



**SLOVENSKI STANDARD**  
**SIST-TS CEN/TS 17413:2020**

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**Inteligentni transportni sistemi - Mestni ITS - Modeli in definicije za nove načine prevoza**

Intelligent transport systems - Urban ITS - Models and definitions for new modes

Intelligente Verkehrssysteme - Städtische IVS - Modelle und Festlegungen für neue Modi

Systèmes de transport intelligents - ITS urbains - Modèles et définitions des nouveaux modes de transport

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**ICS:**

35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport
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**Intelligent transport systems - Urban ITS - Models and definitions for new modes**

Systèmes de transport intelligents - ITS urbains -  
Modèles et définitions des nouveaux modes de  
transport

Intelligente Verkehrssysteme - Städtische IVS - Modelle  
und Festlegungen für neue Modi

This Technical Specification (CEN/TS) was approved by CEN on 27 October 2019 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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<b>Contents</b>	<b>Page</b>
<b>European foreword</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>4</b>
<b>1 Scope</b> .....	<b>5</b>
<b>2 Normative references</b> .....	<b>5</b>
<b>3 Terms and definitions</b> .....	<b>5</b>
<b>4 Symbols and abbreviations</b> .....	<b>9</b>
<b>5 Functional description of the alternative modes</b> .....	<b>9</b>
<b>5.1 Introduction</b> .....	<b>9</b>
<b>5.2 Categorization of modes of transport</b> .....	<b>9</b>
<b>5.3 Links to Mobility as a service</b> .....	<b>13</b>
<b>5.4 Functions and aspects related to the alternative modes</b> .....	<b>14</b>
<b>5.5 Cycling</b> .....	<b>19</b>
<b>5.6 Car sharing</b> .....	<b>20</b>
<b>5.7 Carpooling</b> .....	<b>23</b>
<b>6 Data requirements</b> .....	<b>30</b>
<b>6.1 General</b> .....	<b>30</b>
<b>6.2 Data model</b> .....	<b>30</b>
<b>Annex A (normative) Data dictionary</b> .....	<b>80</b>
<b>Annex B (informative) Use cases</b> .....	<b>96</b>
<b>Annex C (normative) Additional Common Concepts — Extension to EN 12896-1:2016, Public Transport Reference Data Model — Part 1: Common Concepts — Methodologies and Conventions</b> .....	<b>101</b>
<b>Annex D (informative) Additional Information on Carpooling</b> .....	<b>121</b>
<b>Bibliography</b> .....	<b>123</b>

## European foreword

This document (CEN/TS 17413:2020) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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**CEN/TS 17413:2020 (E)****Introduction**

Services already present in the urban environment such as multimodal information and traffic management and control are already well understood. Standard reference data models and data exchange formats for the use of these services, in particular data sets describing the public transport offer, are already standardized and available. However, a previous study has identified that there is a need for reference data models to accommodate emerging modes of transport to allow seamless transitions for the traveller between all available modes. Examples of these new modes are car and cycle sharing, car-pooling, and intelligent parking (Park & Ride).

The Commission Delegated Regulation (EU) 2017/1926 requires that Member States facilitate the easy exchange and reuse of data for the provision of comprehensive travel information services. Transport authorities, transport operators, infrastructure managers or transport on demand service providers as appropriate should make the static data, corresponding metadata and information on the quality of the data accessible to users through a national or common access point.

This document defines a reference data model, in order to allow integration of these modes into urban multimodal services (e.g. trip planning systems).

This document considers in first place static data, but some aspects of real-time (dynamic) information are taken into account in order to enable efficient traveller information and includes: cycle sharing; car sharing; carpooling and cars with a driver (taxi).

To form this document, information has been gathered from outreach to stakeholders, Transmodel (EN 12896 series), and documents in the Bibliography.

CEN/TS 17413 is a project under the European Standardization body CEN/TC 278 - Intelligent Transport Systems Working Group 17 (Urban ITS). Its title is Models and definitions for new modes. The project team members have worked within Intelligent Transport Systems for many years as developers, implementers and standardizers.

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## 1 Scope

This document defines new modes in a reference data model, in order to allow integration of these modes into urban multimodal travel services (e.g. trip planning systems).

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12896-1:2016, *Public transport – Reference data model – Part 1: Common concepts*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

### 3.1 General terms and definitions:

#### 3.1.1

##### **attribute**

property of an entity

#### 3.1.2

##### **conceptual data model**

description of a real-world domain in terms of entities, relationships and attributes in an implementation independent manner in order to provide a structure on which the rest of the development of an application system can be based

#### 3.1.3

##### **conceptual level**

conceptual data model, in the context of data modelling

#### 3.1.4

##### **database**

collection of data

Note 1 to entry: Often used in the sense of the physical implementation of a data model.

#### 3.1.5

##### **data domain**

data structure made up of data related to each other, through the fact that there is a functional area or group of functions using this data set as a whole

#### 3.1.6

##### **data model**

description of a real-world domain in terms of data and relationships

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**CEN/TS 17413:2020 (E)****3.1.7****entity**

object (data) that has its own existence (as opposed to an attribute)

**3.1.8****fare management**

activities related to the collection of money from passengers

**3.1.9****function**

activity

**3.1.10****functional area**

arbitrarily defined set of activities used to define the objectives and limits of the data model

**3.1.11****interoperability**

ability of (sub)systems to interact with other (sub)systems according to a set of predefined rules (interface)

**3.1.12****logical data model**

data design that takes into account the type of database to be used but which does not consider means of utilization of space or access

**3.1.13****logical level**

logical data model, in the context of data modelling

**3.1.14****object-oriented data model**

data structure expressed according to principles that allow for a direct implementation as an object-oriented database, where information is represented in form of objects, i.e. respecting the principle of encapsulation meaning in particular that each data is accessed or modified through operations (methods) belonging to it

**3.2 Domain specific terms and definitions:****3.2.1****access mode**

characterization of the traveller movement (e.g. walking, cycling, etc.) enabling the traveller to reach public transport or to carry out a whole trip

**3.2.2****alternative mode**

publicly advertised mode of operation different from the conventional mode of operation, in particular vehicle sharing, vehicle rental and vehicle pooling

**3.2.3****car pooling**

vehicle pooling applied to cars, consisting in sharing a privately owned car for a trip between a defined driver who is already engaged in the trip and at least another traveller



### 3.2.4

#### **car rental**

vehicle rental applied to cars, consisting in making car(s) available at specified agencies with the constraint to bring them back at specified agencies

### 3.2.5

#### **car sharing**

vehicle sharing applied to cars, consisting of the short-term use of a vehicle for a specific journey or time where the car might be taken from and parked at different places in an urban area

### 3.2.6

#### **conventional mode**

legacy mode of operation which is provided as a scheduled and/or flexible publicly advertised transport offer relying on a set of features:

- drivers are employees;
- the fleet is owned by an operator or an authority;
- the network topology is defined well in advance and is based on lines and journey patterns

Note 1 to entry: The distinction between alternative and conventional mode of operation relies on the fact that one or more of the conditions as above may not be fulfilled. Moreover, the difference is in the mode of operation rather than the way the traveller is served.

### 3.2.7

#### **cycle rental**

vehicle rental applied to cycles, consisting in making cycle(s) available at specified agencies with the constraint to bring them back at specified agencies

### 3.2.8

#### **cycle sharing**

vehicle sharing applied to cycles consisting of short-term cycle rental where the cycle can be taken from and parked at different places in the urban area

### 3.2.9

#### **flexible transport mode**

passenger transport operation linked to a fixed network/schedule but offering flexibility, in order for instance, to optimize the service or to satisfy passenger demand

### 3.2.10

#### **operational service**

activities performed by actors in charge of operation of a service

### 3.2.11

#### **park and ride**

activity allowing travellers to transfer between personal/alternative mode and conventional mode

### 3.2.12

#### **park and ride facility**

location dedicated to travellers allowing them a modal transfer, in particular to leave/pick up their personal vehicles before/after a trip on public transport

## CEN/TS 17413:2020 (E)

**3.2.13****personal mode**

private mode of operation excluding any publicly advertised use

**3.2.14****public transport**

means of transport advertised and available for use by the general public

**3.2.15****scheduled mode**

passenger transport operation following a fixed schedule and fixed routes

**3.2.16****taxi**

type of vehicle pooling operation where the vehicle is driven by a driver providing services to travellers for commercial reasons

**3.2.17****traveller information provision**

activity consisting in the provision of information on the rules/conditions related to a traveller service and concerning the available transportation means

**3.2.18****traveller service**

activity (in general, initiated by users) in view of facilitating/enabling a trip

**3.2.19****walking mode**

walking as considered as an access mode so the traveller walks to a stop to get to the transport option

**3.2.20****vehicle pooling**

particular mode of operation of a privately-owned vehicle consisting in sharing the vehicle for a trip between a defined driver who is already engaged in the trip and at least another traveller

**3.2.21****vehicle rental**

particular mode of operation of a vehicle fleet (in general privately owned) consisting in making it available at specified agencies with the constraint to bring them back at specified agencies

**3.2.22****vehicle sharing**

short term vehicle rental where the vehicle can be taken from and parked at different places in the urban area, often without the constraint of bringing the vehicle back to a dedicated specific location

**3.2.23****vehicle with driver**

vehicle operating on demand such as a taxi, chauffeured car or dispatched mini-cab

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## 4 Symbols and abbreviations

CCAM	Cooperative, Connected and Automated Mobility
EU	European Union
GDF	Geographic Data Files
GNSS	Global Navigation Satellite System
INSPIRE	Infrastructure For Spatial Information In Europe
ITS	Intelligent Transport Systems
MaaS	Mobility as a Service
U-ITS	Urban ITS

## 5 Functional description of the alternative modes

### 5.1 Introduction

This document describes an extension of the Public Transport Reference Data Model, known as Transmodel (EN 12896 series), which provides definitions and a conceptual data model for the “conventional transport” domain. This clause provides a clarification as regards the “conventional transport mode” vs. “alternative transport mode” (mentioned as 'new modes' in the title of this specification).

### 5.2 Categorization of modes of transport

#### 5.2.1 General

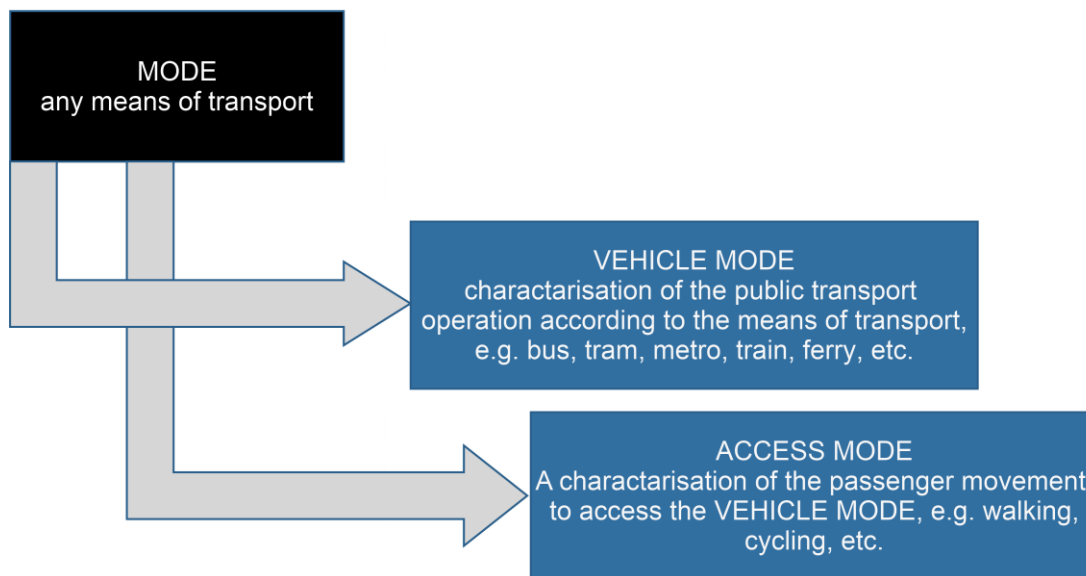
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'mode' as any means of transport used or available. It is split into 'vehicle mode' and 'access mode' (see Figure 1).

'Vehicle mode' is a characterization of the public transport operation according to the means of transport, e.g. bus, tram, metro, train, ferry, ship, or bicycle.

'Access mode' (e.g. walking, cycling, private car driving, etc.) is a characterization of the traveller movement (e.g. walk, bicycle, etc.) enabling them to reach the 'vehicle mode' or to carry out a whole trip.



**Figure 1 — Categorization of transport modes**

A distinction is made between 'vehicle mode' and 'vehicle type'. Each 'vehicle mode' may correspond to a range of 'vehicle types' (e.g. the 'vehicle mode' 'bus' may correspond 'standard', 'articulated, minibus', 'double-deck' buses).

A further, finer categorization of transport modes is provided by the concept of 'submode', which is a variant of a 'mode'. For example, for the mode 'rail', possible submodes are 'international rail' or 'domestic rail'; for the mode 'bus', the example of submode is 'regional bus', for the mode 'car', examples of submodes are 'electric car', 'conventional car', 'self-driven car'.

This document takes over these normative definitions and provides a further clarification as regards the term 'public transport'.

For this document 'public transport' has to be understood as any means of transport, advertised and available for use by the general public.

## 5.2.2 New modes as an alternative mode of operation

### 5.2.2.1 Overview

Modes and submodes being defined as 'transport means' may be characterized in terms of types of operation, i.e. ways they are operated.

This document distinguishes the following types of 'mode of operation' (see Figure 2):

- conventional mode of operation: the legacy mode of operation which is provided as a scheduled and/or flexible *publicly advertised* flexible transport offer. This mode of operation is either following a fixed schedule and fixed routes or linked to a fixed network/schedule but offering flexibility, in order for instance, to optimize the service or to satisfy passenger demand;
- alternative mode of operation: any *publicly advertised mode of operation different from the conventional mode of operation*, in particular vehicle sharing, vehicle rental and vehicle pooling; and
- personal mode of operation: a private mode of transport *excluding any publicly advertised use*.

The scope of Transmodel is the conventional mode of operation, including both scheduled and flexible mode of operation. The distinction between alternative and conventional mode of operation relies on the fact that a conventional mode relies on a set of features: drivers are employees and the fleet is owned by an operator or an authority and the network topology is defined well in advance and is based on lines and journey patterns; whereas the alternative modes may not fulfil one or more of these features.

This document (referring to 'new modes') concerns the alternative mode of operation.

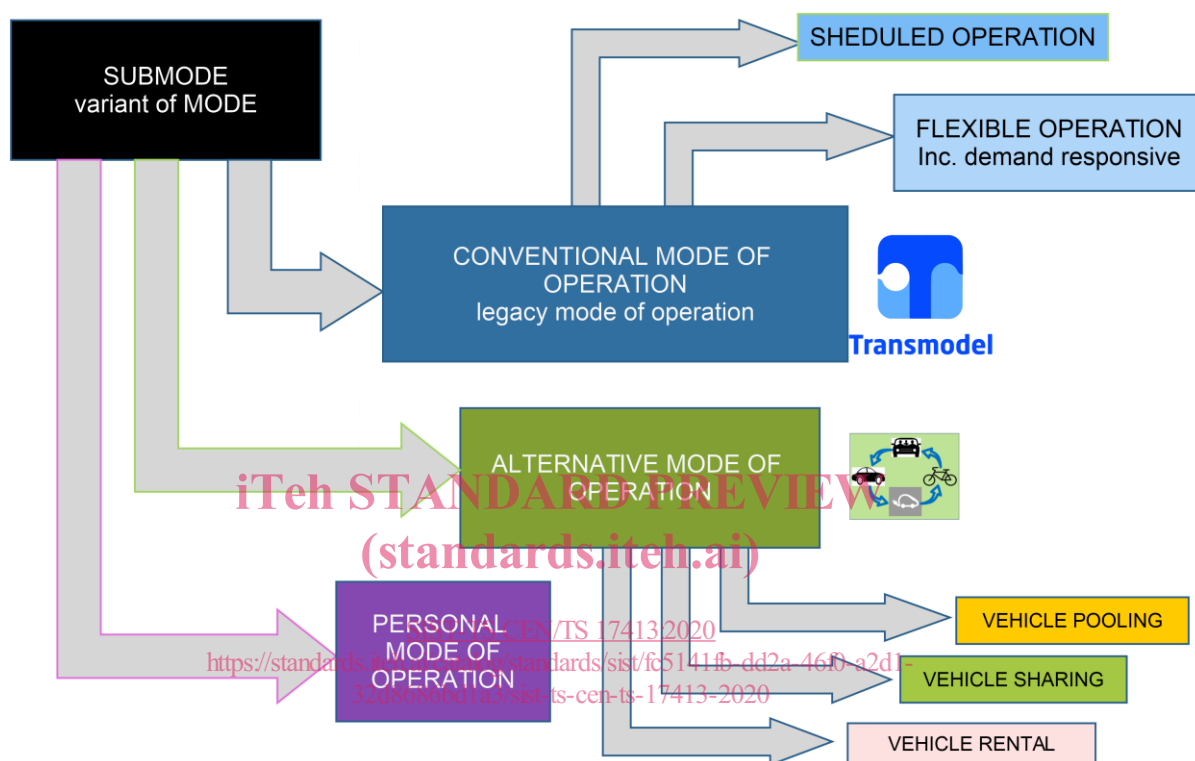


Figure 2 — Operation types for transportation mode

### 5.2.2.2 Wording convention

In this document, alternative mode of operation, alternative mode and new mode are used as synonyms (with a preference to alternative mode).

Conventional mode of operation is used as synonym of conventional mode, flexible mode of operation is synonymous to flexible mode, scheduled mode of operation as synonymous to scheduled mode.

### 5.2.2.3 Transport modes in Commission Delegated Regulation (EU) 2017/1926

The Commission Delegated Regulation (EU) 2017/1926 (see [9]) partitions the transport modes into Scheduled, Demand Responsive, and Personal. Rather than a definition, examples for these concepts are provided.

Scheduled modes: Air, rail including high speed rail, conventional rail, light rail, long-distance coach, maritime including ferry, metro, tram, bus, trolley-bus.

Demand-responsive modes: Shuttle bus, shuttle ferry, taxi, car-sharing, car-pooling, car-hire, bike-sharing, bike-hire.

Personal modes: Car, motorcycle, cycle.

## CEN/TS 17413:2020 (E)

Table 1 below provides the correspondence of the different concepts and terms in use with the concepts of this document.

**Table 1 — Concepts and terms**

Mode of operation	Type of mode of operation	Specification covering data requirements	Type of mode according to the Commission Delegated Regulation (EU) 2017/1926	The Commission Delegated Regulation (EU) 2017/1926: examples
Conventional mode of operation				
	Scheduled mode of operation	Transmodel	<i>Scheduled mode</i>	Air, rail including high speed rail, conventional rail, light rail, long-distance coach, maritime including ferry, metro, tram, bus, trolley-bus.
	Flexible mode of operation	Transmodel	<i>Demand-responsive mode</i>	Shuttle bus, shuttle ferry
Alternative mode of operation		SIST-TS CEN/TS 17413:2020 <a href="https://standards.iteh.ai/catalog/standards/sist/fc5141fb-dd2a-46f0-a2d1-32d8686bd1a3/sist-ts-cen-ts-17413-2020">https://standards.iteh.ai/catalog/standards/sist/fc5141fb-dd2a-46f0-a2d1-32d8686bd1a3/sist-ts-cen-ts-17413-2020</a>		
	Vehicle sharing (car sharing, cycle sharing)	This document	<i>Demand-responsive mode</i>	car-sharing, bike-sharing
	Vehicle pooling (carpooling)	This document	<i>Demand-responsive mode</i>	car-pooling, taxi
	Vehicle rental (Car rental, cycle rental)	This document (partly)	<i>Demand-responsive mode</i>	car-hire, bike-hire.
Personal mode of operation			<i>Personal mode</i>	Car, motorcycle, cycle.

### 5.2.3 Limits of the specification

This document concentrates on data domains of use for the alternative modes of operation: vehicle sharing, vehicle pooling.

Vehicle rental and taxi are only partly considered.

The correspondence with the Commission Delegated Regulation (EU) 2017/1926 is provided in the table above.

This document does not cover Flexible Transport, as it is already covered by EN 12896 series.

Two following types of usage as regards cycle sharing car sharing and car-pooling have been identified: the mobility of persons; and the transportation of goods. This document considers mobility of persons only.

Types of vehicles considered are referred to in Subclauses 5.5.1 and 5.6.1

The data model focuses at the functional domain (Traveller) Information Provision mainly, in order to satisfy the requirements of the Delegated Regulation (EU) 2017/1926 mentioned above and covers partly data requirements of the functional domain Traveller Services (see Figure 3).

Operational Services are not in scope of this document.

### 5.3 Links to Mobility as a service

#### 5.3.1 Mobility as a service (MaaS)

Since the advent of the personal computer, the internet and more latterly, the smartphone, consumer experiences have become increasingly integrated, and there has become an expectation of greater integration.

As well as an expectation of an integrated experience, there is also a trend towards purchasing services. For example: whereas a meal has been traditionally prepared in the home, it is increasingly common to now buy a meal as a delivered service, ordered from a restaurant online and delivered to one's door by a delivery company as an integrated service, the whole service often provided by an online service provider.

In transportation, however, systems, and until recently user expectations, have been monothetic (based around one theme). "I am going to visit my brother.": "How will you get there?" "I am going by train" or "I will take a bus" or "I will drive over" etc.; in the event however, users are likely to also employ a car to get to the station, or use a combination of bus and a train, etc.; but these have not provided the joined up integrated service experience now expected in other aspects of life.

Increasingly, and especially in the urban setting, multiple modes of transport are used; and with the advent of car sharing, carpooling, cycle sharing, the number of modes, and mode combinations, have multiplied.

By applying the same 'integrated service' logic to the transport sector, because of technology change and the opening up and sharing of transport data sets, considerable 'value' can be added to the travellers experience by the provision of "mobility as a service" (MaaS), i.e. using a digital interface to source and manage the provision of transport related service(s) to meet the mobility requirements of a customer. A MaaS Provider offers its customer the travel experience using any, and probably multiple, types of transport service, public or private, in order to optimize the travel experience. This is all enabled by technological advancement, combined with the rise of new business models to provide Mobility as a Service (MaaS). Innovation is expected to lead to new MaaS offerings for the consumer; market conditions will shape which are made available.

Tailored travel options can be provided using the fastest route, the lowest cost route, most direct route, most environmentally friendly, or most accessible service for persons with reduced mobility, or those travelling with children.

Travellers will no longer need to collect and keep timetables to work out the most optimal connections between transport modes. Personalized smartphone apps designed to serve travellers delivering information in real-time to assist in avoiding congestion and delays and enable the customer to choose a travel option according to the specific travel requirement.

One MaaS possibility is the scenario where MaaS Providers offer consumers a service focussed on vehicle transport e.g. taxi, car sharing and carpooling services. The other possibility is a scenario where consumers are offered a fully intermodal service, i.e. combining different modes of transport.