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7

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

REFERENCE 'SCOPE OF WORK" DOCUMENT FOR MaaS PROJECT

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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.

CONTENTS

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 details out the typical 'scope of work' that cities can refer to while planning and implementing a MaaS solution. It describes various tasks that the city authorities can include in the contractor's 'scope of work' while drafting a 'terms of reference' document. These tasks include planning and designing of MaaS system architecture, development and testing of an integrated MaaS platform, deployment and management of the MaaS platform and maintenance and technical support. The city authorities can consider this as a reference document and amend the 'scope of work' as per their actual project scope and requirements.

2 PROJECT INTRODUCTION

As the cities are undertaking several initiatives to shift from private transport to public transport, mobile and data services, as well as other innovative mobility solutions are emerging as prominent facilitators.

With a major thrust on innovation in the public

[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.

transport such as metro, city buses, Bus Rapid Transit system (BRTS) on the one hand, and the evolution of new mobility services (Ola, Uber, etc.) on the other, these changes are challenging the traditional transportation industry with improved flexibility, technology and point to point service. Therefore, mobility patterns have become less predictable with the emergence of new modes and technologies and the increasing heterogeneity of lifestyles. These changes require better and more continuous collection and analytics of travel behavioural data.

In consonance with the National Urban Transport Policy (2006), the Government of India (GoI) initiated a series of measures to enhance sustainable transport systems in the cities. One of the initiatives is the Smart Cities Mission, under which several cities are undertaking integrated sustainable transport projects, together with the application of Intelligent Transport Systems (ITS). All these initiatives lead to the generation of a significant amount of data, which, if analysed correctly, can help provide valuable insights on travel patterns and travel system performance.

A vital subject matter that can be presented using such data is the development and implementation of a *Mobility as a Service (MaaS)* platform that helps integrate all mobility solutions and use the generated data under one platform. This can further enable improvement in mobility and reduced congestion while providing an integrated platform to accommodate all users' mobility needs (including the first mile/last mile).

City authorities need to procure such innovative solutions with these emerging technologies, unlike the typical procurement techniques undertaken in the past. This report outlines a typical scope of work that cities can refer to while planning and implementing a MaaS solution.

The concept of *Mobility as a Service (MaaS)* is relatively new and continuously evolving worldwide. MaaS integrates the services and products of mobility providers and offers them as a single service to users. A user accesses a digital platform that helps them plan trips, make reservations/ bookings and payments for their entire journey from a single interface irrespective of the number and type of modal options they choose. MaaS also provides support on the go and allows trip plan alteration. The payment plans can be in the form of discounted packages or subscription plans that meet the needs of different users. MaaS improves mobility options and can reduce reliance on private vehicles while increasing the acceptance of public transport for the larger part of the journey. Services that support mobility (such as fuel stations, electric vehicle charging stations, parking, etc.) can also be part of MaaS.

The city government of [•] envisages planning and implementing an integrated MaaS platform that provides users with a seamless and user-friendly experience, promoting and supporting more sustainable modes of mobility over private car use. Successful implementation of MaaS will help reduce traffic congestion and provide associated economic, social, and environmental benefits for the users and the city of [•].

3 PROJECT OBJECTIVES

The overall goals from the development and implementation of an integrated MaaS platform include agendas as listed below:

i. To improve and enable multi-modal journeys by reducing complexity in making trips, enhancing connectivity, and improving speed and reliability of the mobility options;

ii. To encourage a change of attitude and behaviour towards greater use of the more sustainable modes of transport, for example, public transport and cycling;

iii. To improve access to public transport for all people by strengthening the conditions of sustainable modes of transport, such that they are flexible and convenient compared to the private car;

iv. To enable efficient, user-friendly, and seamless access to different sustainable mobility options, thereby encouraging sustainable travel patterns;

v. To help reduce traffic growth (and congestion) and parking demand by facilitating mode shift from private cars and single-occupancy vehicle trips to more efficient and shared modes of transport;

vi. To actively engage travellers with the process of planning, using, and paying for mobility services via new digital platforms that provide personalised and context-aware travel and mode related information;

vii. To increase user experience and perceived value of public and shared transport services;

viii. To enable efficient use of transport management tools and resources by managing data exchange with all transport sector operators' and provide solutions for data aggregating and brokerage;

ix. To allow better integration between traditional modes of public transport (such as trains and bus) and potential first-and-last-mile modes of transport (such as intermediate public transport, auto-rickshaw, bike sharing, scooter sharing, car sharing, taxi, ride hailing, on-demand shuttle bus services.), including the possibility of integrated pricing (such as giving discounts on some first and last mile modes when they are used to access public transport bus);

x. To allow for subscription packages/ seasonal passes that cover multiple modes of transport (such as public transport and first-and-last-mile modes) to provide cost-effective transport services to users.

4 PROPOSED MaaS PROJECT SCOPE

The city government of [•] seeks the services of a suitably qualified contractor to provide technical expertise to undertake the pre-development, development, and implementation services for an integrated MaaS platform that fulfils the objectives mentioned above for the city of [•]

The Scope of services for this project is outlined below.

i. The successful bidder shall have the technical capability and the capacity to deliver all elements of the services described in this document within the specified timeframe as set out within the project duration.

ii. The city government of [•] requires a competent contractor to plan, design, test, commission, deliver, deploy, and maintain an integrated MaaS platform that incorporates all forms of transport under a single integrated platform that allows users to plan, reserve, and pay for their journeys. The incorporated modes of transport shall include but will not be limited to public transport, taxis, ride-hailing, car-sharing, electric scooter sharing and bicycle sharing, on-demand shuttle services

iii. The contractor shall provide expertise and know how to plan, develop, test, and effectively deploy the fully integrated MaaS platform for the city of [•], with qualified & professional experts to complete and deliver all tasks as required by the city government of [•] for a term of [•] months and [•] years for maintenance and technical support.

The MaaS platform shall encompass (but not limited to) the following key components:

i. A multimodal real-time journey planner combining public transport with shared mobility, ride-hailing (e.g., Uber, Ola, Meru), on-demand transport services (shuttle, etc.), [•], etc.;

ii. Service alert engines that always keep users aware of last-minute changes and disruptions for requested modes and re-booking suggestions in such cases;

iii. Mobile payments & advanced customer communication;

iv. Robust mobility analytics;

v. Streamlined all aspects of travel into one solution, including trip planning and booking and payment in a unified manner;

vi. Support different payment plans for users (pay-as-you-go, partial subscription, full subscription, etc.);

vii. Cost analysis of comparison between different travel options, e.g., private car vs public transport;

viii. Storage and management of travel data and booking information;

ix. Expense recording and analysis;

x. Ability to make, change or cancel a booking/ request;

xi. Personalisation and data learning from historical data to plan future travel arrangements;

xii. The total cost of mobility analysis;

xiii. Cybersecurity and protection of operator and user data;

xiv. Secured backup of data and resilience;

xv. Accounting and revenue allocation (among various operators).

5 DETAILED DESCRIPTION OF THE SCOPE OF WORK

The scope of services range across the following three main tasks and a fourth task related to maintenance and technical support, each with associated tasks and sub-tasks:

Task 1: Planning and Design - Completion of all pre-development activities, including planning and designing of the proposed MaaS system architecture;

Task 2: Development and testing of an Integrated MaaS platform;

Task 3: Deployment and Management of the MaaS platform; and

Task 4: Maintenance and technical support

Further details on what each task of the project entails and the corresponding requirements are set out below. The contractor shall detail in the technical proposal how each task will be delivered to the satisfaction of the city government of [•]. All tasks shall be costed separately and individually.

In technical proposals, the bidders shall demonstrate the ability to develop the MaaS platform for the city of [•] in conceptual planning, development, deployment, and maintenance.

All deliverables are subject to approval from the city government of [•] and other associated stakeholders before proceeding to the next task.

5.1 TASK 1: PLANNING AND DESIGN OF MaaS

The city government of [•] seeks to develop and deploy a well-integrated and user-friendly MaaS platform for the travellers in the city of [•]. This project has the potential to significantly change the travel behaviour of urban transport users with greater collaboration between the public and private sector transport operators.

MaaS is a consumer-centric concept that facilitates access to mobility solutions for users. It offers an opportunity to improve how people and goods move, both from the perspective of policymakers and travellers.

The proposed MaaS solution in the city of [•] is expected to lead to a significant change in the existing transport operator(s) business models, including a shift from transport providers offering services to their own customers to an approach where consumers are provided easy access using a service-based model.

The contractor shall demonstrate the ability to develop an effective MaaS platform for the city of [•] in services ranging from conceptual planning, development & testing to enable and deliver the product with the user cases outlined in the scope of services and other business requirements, if any.

The contractor shall demonstrate the experience and capabilities to deliver this task as part of the technical proposal.

The contractor shall complete all elements related to the planning and pre-development stage to meet the project objectives, including, but not limited to, the following:

i. Definition of the vision, goals, objectives, KPIs, and target values for MaaS in the city of [•] ;

ii. Assessment of current situation in city of [•], including, but not limited to, conducting a comprehensive study on the transport and mobility ecosystem, and understanding and developing lessons learnt from the systems namely, *FAS Tag, One Nation One Card, ChartrApp,* and other relevant apps.

iii. International benchmarking, best practices, and lessons learnt related to MaaS development and implementation elsewhere.

iv. Stakeholder mapping and engagement (e.g., internal and external, including mobility service providers).

v. Study and evaluate all possible MaaS platform models (and data requirements related to each) and make well-justified recommendations on which is the most suitable for the city of [•]. Following are some of the possible options that the contractor needs to study (each has its advantages and disadvantages):

   - Model in which the government/ public sector has complete control of the back and front-end. Here, the mobility operators open their data and APIs to the city government of [•], and the city government of [•] itself, will be the MaaS integrator.
   - Liberal market model – either unregulated market in which MaaS integrators directly

make agreements with mobility operators; or regulated such that all private and public mobility operators are required to open their data and APIs to all third-party private MaaS integrators.

- Liberal model but regulated by the government to ensure public interest. In this case, the mobility operators open their data and APIs to the city of government of [•]. City government of [•] then sets up an open back-end platform to which private and public MaaS integrators can connect their front-end applications while following rules set by the government.

vi. Conceptual framework development of proposed MaaS solution;

vii. Business model, benefits of MaaS and business case;

viii. Gap analysis including a review of the existing systems and applications of the city government of [•], recommendation of back-end system requirements and potential options'

ix. Detailed system design document;

x. Types of data required data providers and data aggregators. In addition, the potential for integration with traffic management centres (holistic mobility data lakes);

xi. Study the possibility of covering both passenger and goods mobility;

xii. Technology requirements and key enablers;

xiii. Service providers and responsibility distribution, including roles played by the private and public sector in providing MaaS;

xiv. A report on how MaaS will be integrated with existing or new (future) services;

xv. The potential impact of MaaS on existing services and operations;

xvi. An overall approach to implementing MaaS (open to flexibility) along with precise implementation steps, roles/ responsibilities, cost estimates/ required budgets, timelines, and risk management;

xvii. Potential social, economic, and environmental impacts;

xviii. Potential impacts on congestion and land use planning (if any);

xix. Identify, and recommend any relevant policies or regulations as required. The contractor shall review all relevant existing laws, regulations, policies, and the operators' terms and conditions and recommend new or modifications to the existing ones to enable the successful implementation of MaaS (for example, data sharing, granting MaaS integrator access to the available data and booking systems of the operators, compensation for unsatisfactory service, etc.) and prevent undesirable effects (shifting to less sustainable modes, discrimination, etc.). Any new or modified regulations/ policies/ conditions shall be subjected to regulatory/ policy impact assessment.

xx. Define incentives for encouraging sustainable transport choices.

xxi. Any other additional element that is deemed necessary to complete this task.

The contractor shall propose a complete and comprehensive (independent) MaaS system that uses the latest industry standards, which shall have the capabilities of being highly integrated with existing and new systems.

The contractor shall consider all the following existing systems. The level of integration required shall be assessed and decided during task 1. This shall be approved by the City Government of [•].

i. BRTS, metro system, taxi services, car share, ride-hailing, micro mobility mode, etc.;

ii. Automated Vehicle Management (AVM) System;

iii. Automated Fare Collection (AFC) System;

iv. Taxi dispatch and automated vehicle management system;

v. The existing Multimodal Journey Planner System (MMJP) if available in the City of [•];

vi. The existing FASTag system and payment system as per local regulations; and

vii. Customer Relationship Management (CRM) System and the call centre system of the city government of [•].

The technical proposal shall provide an adequate overview of the methodology proposed by the contractor beyond what is included in the scope

of the working document. It should clarify to what extent it is proposed to utilise the One Nation One Card model and other external models/ tools in the evaluation.

DELIVERABLES REQUIRED

The contractor shall be responsible for the following deliverables and shall demonstrate in the technical proposal the methodology to deliver these tasks:

i. Baseline and gap analysis report including options for back-end systems, detailed integration plan (with existing/other systems), and data security approach;

ii. Benchmark and best practices report;

iii. Feasibility report (including organisational acceptability, social acceptability, technical feasibility, financial feasibility, economic feasibility, etc.) The feasibility study must meet the City Government of [•] feasibility study guidelines and international best practice;

iv. A business case report;

v. Stakeholder Mapping and Engagement- Stakeholder engagement shall be adequately documented, analysed, and adequately reflected as relevant in the project deliverables;

vi. Detailed system design document;

vii. Knowledge transfer approach;

viii. Concept development and testing plans;

ix. Deployment plans;

x. Policy and regulatory changes;

xi. Final report; and

xii. Presentations at each stage of the task.

The deliverables are only indicative at this stage; The city government of [•] will work with the contractor to identify all key deliverables required for this task before the contractor proceeds to task 2. The first task is expected to be completed within [•] months from the project's commencement date, subject to the approved program/schedule. The city government of [•] approval is required before the contractor can proceed to task 2 (the development stage).

5.2 TASK 2: DEVELOPMENT AND TESTING OF MaaS PLATFORM

The city government of [•] aims to deliver a total journey solution by seamlessly integrating all elements of the trip-making using a MaaS platform with public transport routes, timetables, service information, ticketing, journey planning, etc.

The development of a MaaS platform includes a collection of components, which perform integral functions such as data import, data storage, journey planning, optimisation, customisation/ personalisation, ticketing, payment, and communication. These functions allow users to plan multi-modal journeys, book services, receive enroute guidance and re-booking suggestions in case of any disruption, and pay for the journey in a unified manner. Relevant data concerns, amongst others, locations of public transport stations/stops, routing and timetable information; real-time location of services such as busses, shared-cars, and e-bikes, etc.; location and pricing information of ride-hailing services (i.e., Ola / Uber/Meru); and the respective booking and payment systems of the various modes.

When developing the MaaS platform, the contractor shall consider the whole MaaS ecosystem that considers all key stakeholders and their value chain that supports the delivery of MaaS, including transport operators (public and private), data providers, and MaaS users. The aggregator business model shall be well defined at the early stage of the project, and the value proposition, including 'bundles' of different mobility services and incentives, shall be clarified.

For task 2, the contractor shall consider all key elements required during the development stage as outlined below (but not limited to).

i. Application architecture shall be developed, preferably using an open architecture that supports easy integration between different systems. The contractor shall provide all necessary web services/ APIs and documentation *(including third party integration documentation)*

ii. All systems should be capable of integrating all available transportation modes such as public buses, taxis, ride

hailing, car sharing, on-demand shuttle bus, electric scooter and cycle sharing services, and shall be easy to integrate any new services in the future.

iii. A solution-based approach shall be adopted that focuses on developing a customer-focused platform that is intuitive and easy to use.

iv. The platform shall be flexible, adaptable, and easy to enhance and add future services

v. The platform shall provide efficient and flexible trip planning and optimisation based on objectives that can be set/ controlled by the government or regulator – to manage travel demand and traffic/ serve the public interest/ ensure sustainability/ reduce the substitution of public transport with other modes as well as real-time conditions and user preferences (for example related to mode, route, duration, cost, comfort, accessibility, privacy, environment, etc.).

vi. The platform shall allow flexible optimisation settings by the government or regulator, for example, settings that vary by geographic area/ zone, time of day, etc.

vii. The platform shall have high availability, disaster recovery solution, and backup and restoration functions with highly resilient self-healing capabilities

viii. Other systems needed to be integrated, data sources, business rules, and types and functionality shall be developed and agreed upon with the city government of [•]

ix. A review of current MaaS platforms shall be conducted to understand any shortfalls and thereafter adopt best practices.

x. Minimal Viable Product (MVP) shall be agreed with the city government of [•] at the beginning of task 2

xi. Conceptual sketches/wireframes shall be developed

xii. The designs and prototypes shall be considered using interface animations and finalised with the city government of [•]

xiii. Agile development processes shall be considered

xiv. Appropriate testing & quality assurance shall be undertaken at every phase of the development cycle.

xv. Testing should be built into the development process

xvi. Data sharing and ownership (or responsibility) protocols shall be developed

xvii. A clear MaaS reference architecture shall be prepared and agreed upon with the city government of [•] that includes all involved stakeholders to cover and agree on system security, system governance, and working relationships between each stakeholder.

xviii. MaaS platform shall be available through appropriate devices such as smart phones, desktop/tablets, smart watches, and other digital devices.

xix. The users of MaaS shall be able to purchase mobility services, receive personalised and contextualised information on which to make real-time travel decisions and provide feedback to the city government of [•] as and when needed.

xx. The user Interface may offer additional benefits to meet other lifestyle requirements of users.

xxi. A new back-end system shall be developed that caters to all the current and future MaaS requirements (type, scale and complexity shall be agreed upon in task 1)

xxii. The platform for the back-end system shall offer data and analytic capabilities. This comprises processing, repackaging, and publishing data from a range of sources, including open data and private data (such as the available route(s), data on where customers can access/egress services, pricing information, transaction validation, real-time asset/vehicle locations, service characteristics and usage by customers, etc.)

xxiii. The system should be capable of generating information for transport planning, such as origin-destination and related journey information (based on

aggregated and anonymised usage data).

xxiv. The system shall have comprehensive user profile management, including easy login authentication and registration process. The contractor shall consider utilising the 'One Nation One Card' smart pass service where possible.

xxv. The platform shall offer zone-based fare estimation, including first-last mile modes and estimation of all relevant fare structures, discounts, passes, etc.

xxvi. The platform shall provide information and map of nearby mobility options, including PT network availability, points of interest, and live departure/arrival timing, in addition to a CO_2 calculator function that shows CO_2 per mode/trip during journey planning.

xxvii. The MaaS platform shall be independent and capable of being highly integrated with existing systems (and provision shall be made for future systems) – level of integration shall be agreed on with the city government of [•] prior to development work. Existing systems in the city of [•] shall be included as far as possible but should not be the limit for integration:

- BRTS
- Bus Automated Vehicle Management (AVM) System
- Bus Automated Fare Collection (AFC) System
- Taxi Dispatch and Automated Vehicle Management System
- The existing Multi-Modal Journey Planner System (MMJP)
- The existing FASTag system.
- Customer Relationship Management (CRM) System and the call center system of the city government of [•]
- 3rd party operators (i.e., e-scooter, bike-sharing and car-sharing operators)

xxviii. The platform shall provide real-time information for all the integrated and available modes of transport, including the ability to push notification alerts and reminders

xxix. The design and usability of the platform shall follow industry best practices

xxx. The hosting of all applications shall be agreed with the city government of [•]

xxxi. All the applications shall follow and adhere to the requirements of the city government of [•]and should use the latest software and technology.

xxxii. All the authentications and configuration shall be aligned with the information security standards and should adhere to the requirements of the city government of [•].

xxxiii. The city government of [•] reserves the right to reject any application, which does not follow the guidelines put forth by the city government of [•]

xxxiv. All the applications should use the latest version of all the software and technologies required, and Legacy applications shall not be allowed.

xxxv. Any application developed by the contractor should be of the latest technology and provide support during the entire contract tenure.

xxxvi. Any applications build on outdated software will not be accepted by the city government of [•]

xxxvii. All applications required integration must adhere to the system integration policy of the city government [•].

xxxviii. All integrations with applications need to be reviewed by the city government of [•] before implementation.

DELIVERABLES REQUIRED

The contractor shall be responsible for the following deliverables; in addition, the contractor shall demonstrate in the technical proposal the methodology through which these tasks will be delivered:

i. Business rules, details of other systems that are integrated, data sources and types and functionality;

ii. Conceptual sketches/wireframes and Minimal Viable Product (MVP);

iii. The designs and prototypes of the MaaS application;

iv. Data sharing and ownership (or responsibility) protocols;

v. Full application architecture;

vi. A new back-end system for MaaS;

vii. Final MaaS platform with an easy-to-use interface available on smartphones (android and iOS), desktop/tablets, smart watches, and other digital devices. All available transport services shall be integrated;

viii. Test procedures and results at each stage of development;

ix. Platform with high availability, disaster recovery solution with backup and restoration;

x. Presentations and internal workshops for task deliverables;

xi. The contractor should include all necessary hardware and software in their pricing, which is needed in this project. The hardware shall meet the project requirements considering the data growth and data retention during the project lifecycle.

xii. The hardware shall be installed on premises of the city government of [•] by the contractor as required. The contractor can also suggest an alternative cloud hosting option and outline the advantages and disadvantages as part of the technical proposal;

xiii. The provided solutions should be highly scalable and capable of delivering high performance as and when the transaction volumes/ users increases without compromising on the response time;

xiv. The architecture should have the ability to withstand all single-point of failure by providing clustering features;

xv. The architecture should support distributed processing, load balancing & redundancy; and

xvi. The development infrastructure in the proposed solution will be needed to support the ongoing development/upgrade/ testing/training needs during and post-implementation.

5.3 TASK 3: DEPLOYMENT OF MaaS PLATFORM

5.3.1 TASK 3.1: MaaS DEPLOYMENT

The city government of [•] aims to create a localised MaaS platform that works with the public transport services and private-sector partners available in the city of [•].

By task 3 of the project, the contractor shall have already developed a fully integrated and functional MaaS platform that has been designed, developed, and tested based on the requirements of the city government of [•], which helps to achieve travel behaviour change and manages travel demand.

For task 3, the contractor shall consider all key elements required during the deployment stage as outlined below (but not limited to).

i. Fully functional and user-friendly front end with all the functionality that seamlessly manages door to door journey planning and payment/subscription services;

ii. Deployment of final MaaS platform that is available via smartphones (android and iOS), desktop/tablets, smart watches and other digital devices with all available transport services integrated; and

iii. Back-end system that is fully integrated and adaptable.

DELIVERABLES REQUIRED

The contractor shall be responsible for the following deliverables; in addition, the contractor shall demonstrate in the technical proposal the methodology through which these tasks will be delivered:

i. Fully integrated and user-friendly MaaS platform for the city government of [•]

ii. An integrated and adaptable back-end system

iii. Product material for the website and social media platforms of the city government of [•]

iv. Presentations and internal workshops for this task

v. User manual by the city government of [•]

vi. Training for the staff of the city government of [•]

5.3.2 TASK 3.2: BRANDING AND MARKETING

The city government of [•] requires the contractor to develop a unique and compelling brand and an associated campaign to raise awareness of the MaaS platform and the benefits of using MaaS

in the city of [•]. There shall be a comprehensive execution plan for the marketing and awareness campaign.

The city government of [•]'s PR & Communications Department shall approve all branding and campaign material.

DELIVERABLES REQUIRED

The contractor shall be responsible for the following deliverables in english and [•] furthermore, the contractor shall demonstrate the methodology through which these tasks will be delivered:

i. Development of suitable branding of the MaaS platform to the satisfaction of the city government of [•]
ii. Development and execution of appropriate promotional/marketing material and campaign based on best practices.
iii. Minimum of three alternative branding options shall be proposed
iv. Posters, social media, and website materials
v. Presentations and internal workshops for this task

5.4 TASK 4: MAINTENANCE AND TECHNICAL SUPPORT

The contractor shall provide separate costs for providing maintenance and technical support for three years after the acceptance and deployment of the MaaS platform (each year shall be costed separately). This task shall encompass all the technical support and maintenance requirements for the back-end system(s) and front-end applications. The details regarding the maintenance management processes, a proposed minimum level of service for the platform, required resources, technical capabilities and location of proposed staff shall be included in the technical proposal.

MaaS system maintenance must be performed to identify, isolate, and rectify any system fault to restore the failed equipment systems to an operational condition within the tolerances or limits established for operations.

The maintenance shall be available 24/7, and response time to all system failures shall be a maximum of 1 hour. Executing any planned corrective or enhancement maintenance of the MaaS system shall be agreed in advance with the city government of [•]. The contractor shall be responsible for all back-end and front-end systems and software maintenance (for all levels). The contractor shall ensure round the clock availability of the MaaS system. In case of any changes/ upgrades of the existing application or related integrations, the contractor must conduct appropriate testing to ensure the correctness of the implementation. The maintenance and technical support for the MaaS platform shall include the performance requirements as stated below:

Table 1- Minimum performance requirements for the maintenance and technical support task

ACTIVITY	KPI	PERFORMANCE LEVEL	DEDUCTION PER OCCURRENCE OF KPI FAILURE
Monthly Maintenance	Monthly Maintenance Tasks	Time of completion of task as per the procedure/ plan	INR_____ for each Day of delay
Corrective Maintenance	Response time	Within 1 Hour from the time of notification of the fault.	INR_____ for each hour of delay
Corrective Maintenance	Resolve time	Solve the fault within 2 hours from the time of notification of the fault.	INR_____ for each hour of delay
	TBF (Time Between Failure)	Same type of fault recurs within 1 month.	INR_____ if it occurs more than 3 times per 30 Days, during the affected days/or month
Documentation	Maintenance Plan	First month of each year (based on project start day)	INR_____ for each Day of delay
	System condition report	Each Month	INR_____ for each Day of delay
	Performance and Availability Report	Each Month	INR_____ for each Day of delay
Email response and requests	Contractor shall respond to email requests	Within 2 hours	INR_____ for each hour of delay
Bug Fixing & Testing Software with Testing Reports	% of uncovered reported bugs	System shall be deployed and maintained with 100% of resolved/fixed bugs	Failure to resolve the uncovered bugs shall result in a deduction of INR_____ per day of delay

ACTIVITY	KPI	PERFORMANCE LEVEL	DEDUCTION PER OCCURRENCE OF KPI FAILURE
Uninterrupted integration with related entities- internal & external	Fully functional system and application without any failure on the integration with related entities	0% outage on integration	Failure to perform shall result in a deduction of INR_____ per day of the outage
High availability of all MaaS Services and related systems at all times	Fully functional system without any failure on the availability of the services	100% availability of the services	Failure to perform shall result in a deduction of INR_____ per hour of outage for each affected service.
Backup of data as per the scheduled plan	Perform an incremental and full backup of all system data as per the agreed plan	100% backup of data	Failure to perform the backup shall result in a deduction of INR_____ per day of delay
Critical updates Patching of all systems	Perform updates on all systems to the latest stable release	100% patches systems	Failure to perform the updates shall result in a deduction of INR_____ per day of delay
System security, including OS hardening and anti-malware	Hardening of all systems OS as per Client standards	100% pass scheduled security Audit	Failure to perform the System security shall result in a deduction of INR_____ per day of delay

*Note: Availability = [(Total Number of Hours in a Month- Total Number of Hours system is down)/Total Number of Hours in a Month]*100*

5.5 KEY POINTS REGARDING THE MaaS PLATFORM

The MaaS platform shall connect to all forms of data coming from the different players in the city of [•]'s transport ecosystems. Either proprietary or standard interfaces can integrate these data forms.

The journey planning function shall combine different means of public and private transport and journey planners enabling door-to-door navigation. In addition to buses, trains, trams, ferries (if available), and micro-mobility, the platform shall also consider car and bicycle rides as well as walking distances. Real-time data concerning delays, cancellations or rerouting are centrally integrated into the platform and immediately provided to the passengers.

MaaS platform shall offer sophisticated interactive maps equipped with the latest features, thus making the connection search easy and convenient for the users. Passengers can decide on the results that should be displayed – and those they do not need for their journey. This shall include public parking locations (when using vehicle-based modes) and parking cost and payment options. The contractor shall consider the city of [•]'s navigable road network data and navigation engine and, if deemed suitable, utilise its data subject to the city government of [•]'s approval.

The platform shall calculate the emission and cost savings for chosen mobility options. The parameter shall include;

i. CO_2 emission
ii. particulate matter
iii. Energy consumption
iv. Calorie consumption (bicycle/walk)

The platform shall have the possibility of integrating the multi-modal platform app with an external loyalty system to collect mobility points. The system can transfer mobility points for all user purchases in the multi-modal platform app to the loyalty system via an API to be provided by the loyalty system.

All tickets have the same monitoring and security features, including mobile ticketing. There is also the option to include additional verification features for an even quicker and more secure ticket inspection. All tickets contain a standard 2D code. The security features for visual inspection can be customised.

The payment gateway shall be compatible with National Common Mobility Card and capable of supporting multiple payment providers and payment methods, including debit cards, credit cards (American Express, VISA, MasterCard, etc.) PayPal Express, e-wallet, Mobile Pay (Apple/Google/Samsung/Amazon Pay in examination/implementation), etc.

Users shall be able to set individual travel preferences in the user profile. These settings are considered in all routing requests and are synchronised when using an online profile across devices. These settings include, for example:

i. Preferred means of transport: product selection of available means of transport
ii. Footpath settings - e.g., walking speed and

maximum desired distance

iii. Information on bicycle usage - e.g., own bicycle availability, speed, minimum and maximum desired distance

iv. Personal car use, including costs and CO2 emissions per km

v. Subscriptions for other mobility services

5.6 IT ENTERPRISE AND SECURITY REQUIREMENTS

Security: The architecture should ensure confidentiality, authenticity, and reproducibility and comply with the legislation.

Availability: Applications should be capable and distinctly available.

Maintainability: Applications should be easily maintainable with respect to future organisational changes and technological advancement.

Error Tolerance: Systems should be capable of handling unforeseen and invalid system states.

Performance: Systems should have response times that encourage widespread adoption within their user communities.

Scalability: The architecture should be scalable to allow additional users' capacity/bandwidth/volume in the near future and beyond.

Interoperability: The architecture should easily interface with other systems to allow multiple systems to operate within one environment.

Reusability: Systems will be designed to submit the data only once at the source and used in multiple applications within many organisations.

Openness: The architecture's interface should be well defined and well documented to simplify the integration of existing and/or new applications.

Flexibility: The architecture should be easily adjustable to new frames of reference and upgrades at a predictable cost.

Management and Support: A management support model is required to maintain systems capability in a high state of usability, and to support network users by providing assistance, advice, and counsel.

Completeness: Provide an architecture that yields a complete application if closely followed.

Any solution must provide conceptual, logical, and design diagrams that cover: high-level architecture, processes flow, technology components, applications, modules, data, infrastructure, and security as relevant. These deliverables need to be built based on industry standards and best practices. Compliance with approved government standards/guidelines is required.

The project and enterprise architecture teams at the city government of [•]should review and approve these deliverables.

5.7 LANGUAGE

All final task deliverables and final project documents, including the MaaS app, will be required in both english and the regional language (if required). The Contractor shall demonstrate the ability to produce highly technical documents in both languages.

5.8 OTHER REQUIREMENTS

INNOVATION AND CAPACITY BUILDING

In addition to demonstrating fulfilment of each of the task requirements stated above, the contractor shall demonstrate innovative approaches that would add value to the MaaS platform. The contractor should provide evidence of the successful application of these approaches elsewhere that apply to the context of this work and in the local context. The contractor shall demonstrate innovation in developing new mobility platforms and deploying such platforms in real world environments.

The city government of [•] requires training and capacity to be provided to the relevant team. The contractor shall demonstrate the ability to deliver practical technical training and demonstrate how they will ensure knowledge transfer to the city government of [•]' staff.

The contractor shall demonstrate the ability to develop and deliver high-level documents and publications as required by the city government of [•], including the final project deliverables.

6 PROJECT DELIVERY SCHEDULE

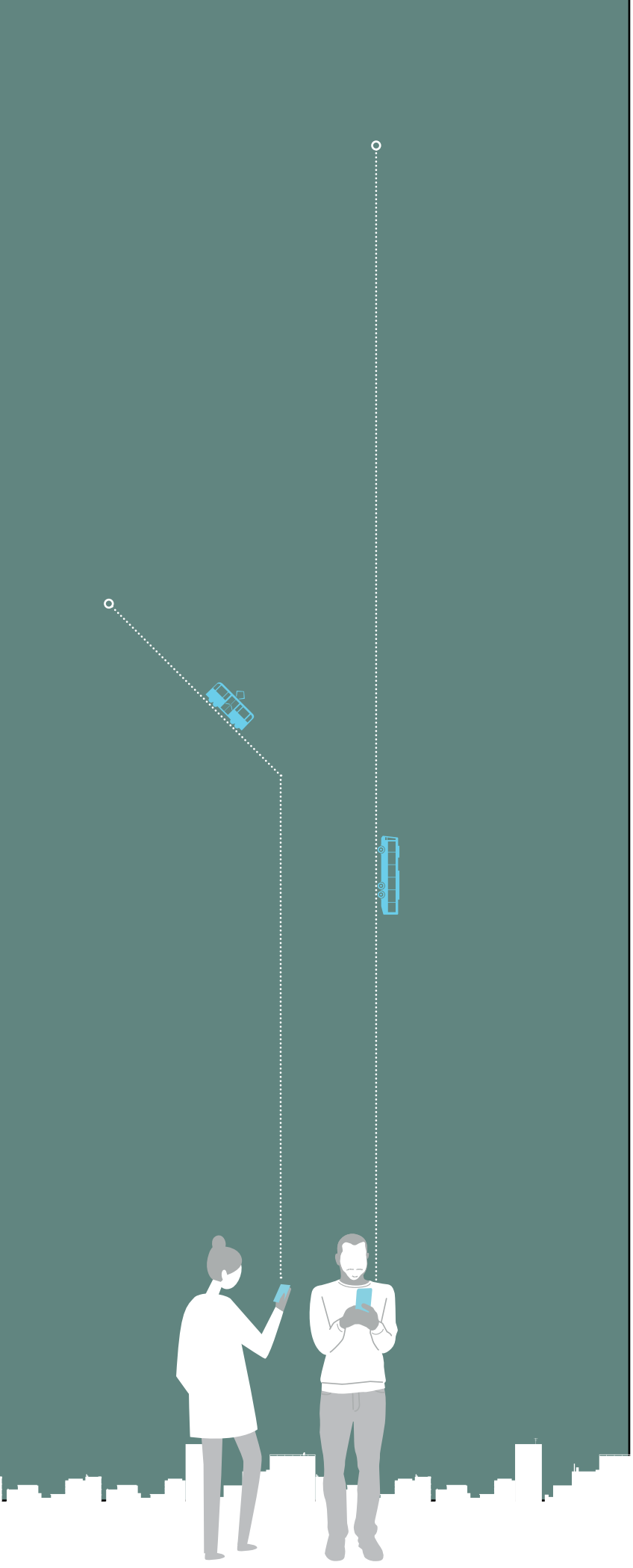
The contractor shall provide a detailed programme for developing, testing and deploying the MaaS platform, with clear milestones per the scope of services. The

proposed project schedule will be subject to the city government of [•]'s approval.

The contractor shall complete the project within the specified period for each task. This commission will be for a period of [•] months, from the date of award with 3-year maintenance and technical support as per the below table.

Table 2 - Task Durations

ACTIVITY	KPI	PERFORMANCE LEVEL
Task 1	Planning and Design of MaaS	[•••] Months from commencement date
Task 2	Development and testing of an Integrated MaaS platform	[•••] Months from commencement date
Task 3	Deployment and Managing of MaaS platform.	[•••] Months from commencement date
Task 3.1	Branding and Marketing for the MaaS platform	[•••] Months from commencement date (subject to awarding)
Task 4 Year 1	Maintenance and technical support	[•••] Months from commencement date (subject to awarding)
Task 4 Year 2	Maintenance and technical support	[•••] Months from commencement date (subject to awarding)
Task 4 Year 3	Maintenance and technical support	[•••] Months from commencement date (subject to awarding)



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 Bhubaneshwar, 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.