



# Technical Report

**ISO/TR 16497-1**

## **Sustainable mobility and transportation — Sustainable mobility services —**

### **Part 1: Use cases**

*Mobilité et transports durables — Services de mobilité durable —  
Partie 1: Cas d'utilisation*

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## Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*, Subcommittee SC2, *Sustainable cities and communities - Sustainable mobility and transportation*.

A list of all parts in the ISO 16497 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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## Introduction

This document is intended to clarify items for standardization based on gap analysis of collected use cases of Mobility as a Service (MaaS) or sometimes called as Mobility on Demand (MoD) (only in the US), and related projects.

The objective of this document is to gather use cases for the implementation of sustainable mobility services and facilitate international sharing of experiences and knowledge. The collected data will be analyzed to identify issues for international standardization.

The ISO 16497 series consists of two parts (other parts are planned):

- ISO TR 16497-1 (this document): for case collection and preparation for the further analyses.
- ISO TR 16497-2<sup>1)</sup>.

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1) Under development. Stage at time of publication: ISO/PWI TR 16497-2.



# Sustainable mobility and transportation — Sustainable mobility services —

## Part 1: Use cases

### 1 Scope

This document compiles use cases for the implementation of sustainable mobility services. The collected data will be analysed to identify issues for international standardization.

This document focuses on use cases that aim to implement sustainable transport services. The use cases considered are at the city scale or metropolitan scale, aligned with the scope of smart cities and communities. The use cases encompass land transport, water transport, and air transport for both passengers and freight.

Ideas related to connection and integration, including demand-side, supply-side, and policy framework aspects, are included.

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 4 Use case collection

Multiple use cases have been collected from Japan, China, and India. All cases can be found in [Annex A](#).

### 5 Use case analysis

The use cases are analysed based on policy making and planning, travel mode characteristics, multimodal connectivity and coordination, and operational organization structure.

### 6 Subjects for standardization

#### 6.1 General

By analysing the gathered use cases, discussion points for conducting gap analysis towards standardization have been organized. These points take into account policy goal setting, targeted travel modes, intermodal connections and coordination, as well as operational organizational structures.

## 6.2 Policy making and planning

### 6.2.1 General

Discussion points for policy goal setting are structured based on the types of policy objectives and their evaluations. Five perspectives are considered, integrating well-being and resilience into the three foundational aspects of sustainability: environmental, social, and economic.

### 6.2.2 Policy goals and objectives

The policy objectives and goals for mobility services vary in each use case. To achieve sustainable cities and communities, the relationships between policy goals and various mobility services are organized from five perspectives: environment, social issues, economy, well-being, and resilience.

### 6.2.3 Environment

Assessment is made on the contribution of mobility services towards mitigating climate change, conserving resources, reducing waste and pollution, and enhancing residential environments.

### 6.2.4 Society

Assessment is made on the contribution of mobility services towards ensuring equitable access to needs, maintaining and promoting social participation, and strengthening social cohesion.

### 6.2.5 Economy

Assessment is made on the contribution of mobility services towards economic growth, enhancing the attractiveness of cities and communities, fostering creativity and innovation, and improving the financial stability of service provision.

### 6.2.6 Well-being

Assessment is made on the contribution of mobility services towards promoting health, enhancing quality of life, and fostering a sense of self-efficacy.

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### 6.2.7 Resilience

Assessment is made on the contribution of mobility services towards ensuring redundancy, managing uncertainty and risks, and fostering the development of social capital and capability.

## 6.3 Evaluation of each policy goal

### 6.3.1 General

The assessment of each policy objective focuses on how quantitative and qualitative evaluations are integrated. The contribution of mobility services towards achieving the policy objectives listed in [6.2.3](#) to [6.2.7](#) is evaluated through quantitative and qualitative approaches. Additionally, the alignment of these contributions with the 169 targets of the Sustainable Development Goals (SDGs) is confirmed.

### 6.3.2 Quantitative evaluation

Key Performance Indicators (KPIs) are employed for quantitative evaluations. Output indicators that objectively illustrate the results of each policy measure and outcome indicators that quantitatively reflect the achievement of policy objectives are established, with prominent indicators being determined as KPIs.



### 6.3.3 Qualitative evaluation

In cases where assessing the contribution of mobility services to policy objectives using numerical or statistical data is challenging, qualitative outcome indicators based on users' subjective perceptions and experiences are utilized. These indicators are then comprehensively evaluated in conjunction with the KPIs in [6.3.2](#).

### 6.3.4 Responding to the SDGs (contribution to solving social issues)

By employing the quantitative and qualitative evaluations in [6.3.2](#) and [6.3.3](#), the alignment between policy objectives with confirmed contributions from mobility services and the 169 targets of the SDGs is delineated. This clarifies the contributions of relevant mobility services to the SDGs. Examples of SDG targets closely related to mobility services include:

- Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents.
- Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix.
- Target 7.3: By 2030, double the global rate of improvement in energy efficiency.
- Target 8.9: By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products.
- Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.
- Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.
- Target 11.7: By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

## 6.4 Travel modes

### 6.4.1 General

From the perspective of travel modes, the situations requiring mobility services and the forms of mobility services provided are delineated based on the categories of targeted travel needs, combinations of travel modes, and combinations of mobility services.

### 6.4.2 Target travel needs corresponding to policy goals

#### 6.4.2.1 General

The travel demands of cities and communities are classified based on travellers' attributes and purposes, identifying the travel needs that correspond to policy objectives.

#### 6.4.2.2 Classification of travel needs

The mobility scenarios in cities and communities are classified based on the attributes of travellers (e.g. age, car ownership) and their trip purposes (e.g. commuting, shopping, leisure).

#### 6.4.2.3 Identification of travel needs requiring mobility services

Travel needs closely related to the policy objectives to be achieved are determined. In situations where alternative travel mode choices are limited, some form of mobility service is considered necessary.

### 6.4.3 Combination of travel modes (inter-modal transport)

#### 6.4.3.1 General

In terms of travel mode combinations, evaluation is given to the integration of diverse mobility tools and the merging of distinct mobility services.

#### 6.4.3.2 Mobility tool combinations

Combinations of mobility tools are organized based on combining existing tools (e.g. private cars and car-sharing), combining existing tools with new ones (e.g. conventional buses and autonomous electric wheelchairs), and combining new tools with each other (e.g. electric kick scooters and autonomous buses).

#### 6.4.4 Mobility service combinations

Combinations of mobility services are delineated based on temporal aspects, such as variations in travel demand by time of day, day of the week, and season, as well as spatial aspects, such as the distribution of urban functions and residential populations.

## 6.5 Multimodal connectivity and coordination

### 6.5.1 General

In a multimodal situation, users have the option to choose from multiple travel modes. In such cases, it is necessary to organize how connections and coordination between travel modes are established. This organization is based on what is being connected and coordinated, the purpose, and how these connections and coordination are achieved in terms of systems and technology. Identifying the advantages and disadvantages for users or potential users is particularly important.

Examples of connectivity and coordination discussion are based on three aspects:

- Demand-side aspects include bundling daily travel and tourism travel, and induced demand created by new services.
- Supply-side aspects involve coordination between existing vehicles and new mobility tools, coordination between existing services and new services, coordination between rails and micro-mobility modes, such as small electric vehicle sharing services, and coordination between buses and autonomous electric wheelchair sharing.
- Policy framework aspects encompass the connection between policy evaluation and strategy confirmation based on mobility data space activities, the connection for available and attractive tourism options, and the connection of existing services based on new services.

### 6.5.2 Situations of connection and coordination

Possible scenarios for connections and coordination between travel modes include situations where travellers gather information about their trips (e.g. routes, travel time, fares and fees), situations where they reserve mobility services, and situations where they pay for fares and fees associated with these services.

### 6.5.3 Objective

The policy objectives intended for connecting and coordinating different mobility services, include promoting a modal shift away from private cars, encouraging out-of-home activities that contribute to personal health improvement and local economic revitalization, among other aspects.

### 6.5.4 Methods and technology

Methods and technologies for connecting and integrating mobility services can be organized according to their purposes. Potential objectives include streamlining the collection of travel-related information,

simplifying service reservations and payments, consolidating fares and fees between different services, and offering new services through collaboration with other entities (e.g. MaaS apps) and the motivation that comes from these initiatives.

## 6.6 Operational organization structure

### 6.6.1 General

It is crucial to highlight the significant disparities across various use cases, particularly in terms of the stakeholders involved in projects aiming to connect and integrate mobility services, the nature of relationships among these participants, and the methods employed to secure funding for successful implementation.

### 6.6.2 Participants' roles and relationships

For each use case, it is necessary to define the roles and relationships of the entities involved in the project. This includes clarifying the leading entities responsible for policy and decision making, as well as the operators of the MaaS platform.

### 6.6.3 Finance

Each use case will be structured to encompass the financial scale required for project execution, the relationships between all cost bearers and the direct and indirect beneficiaries resulting from connected and coordinated mobility services, as well as the mechanisms for revenue reallocation and internal subsidization.

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