figure 2: Smart Cities Mission Initiatives

two initiatives are aggregate statistics. While this is useful for analysing the overall status and trends of mobility, it does not provide detailed insights on the transportation sector and its performance.

One of the reasons for limited sharing of datasets is the lack of clarity on what data is relevant and what data is sensitive and hence needs to be protected. The other challenge is the technical competencies of the public agencies in handling enormous amount of datasets. With the application of smart tools in transportation, plethora of information is getting generated at city level. Before sharing such vast amount of city level data, it would have to be cleaned, stored, classified, structured in a standardised format and anonymised as some of the data may also include personal information³. Thus, utilisation of open data requires advanced analytical capabilities, high-end IT infrastructure, and heavy financial investments. The transport agencies are constrained on these accounts hindering optimal usage of the datasets .

Furthermore, the private data owners, to benefit from a competitive advantage are not keen on sharing their data. This leads to the datasets

staying in respective repositories with significant untapped potential. Absence of a standardized format leads to a lack of interoperability further limiting the data usage.

A guidance document on urban mobility data and its sharing would thus be useful for cities to fully leverage the data to address complex urban transport challenges and provide better services to city residents. This policy document therefore presents an outline for urban mobility data policy which can help raise awareness on data sharing.

5 URBAN MOBILITY DATA POLICY - OBJECTIVES

The urban mobility data policy framework aims to present guidelines to facilitate sharing of transportation data collected by the public and private agencies in a standardized machine-readable format ensuring privacy of travelers is protected.

City authorities need data on movement of people for designing of the transportation systems based on the commuter travel patterns and developing

³ The Personal Data Protection Bill, 2019 (“PDPB”) was introduced in Lok Sabha on December 11, 2019. The purpose of this Bill is to provide protection of privacy of individuals relating to their Personal Data and to establish a Data Protection Authority of India for the said purposes and the matters concerning the personal data of an individual.



Figure 3 Four Principles for Data Management in Mobility Sector

strategic transportation plans. The private operators use the data collected for monitoring and optimising their services. They are not keen on sharing of this information with the public agencies as they feel that they would lose their competitive advantage. The third stakeholder is the citizen whose concern is free movement without any undue surveillance. The urban mobility data framework should address these concerns and facilitate seamless data sharing for aiding transport system planning, operations and monitoring decisions.

A report from National Association of City Transportation Officials (NACTO)⁴, USA sets out four principles for city agencies and private sector partners to share, protect, and manage data to meet transportation planning and regulatory goals in a secure and appropriate manner.

These principles are:

- i. Data provides necessary information for understanding the transport system and the travel patterns and hence is a public good.
- ii. Smart data collected also contains geo-spatial locations of travelers which could be linked to personal information. Such data should be handled in accordance with the existing privacy policies and regulations.
- iii. For data sharing, it is desired that there is clarity on the datasets captured and their utility. Not all data is important, hence clarity on what analysis is required for transport system planning, management is necessary for identifying data required.
- iv. Data sharing should be convenient and for this the data standards and formats

should not be restrictive. Development of proprietary tools or formats may be restrictive and constrain data sharing as new vendors come in. Data portability is hence important.

Considering the above, the policy objectives for mobility data policy are listed below:

Objectives of Mobility Data Policy

- i) To help create a framework that can foster the data standardization, data storage, data retrieval and data sharing in an urban area
- ii) Enabling public, private, and other third-party operators to access the shared mobility data while ensuring data protection and ethical usage
- iii) Identifying the roles and responsibilities of different parties in data sharing and management along with those concerning physical and digital infrastructure for data resources and data flow
- iv) Defining a structured standard for interoperable data format creation, development and adoption by different stakeholders

6. POLICY FRAMEWORK

Cross-sector collaboration between government organisations and private sector providers can add value to the data and make way for better policy designs and enhanced public services. Based on the principles and objectives defined above, a policy framework has been outlined. This open mobility data policy framework would be of relevance for different public and private

⁴ <https://nacto.org/>

agencies in urban areas dealing with transport facilities and services.

The proposed policy framework is developed across *nine policy pillars* and specific policy instruments within each of these pillars are identified.

6.1 DATA COVERAGE

A wide range of data is available in public domain which would be useful in planning, design, operations and monitoring of the transport services. Apart from this, mobility data from the other service providers like the IPT drivers, aggregator cabs and other micro-mobility players include travel information (origin, destination, path of travel and also traveller details) of the commuters.

The first step is to define the objective of data collection rather than just collecting and collating huge volumes of datasets from different sources. The data standards and specifications would also depend on the purpose for which the data is being collected and analysed. For example, for development of a MaaS platform in a city, information on services (static details like routes, fares, schedules as well as real-time service details) would be required. To ensure interoperability of data, data standards should be set out so that information from multiple service providers could be processed easily.

Owing to the multiple agencies handling different transport services, the datasets are currently not shared across agencies. Also, the data collected by private market players are

in private domain. The data coverage should take into account all datasets which would be useful for the defined objectives and purpose. Currently, public agencies do not have any regulatory authority over data available with private transport service providers. This would mean developing mechanisms for ensuring data sharing not only by the public agencies and but also by the private transport service providers.

Data coverage policy area should answer the following questions

- i) In the content of the subject city, what data needs to be collected?
- ii) What should be the data format and data collection standard that needs be followed ?
- iii) What data should be put on the open data platform and by whom?

6.2 REGULATION AND ACCOUNTABILITY

One of the important policy areas is to outline the regulatory mechanism for data sharing and fix accountability. This is crucial as the policy is regarding the personal data usage.

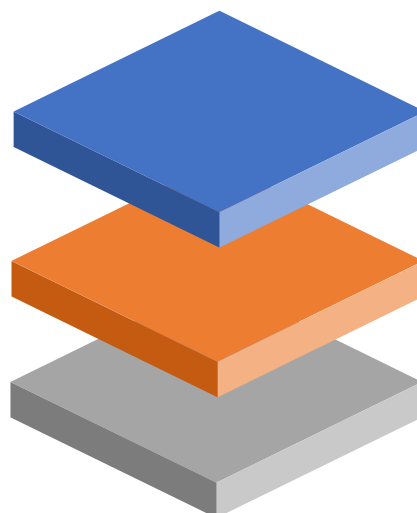
Government authorities have a larger role to play including formulating the strategic vision and objectives, delegating authorities, defining roles and responsibilities of various stakeholders, and providing oversight and transparency into the execution of the strategy to represent the

DATA COVERAGE

- 1. Data Typology
- 2. Data Standards
- 3. Data Access

INSTITUTION AND GOVERNANCE

- 7. Nodal Agency
- 8. Funding and Resources
- 9. Citizen Engagement



REGULATION AND ACCOUNTABILITY

- 4. Data Privacy
- 5. Data Protection
- 6. Data Sharing

Figure 4 Proposed Policy Framework

interests of all stakeholders effectively. Within the mobility data sharing initiative, the city government/nodal agency should be responsible for decisions ranging from data provisions and rules of accessibility to types of data standards used, and as to which stakeholders can be involved.

Datasets such as travel records may also have personally identifiable information attached, hence utmost care for anonymising the datasets as well as restricting access to any such information should be undertaken.

Regulation and policy areas should answer the following questions.

- i) How should data privacy be ensured ?
- ii) Who should be responsible for data protection and safe data storage ?
- iii) What should be the mechanism of data sharing and how should accountability be fixed for someone who receives the data?

6.3 INSTITUTION AND GOVERNANCE

Extensive amounts of mobility data is collected on a regular basis which could be extremely useful for service improvements, strategic and policy planning. Lack of understanding of how the data could be leveraged for decision making or in some cases absence of appropriate data sharing framework, respective institutions do not share data. When shared on an open data portal, within the framework of a secured data

Institution and governance policy areas should answer the following questions.

- i) Which agency should be designated as the nodal agency for mobility data management?
- ii) How should the findings and other resources be mobilized in order to manage a complex and sensitive database in a secured environment?
- iii) How can one ensure citizen's engagement in managing data that may include their personal information?

sharing policy, availability of datasets have led to generation of mobility solutions.

Since data in transportation domain pertains to individual and transport service providers, it is important to designate a public organization to be responsible as data custodian and data principal.

7 POLICY MEASURES

7.1 DATA TYPOLOGY

Different types of mobility datasets are collected by public and private agencies at an urban level. Identification of data which should be shared across agencies should be based on requirements for strategic planning, operations planning, transport management and monitoring purposes. In addition, data for improving information provision for commuters including static service information as well as real-time service details should also be included.

The urban transport data collected by different agencies in the cities can be categorised as:

- i. Non-transport data for strategic transport planning
- ii. Spatial data on transport infrastructure and services
- iii. Transport-related aggregate datasets and statistics
- iv. Mobility data collected through the technology applications providing a real-time feed

The details of some of these datasets that can be collected are presented below:

Ministry of Housing and Urban Affairs, Government of India has introduced a common mobility payment card called National Common Mobility Card (NCMC). The NCMC is an inter-operable transport card that enables the user to pay for travel, toll duties (toll tax) etc., in addition to using it for retail shopping and withdrawing money. This single payment digital channel captures valuable demographic and movement patterns of commuters. This data can be useful for service planning, however personal data would have to be protected.

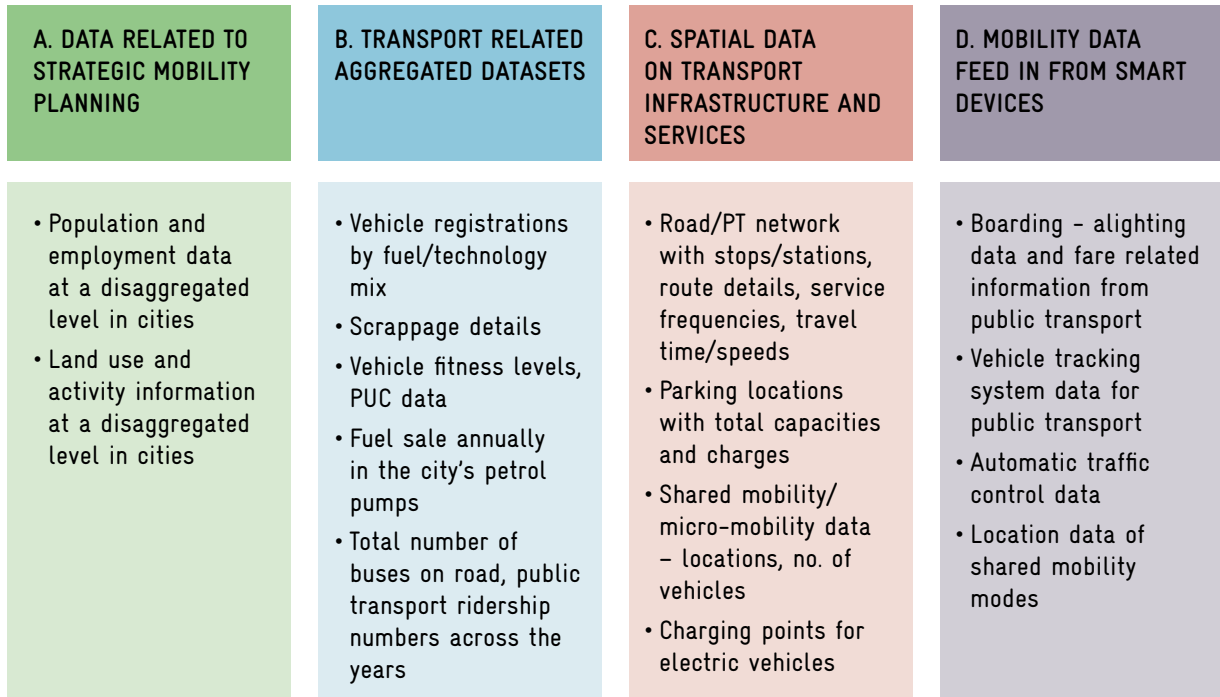


Figure 5: Types of Urban Transport Data

The policy interventions associated with the data typology is listed in the following box.

Policy Intervention: Data Typology

- The data pertaining to mobility or other related aspects like land use, activity patterns, etc., which influence mobility, need to be collected and stored in a single platform. The data that gets collected as part of any project should be mandatorily stored in the specified format for sharing.
- Data and information related to static data like infrastructure details, spatial data related to transport infrastructure and dynamic information through real-time feeds, e.g., vehicle locations, system usage etc. should be collected and shared through an open data platform.
- Cities should introduce 'National Common Mobility Card' for use on all public transport, including autos, taxis and ride sharing services. Card issuing authorities should share the travel related data with city authorities within the required privacy provisions.

- Data should be segmented or aggregated before addition to the dataset to avoid issuing any Personally Identifiable Information (PII).

7.2 DATA STANDARDS

For open data sharing, it is important that the data is available to the widest range of users for the widest range of purposes. This would require releasing information in standardized formats which are machine readable.

Transportation related datasets are generated from diverse sources which may require collation and storage on an open data portal or access could also be provided through open APIs⁵. Cities need to coordinate to create or adopt standardized, open data formats that level the playing field between companies and transportation providers by making expectations about information sharing and management more consistent and predictable across cities. Standards such as the 'Mobility Data Specification'⁶ can be referred to as the reference point to customise as per local requirements.

⁵ An API (Application Programming Interface) is a software intermediary that makes it possible for application programs to interact with each other and share data

⁶ <https://www.openmobilityfoundation.org/>

Policy Intervention: Data Standards

- The data would need to be put in standardized machine-readable data formats for interoperability.
- Cities need to coordinate to create or adopt standardized and open data formats.
- Standards such as the '*Mobility Data Specification*' and some standard data specifications are available, like General Transit Feed Specification (GTFS) part of Google Transit APIs and General Bikeshare Feed Specification (GBFS) developed by North America Bikeshare Association (NABSA), which could be adopted and used as a reference case.
- Cities should encourage use of APIs to share data, through development of standard APIs.

The data would need to be put in standardized machine-readable data formats for interoperability. Open data standards help cities and private companies to share data in universal formats, enabling cities to use data from multiple sources and support innovation in both public and private sectors. Some standard data specifications are available, for e.g., GTFS and GBFS, which could be adopted; for others, the data specifications would have to be designed. Adoption of standard specifications would lead to data generation in uniform formats to facilitate interoperability across datasets.

7.3 DATA ACCESS

Data sharing would need to be incentivised for better access to the available diverse databases. Private operators, especially, will need attention as they are wary of sharing the revenue information and losing the competitiveness by sharing the travel information of the commuters. While maximum data should be provided as open-access, agencies may restrict access to certain information in order to safeguard business interests or privacy concerns. Licenses and contractual agreements specifying conditions of usage and sharing remain mandatory in the data sharing process. The data may, thus, be provided either as 'open-access' or 'restricted access'.

Policy Intervention: Data Access

- **Open data access:** This would not require any authorisation and would be available through open APIs. The users may be required to register for accessing the data. The available datasets may include vehicle fleet size, trip frequencies and routes, information on journey, stops/stations and transit interchange zones.
- **Restricted data access:** Data sets under this category could be accessed for research purposes and/or for preparation of specific city-level studies/mobility plans etc. and shall require authorisation from the respective agency. Individual journey traces, ticketing, live location, and other such data may contain personal information and should not be publicly available. However, the related journey aspects remain integral to mobility services and therefore, such data can be shared for research and collaborative purposes after it has been anonymized.

7.4 DATA PRIVACY

While cities had, historically, held and managed information that was believed to be personally identifiable and sensitive, the volume of mobility data with geospatial characteristics that can now be gathered, combined, and analyzed, is unprecedented. To protect the people they serve, cities should ensure that their policies and practices are updated to treat geospatial trip data as Personally Identifiable Information (PII) and that private operators follow efficient practices to protect the privacy of their customers.

Detailed data collected and shared by the operator should be anonymised, filtered, and segregated according to the defined data specification.

The responsibility for protecting privacy does not end with the public sector. In addition, as part of the terms for operating a business in the public right-of-way, private companies should act as responsible stewards and protectors of the data they gather. For example, companies could commit to retaining individual trip level data only for the duration of time that is necessary to carry out the legitimate mobility-

related purposes of cities and private-sector partners.

Third-party data aggregators can help provide oversight and accountability in data use, storage and sharing and ensure data privacy. Thus, involvement of third-party data aggregators can be considered and they could act as a neutral intermediary engaging with public and private stakeholders to represent their best interests while preserving the privacy of individuals.

Individual trip information shall focus on the most common routes and transport modes without tracing step to step movements, and access to anonymised data shall have to be synchronized as per the government guidelines to protect individual privacy. Abiding by the government guidelines it should be ensured that data sharing is ethical, inclusive, and unbiased.

Government of India has introduced the Personal Data Protection Bill, 2019⁷. Any MaaS development and deployment shall be based on the latest bill and should comply with the 'Seven Intended Principles' as laid down in the bill and shown below:

- i. **Technology Agnosticism:** Any solution to be technology neutral and interoperable with various technology.
- ii. **Holistic Application:** The legal framework shall be equally applicable to all its stakeholders irrespective of what degree of participation each one is having or whether they are public or private participant.
- iii. **Informed Consent:** Consent is an expression of human acceptance, for such consent expression to be genuine, it must be informed and meaningful. Any legal framework on data privacy must ensure that consent meets the aforementioned criteria.
- iv. **Localisation of Data:** Data localisation requires companies to store and process data on servers physically located within national borders.
- v. **Controller Accountability:** The service provider to appoint a fiduciary that can ensure transparency as well as accountability

while collecting and disseminating personal data. Fiduciary shall, from time to time, be responsible to give notices and inform the both users as well as service providers on their rights in a transparent manner with respect to the laws framed

- vi. **Structure enforcement:** Enforcement of the data protection framework must be by a high-powered statutory authority with sufficient capacity. This must coexist with appropriately decentralised enforcement mechanisms
- vii. **Deterrent Penalties:** Penalties on wrongful processing must be adequate to ensure deterrence and any technology solution to provide for penalties in case of data security breach.

These principles should be followed while the mobility data is made available on an open data portal.

Considering the above, the policy interventions are as follows:

Policy Intervention: Data Privacy

- Treat geospatial mobility data as Personally Identifiable Information (PII) and it should be gathered, held, stored, and released in accordance with the standard policies and practices for PII.
- Develop or update protocols for how such data is handled, stored and protected. Such protocols should include policies for handling public disclosure requests that recognize the private nature of mobility data.
- As the technology advances, authorities should ensure that data policies and practices are routinely updated.
- Ensure that transport service providers and other vendors follow mobility data standards and data privacy laws.
- MaaS deployment and development shall be based on the Personal Data Protection Bill, 2019 and comply with the 'Seven Intended Principles' as laid down in the bill.

⁷ http://164.100.47.4/BillsTexts/LSBillTexts/Asintroduced/373_2019_IS_Eng.pdf

7.5 DATA PROTECTION

The collection and sharing of mobility data are prone to risks and vulnerable to misuse. therefore, it is essential to create data sharing models and protocols that are transparent and aligned with community expectations regarding correct and proper use.

It is essential to protect mobility data from any potential threat of misuse. Even when anonymised, mobility data can be easily traced back to individual users if precautions are not undertaken to manage and aggregate data appropriately. There is a need to develop robust frameworks in order to maintain individual privacy and to ensure that data is appropriately stored, accessed, aggregated, and protected.

Further, while the Personal Data Protection Bill is to be abided by, it is crucial to determine a process for filtering, anonymizing, and sharing the datasets in the public domain, and clearly defined compliance mechanisms.

Policy Intervention: Data Protection

- Follow the provisions under the Personal Data Protection Bill, 2019 and comply with the 'Seven Intended Principles' as laid down in the bill.
- Cities should develop policies, regulations and provide agreements for ensuring that mobility data is appropriately handled, used, stored, accessed, and disseminated.
- Set limit on the amount of time the individual trip records are held and delete individual records once the time window has passed. Never allow individual trip records to be saved outside of a secure database.
- Aggregate all geospatial data before committing it to permanent storage.
- Require companies and contractors to abide by industry best practices for retention and storage of records.
- Employ, regulate, and enforce IT best practices to monitor individual trip records/ sensitive data.

7.6 DATA SHARING

Data sharing and access should be through a contractual agreement. In order to access the open data, the user has to accept the terms of use that are clearly mentioned in simple English and local language. Most commonly used license provisions⁸ prevalent in case of mobility data sharing⁹ in matured markets can be used as a reference document while drafting the local terms of use for data access.

The open-access data could be shared through an open API, while the restricted access data could be shared through a separate and restricted login. Policy mechanisms would have to be put in place for data sharing between public and private- sector service providers and third-party operators.

Policy Intervention: Data Sharing

- The open-access data should be shared through an open API, while the restricted access data could be shared through a separate and restricted login.
- Data sharing should be through a well-defined contractual agreement with terms of use, liabilities, roles and responsibilities clearly identified.
- Data should only be shared publicly in an aggregate form.
- Cities should preserve the right to share data with researchers and other stakeholders for uses in the public interest, provided that the receiving party commit to follow industry best practices for data storage, access, and retention.

7.7 NODAL AGENCY

Private transport service providers are likely to require reasoning, trust, and incentives to share their datasets into the open database. Since the government is more likely to act in favour of the public than a private operator whose objective is to maximise personal gain, it is only sensible for the city government to handle and manage the data.

⁸ <https://www.vianova.io/blog/practical-guide-to-mobility-data-sharing-and-personal-privacy-under-gdpr-ruling>

⁹ https://cao-94612.s3.amazonaws.com/documents/DataSharing_Anticipated-Impact-Report_DRAFT_5-31.pdf

The flow of data can be managed through data collection and storage policies. Under the Smart Cities Mission initiatives like data smart cities and city data policy have been instrumental in suggesting a framework for city level open data policy. As suggested by MoHUA under the above two policies, it is proposed that a designated data sharing cell specifically for transport data is formed at city level under either the Ministry of Road Transport and Highways or Ministry of Housing and Urban Affairs for mobility data sharing framework development.

The primary responsibility of the designated cell shall be to decide upon the standards and regulations for mobility data collection, sharing, and storage, maintenance and control of the data flow, usage, and circulation.

As suggested under the data smart cities guidelines, city data officer shall act as the data custodian and will develop a City Data Policy (CDP) and work with city leadership to set up a data culture. Active participation of data agencies would have to be ensured for successful data collaboration within the city. At departmental level, Data Champions (DCs) would be designated who would act as trainers and lead the team of data coordinators at the department level.

A smart city data alliance formed under the Smart Cities Mission will provide a collaborative framework to create and define use cases to solve critical city problems through the use of data. It shall also catalyze the right set of collaborations and networks to make available such data and undertake continuous dialogue between various stakeholders. The alliance will undertake education and awareness about data in the community. It shall also understand and address concerns on data privacy and security. The smart city data alliance shall act as a nodal agency to appoint the data controller who has the responsibilities and powers to implement the purpose of Open Mobility Data Sharing Policy.

Regulations of the Personal Data Protection Bill 2019 should be adhered to for data sharing. Gaps in the existing data control structure should be bridged, and liabilities for misconduct should be detailed.

The shared data should also be authenticated and verified for other transfers and

exchanges. Converging the database and creating a platform for interoperable data while protecting the right to privacy of citizens remains the end goal.

Policy Intervention: Nodal Agency

- City data officer to be the custodian of urban mobility data and drive the mobility data policy
- Data champions will be senior functionaries who shall act as trainers and lead the team of data coordinators at the departmental level.
- A designated mobility data cell should be established at city level under a national ministry as a regulator and policy making division.
- A designated smart city data alliance at local level agency can take up data sharing and data management responsibilities at the bottom tier of the city level.
- Designated city level agency should ensure secured data sharing from mobility services operating in the public right-of-way as a default requirement for operating in the public area.

7.8 FUNDING AND RESOURCES

Mobility data collection, storage, retrieval, and sharing require IT infrastructure that includes both hardware and software. Government authority being the data custodian needs to invest in infrastructure for larger public and social goal. Indian cities should leverage on Smart Cities Mission that is being implemented in more than 100 cities. Additionally, a data center is being set up as part of Smart Cities Mission.

It is proposed that mobility data shall be stored and hosted in the data room created under Smart Cities Mission. The funding required to facilitate should be mobilized using public private partnership approach between transport authority and transport service providers.

Transport service providers, currently, manage the data available with them in a highly

secured environment. Through a public private partnership approach data sharing shall be the responsibility of transport service providers and the government should contribute to the required infrastructure.

Cities should also ensure that they are building internal staff capacity to assess and manage data, especially so that they can evaluate the quality of the data they get access to or receive from private vendors. Additionally, cities would need software expertise (e.g., GIS, SQL, Python/R, JavaScript etc.) to handle analysis and should develop capacity through upskilling and reskilling around key skill or expertise areas such as statistics and basic auditing/fraud detection.

Policy Intervention: Funding and Resources

- Government authority as the custodian of the urban mobility data should invest in infrastructure development for storage and sharing of mobility data.
- IT infrastructure developed as part of Indian Smart Cities Mission should be leveraged to host mobility data and it is proposed that this mobility data shall be stored and hosted in the data room created under Smart Cities Mission.
- The funding and resources required should be mobilized using public - private partnership approach between transport authorities and transport service providers whereas transport service providers shall be responsible to share the data with the authority and the authority shall, further, be responsible for storage and hosting in a secured environment.
- Cities should build capacity to assess and manage data, especially so that they can evaluate and manage the quality of the data they receive from private vendors.

7.9 CITIZEN ENGAGEMENT

Mobility is one of the most important aspects of people's lives in urban areas, as it greatly affects the accessibility of the workplace, services, social, recreational activities, etc. That is why there is an understandable increase in

the citizens' interest in being informed and participating in mobility planning processes and in the development of concrete mobility measures.

Citizens are the center to the urban mobility data policy. The data that gets collected and shared as part of this policy is regarding commuter travel pattern and accordingly, there is a need to be aware of their rights and responsibilities under the policy.

Cities need to undertake citizen's consultation process before implementing the urban mobility data policy. Further, users need to show the consent for sharing the data for the larger public welfare. At the same time the authority that is managing the mobility data needs to appoint a data fiduciary to resolve any grievance of transport users. Adequate liability provisions shall be made in case of breach of any data sharing terms.

Policy Intervention: Citizen Engagement

- Citizens being the transport users are the center of the mobility data policy.
- They need to be aware of their rights and responsibilities under the urban mobility data policy.
- Public consultation processes to be conducted before implementing the mobility data policy in the subject city.
- Cities should build capacity to assess and manage data, especially so that they can evaluate the quality of the data they receive from the private vendors. No data can be collected and shared without the consent of the users.
- Cities need to appoint a data fiduciary to resolve any breach of data sharing policy and an adequate penalty and compensation provision should be made.

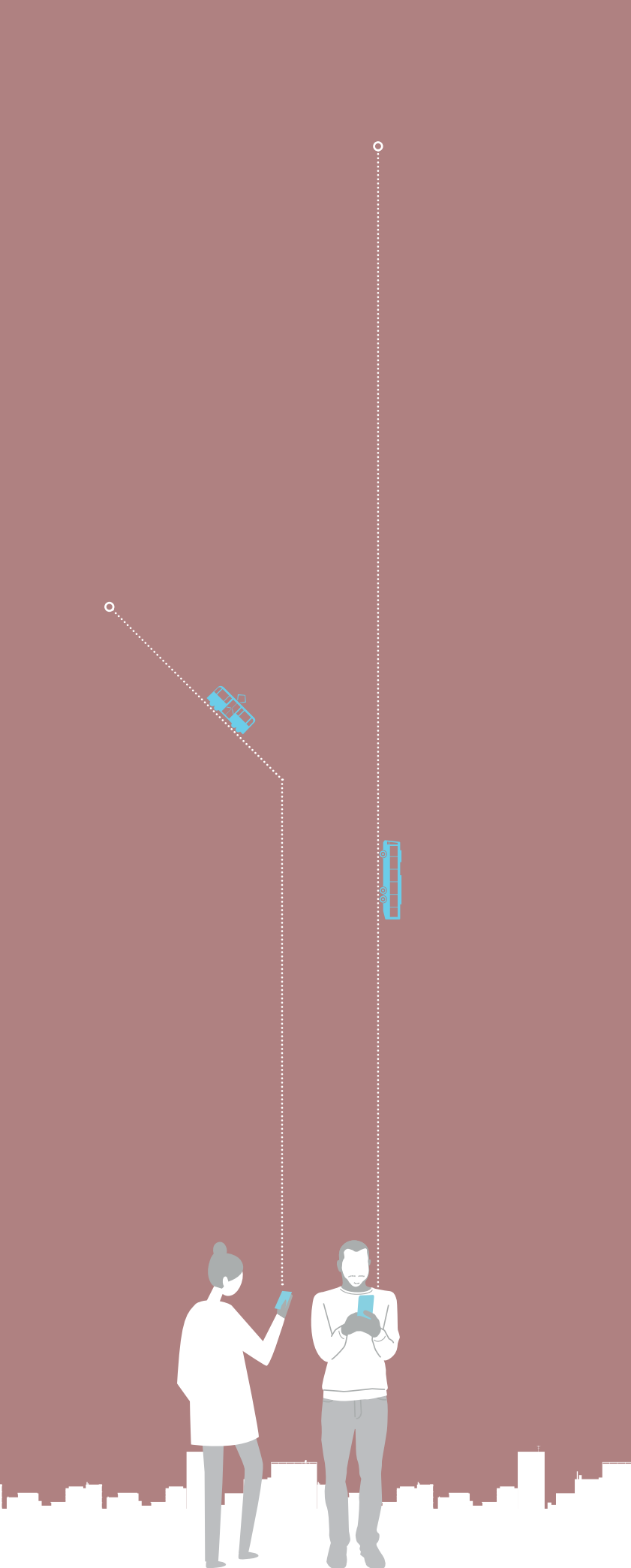
8 SUMMARY

This document presents the outline of the urban mobility data policy. The policy is developed across three policy areas and nine policy pillars. A total of 39 policy recommendations are made across each of the policy pillar and is summarized below:

Table 1: Policy Recommendations

POLICY AREA	POLICY PILLAR	POLICY INTERVENTION
Data Coverage	Data Typology	<ol style="list-style-type: none"> 1. The data pertaining to mobility or other related aspects like land use, activity patterns, etc., which influence mobility, need to be collected and stored on a single platform. The data that gets collected as part of any project should be mandatorily stored in the specified format for sharing. 2. Data and information related to static data like infrastructure details, spatial data related to transport infrastructure and dynamic information through real-time feeds, e.g., vehicle locations, system usage etc. should be collected and shared through an open data platform.
		<ol style="list-style-type: none"> 3. Cities should introduce 'National Common Mobility Card' for use on all public transport, including autos, taxis and ride sharing services. Card issuing authorities should share the travel related data with city authorities within the required privacy provisions. 4. Data should be segmented or aggregated before addition to the dataset to avoid issuing any personally identifiable information (PII) .
	Data Standard	<ol style="list-style-type: none"> 5. The data would need to be put in standardized machine-readable data formats for interoperability. 6. Cities need to coordinate to create or adopt standardized and open data formats. 7. Standards such as the 'Mobility Data Specification' and some standard data specifications are available, like General Transit Feed Specification (GTFS) part of Google Transit APIs and General Bikeshare Feed Specification (GBFS) developed by North America Bikeshare Association (NABSA), which could be adopted and used as a reference case. 8. Cities should encourage use of APIs to share data, through development of standard APIs.
	Data Access	<ol style="list-style-type: none"> 9. Open data access: This would not require any authorisation and would be available through open APIs. The users may be required to register for accessing the data. The available datasets may include vehicle fleet size, trip frequencies and routes, information on journey, stops/ stations and transit interchange zones. 10. Restricted data access: Data sets under this category could be accessed for research purposes and/or for preparation of specific city-level studies/mobility plans etc. and shall require authorisation from the respective agency. Individual journey traces, ticketing, live location, and other such data may contain personal information and should not be publicly available. However, the related journey aspects remain integral to mobility services and therefore, such data can be shared for research and collaborative purposes after it has been anonymized.
Regulation and Accountability	Data Privacy	<ol style="list-style-type: none"> 11. Treat geospatial mobility data as Personally Identifiable Information (PII) and it should be gathered, held, stored, and released in accordance with the standard policies and practices for PII. 12. Develop or update protocols for how such data is handled, stored and protected. Such protocols should include policies for handling public disclosure requests that recognize the private nature of mobility data. 13. As the technology advances, authorities should ensure that data policies and practices are routinely updated. 14. Ensure that transport service providers and other vendors follow mobility data standards and data privacy laws. 15. MaaS deployment and development shall be based on the Personal Data Protection Bill, 2019 and comply with the 'Seven Intended Principles' as laid down in the bill.
	Data Protection	<ol style="list-style-type: none"> 16. Follow the provisions under the Personal Data Protection Bill, 2019 and comply with the 'Seven Intended Principles' as laid down in the bill. 17. Cities should develop policies, regulations and provide agreements for ensuring that mobility data is appropriately handled, used, stored, accessed, and disseminated. 18. Set limit on the amount of time the individual trip records are held and delete individual records once the time window has passed. Never allow individual trip records to be saved outside of a secure database. 19. Aggregate all geospatial data before committing it to permanent storage. 20. Require companies and contractors to abide by industry best practices for retention and storage of records. 21. Employ, regulate, and enforce IT best practices to monitor individual trip records/ sensitive data.
	Data Sharing	<ol style="list-style-type: none"> 22. The open-access data should be shared through an open API, while the restricted access data could be shared through a separate and restricted login.

POLICY AREA	POLICY PILLAR	POLICY INTERVENTION
		<p>23. Data sharing should be through a well-defined contractual agreement with terms of use, liabilities, roles and responsibilities clearly identified.</p> <p>24. Data should only be shared publicly in an aggregate form.</p> <p>25. Cities should preserve the right to share data with researchers and other stakeholders for uses in the public interest, provided that the receiving party commit to follow industry best practices for data storage, access, and retention.</p>
Institution and Governance	Nodal Agency	<p>26. City data officer to be the custodian of urban mobility data and drive the mobility data policy</p> <p>27. Data champions will be senior functionaries who shall act as trainers and lead the team of data coordinators at the departmental level.</p> <p>28. A designated mobility data cell should be established at city level under a national ministry as a regulator and policy making division.</p> <p>29. A designated smart city data alliance at local level agency can take up data sharing and data management responsibilities at the bottom tier of the city level.</p> <p>30. Designated city level agency should ensure secured data sharing from mobility services operating in the public right-of-way as a default requirement for operating in the public area.</p>
	Funding and Resources	<p>31. Government authority as the custodian of the urban mobility data should invest in infrastructure development for storage and sharing of mobility data.</p> <p>32. IT infrastructure developed as part of Indian Smart Cities Mission should be leveraged to host mobility data and it is proposed that this mobility data shall be stored and hosted in the data room created under Smart Cities Mission.</p> <p>33. The funding and resources required should be mobilized using public - private partnership approach between transport authorities and transport service providers whereas transport service providers shall be responsible to share the data with the authority and the authority shall, further, be responsible for storage and hosting in a secured environment.</p> <p>34. Cities should build capacity to assess and manage data, especially so that they can evaluate and manage the quality of the data they receive from private vendors.</p>
	Citizen Engagement	<p>35. Citizens being the transport users are the center of the mobility data policy.</p> <p>36. They need to be aware of their rights and responsibilities under the urban mobility data policy.</p> <p>37. Public consultation processes to be conducted before implementing the mobility data policy in the subject city.</p> <p>38. Cities should build capacity to assess and manage data, especially so that they can evaluate the quality of the data they receive from the private vendors. No data can be collected and shared without the consent of the users.</p> <p>39. Cities need to appoint a data fiduciary to resolve any breach of data sharing policy and an adequate penalty and compensation provision should be made.</p>



Ministry of Housing and Urban Affairs (MoHUA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH are jointly implementing the technical cooperation project "Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)", commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The project works with the three Smart Cities of Bhubaneswar, Coimbatore, and Kochi and respective state governments of Odisha, Tamil Nadu, and Kerala to promote low carbon mobility planning, and to plan and implement sustainable urban transport projects.

As part of the Indo-German bilateral cooperation, both countries have also agreed upon a strategic partnership - Green Urban Mobility Partnership (GUMP) between Ministry of Housing and Urban Affairs (MoHUA) and Federal Ministry for Economic Cooperation and Development (BMZ). Within the framework of partnership's technical and financial cooperation, the German government will support improvements in green urban mobility infrastructure and services, strengthen capacities of national, state, and local institutions to design and implement sustainable, inclusive, and smart mobility solutions in Indian cities. As part of the GUMP partnership, Germany will also be supporting expansion of public transport infrastructure, multimodal integration, low-emission or zero-emission technologies, and promotion of non-motorised transport in India. Through this strategic partnership, India and Germany intend to jointly achieve effective international contributions to fight climate change.