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Javni prevoz - Referenčni podatkovni model - 3. del: Časovne informacije in razporejanje vozil

Public transport - Reference data model - Part 3: Timing information and vehicle scheduling

Öffentlicher Verkehr - Datenreferenzmodell - Teil 3: Taktinformationen und Fahrzeugdisposition

Transports publics - Modèle de données de référence - Partie 3 : Informations horaires et horaires des véhicules

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English Version

Public transport - Reference data model - Part 3: Timing information and vehicle scheduling

Transports publics - Modèle de données de référence - Partie 3 : Informations horaires et horaires des véhicules

Öffentlicher Verkehr - Datenreferenzmodell - Teil 3: Taktinformationen und Fahrzeugdisposition

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 12896-3:2026 E

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European foreword

This document (EN 12896-3:2026) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2027, and conflicting national standards shall be withdrawn at the latest by January 2027.

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

This document supersedes EN 12896-3:2016.

Annex C provides details of the significant technical changes between this document and EN 12896-3:2016.

This document is part of the European standard series EN 12896, known as “Transmodel”. This is a series of documents that comprises the following parts:

— EN 12896-1, Public transport - Reference data model - Part 1: Common concepts

— EN 12896-2, Public transport - Reference data model - Part 2: Public transport network

— EN 12896-3, Public transport - Reference data model - Part 3: Timing information and vehicle scheduling

— EN 12896-4, Public transport - Reference data model - Part 4: Operations monitoring and control

— EN 12896-5, Public transport - Reference data model - Part 5: Fare management

— EN 12896-6, Public transport - Reference data model - Part 6: Passenger information

— EN 12896-7, Public transport - Reference data model - Part 7: Driver management

— EN 12896-8, Public transport - Reference data model - Part 8: Management information and statistics

— EN 12896-10, Public transport - Reference data model - Part 10: Alternative Modes

Together these documents create Transmodel version 6.2 and thus replace Transmodel V6.0.

In addition to the nine normative parts of this series, a Technical Report (Public Transport – Reference Data Model – Informative Documentation) was published in 2016 under the reference CEN/TR 12896-9. It provides additional information to help those implementing projects involving the use of Transmodel. It is intended that this Technical Report will be extended and republished as soon as all the normative parts are revised.

The split into several documents is intended to ease the task of users interested in particular functional domains. It corresponds to the modularisation of Transmodel into functionally related parts, each made up of distinct UML packages and subpackages that describe a particular aspect of public transport. The NeTEx UML model follows the same modularisation, allowing a direct mapping from the conceptual model to the implementation.

For information on the conventions, methodology and notations for conceptual modelling, for a clear overview to help understand the core principles, structure and purpose of Transmodel, and for information on the Functional domains and Modes of operation, refer to EN 12896-1.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom

1 Scope

The present document is composed of the following data packages:

— journey and Interchange;

— vehicle Journey Assignment;

— journey Times;

— block and Vehicle Service;

— dated Journey;

— explicit Frame.

This document itself is composed of the following parts:

— main document representing the data model for the concepts shared by the different domains covered by Transmodel (normative);

— Annex A containing the data dictionary and attribute tables, i.e. the list of all the concepts presented in the main document together with their definitions (normative);

— Annex B presenting the model evolution (informative);

— Annex C, providing details of the significant technical changes between this document and EN 12896-1:2015 (informative)

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, *Public transport - Reference data model - Part 1: Common concepts*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12896-1 and the following apply.

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/

3.1.1
headway
interval between vehicles servicing a route and hence between the arrival of services at a stop

3.1.2
relief
person taking the place of another person as responsible for a certain task (such as driving a bus)

3.1.3
run time
time taken for a vehicle to go between two points

Note 1 to entry: In Transmodel a run time may be specified for the individual SERVICE LINK between two stops and for the whole journey pattern.

3.1.4
wait time
time interval a vehicle spends waiting at a timing point such as a stop in the course of a journey, as distinct from the run times spent moving between the points

3.2 Abbreviations

API	Application Programming Interface
AVM	Automatic Vehicle Monitoring
AVMS	Automatic Vehicle Monitoring System
GIS	Geographical Information System
GPS	Global Positioning System
HTTP	Hypertext Transfer Protocol
IFOPT	Identification of Fixed Objects in Public Transport
ISO	International Standards Organization
IT	Information Technology
NeTEx	Network and Timetable Exchange
PT	Public Transport
PTO	Public Transport Operator
OJP	Open API for Distributed Journey Planning
OpRa	Operating Raw Data and statistics exchange
SIRI	Service Interface for Real-time Information
TM	Transmodel
UML	Unified Modelling Language
URI	Uniform Resource Identifier
URL	Universal Resource Locator
VDV	Verband Deutscher Verkehrsunternehmen (Germany)
WGS	World Geodetic Standard

4 General information

The following standards are based on the Transmodel conceptual data model for public transport domain to provide a harmonized, interoperable, and consistent approach for public transport data, service interfaces, and journey planning across Europe:

— EN 15531 (series) [10] to [16] – Service interfaces for real-time public transport operations.

— CEN/TS 16614 (series) (NeTEx) [17] to [22] – Network and timetable data exchange, including passenger information and accessibility.

— CEN/TS 17118 [23] – Open API for distributed journey planning.

5 Timing information and vehicle scheduling data domain

5.1 Introduction

The work of the vehicles necessary to provide the service offer advertised to the public consists of service journeys and dead runs (unproductive journeys are necessary to transfer vehicles where they are needed, mainly from the depot into service and vice versa). Vehicle journeys are defined for day types rather than individual operating days. A day type is a classification of all operating days for which the same service offer has been planned. The whole tactical planning process is seen on the level of day types in the reference data model, with all entities necessary to develop schedules. These include a series of entities describing different types of run times and wait times, scheduled interchanges, turnaround times etc.

Chaining vehicle journeys into blocks of vehicle operations, and cutting driver duties from the vehicle blocks, are parts of the main functions of vehicle scheduling and driver scheduling, respectively. The corresponding entities and relationships included in the reference data model allow a comprehensive description of the data needs associated with this functionality, independently of the particular methods and algorithms applied by the different software systems.

5.2 Overview - Model and document structure

The timing information model is splits into four main sub-models defined as UML packages.

— Journey and journey times model: describes the time-related information at the level of vehicle journeys, i.e. planned timing for the vehicles at day-type level. It splits into:

  — vehicle journey model;

  — service journey model;

  — time demand times model;

  — journey timing model ;

  — journey pattern times model;

  — vehicle journey times model;

  — interchange model;

  — interchange rule model;

  — coupled journey model;

- flexible service model;
- journey accounting model;

— dated journey model: describes the link of the timing information for a single operating day and the day type related timing;

— passing times model: describes all the different types of passing times for the day type related information;

— vehicle service model: describes the information related the work of vehicles as planned for day types. It constitutes the main part of the vehicle scheduling data domain.

5.3 Journey and journey times

5.3.1 Vehicle journey

5.3.1.1 Vehicle journey – Conceptual model

5.3.1.1.1 General

The daily operation of a vehicle is described by VEHICLE JOURNEYs. A VEHICLE JOURNEY is the planned movement of a type of public transport vehicle using a specified JOURNEY PATTERN on a particular ROUTE. This movement is made between the first and the last POINTs IN JOURNEY PATTERN. Being defined for a DAY TYPE (see EN 12896-1, Public transport - Reference data model - Part 1: Common concepts), a VEHICLE JOURNEY is a class of journeys that would take place at the same time on each day of a specific DAY TYPE. The type of intended public transport vehicle is indicated by a VEHICLE TYPE, TRAIN or COMPOUND TRAIN.

5.3.1.1.2 Basic-vehicle journey

There are two different main types of VEHICLE JOURNEYs: passenger-carrying SERVICE JOURNEYs and non-service DEAD RUNs.

— A SERVICE JOURNEY is a VEHICLE JOURNEY on which passengers will be allowed to board or alight from vehicles at stops. These journeys are usually published and known by passengers.

— A DEAD RUN may be necessary for the vehicle to proceed from the PARKING POINT (see. EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology) at which it was parked to the first SCHEDULED STOP POINT of the JOURNEY PATTERN (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology) where it will start its service operation. In the opposite direction, a DEAD RUN may relate the last SCHEDULED STOP POINT the vehicle has stopped at (finishing its service) to the PARKING POINT where it will be parked. A DEAD RUN may also occur when a vehicle changes from one ROUTE (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology) to another one in order to continue its service there, or for various other reasons.

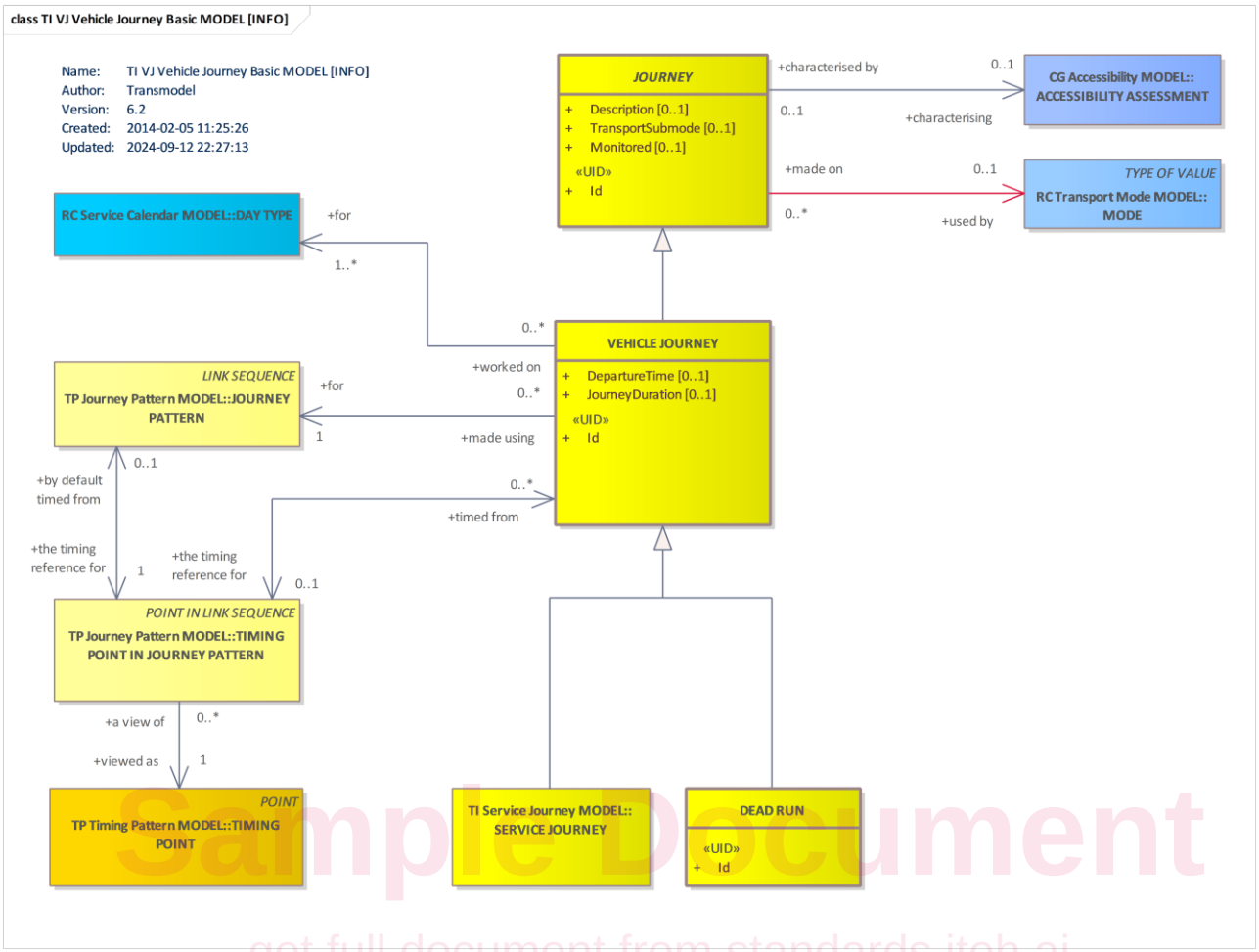

Figure 1 — Vehicle Journey – Basic MODEL (INFO)

5.3.1.1.3 Vehicle journey details – Conceptual model

A VEHICLE JOURNEY may be further defined by a number of other elements, as shown in Figure 4. These include interactions with other journeys (JOURNEY PART, JOURNEY MEETING, etc.); temporal and other conditions (DAY TYPE, VALIDITY CONDITION, see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology; further descriptive and classification information (TRAIN NUMBER, PRODUCT CATEGORY, TYPE OF SERVICE, stops etc.); and operational data (BLOCK).

A TEMPLATE JOURNEY allows a set of VEHICLE JOURNEYs to be defined that follow a common temporal pattern.

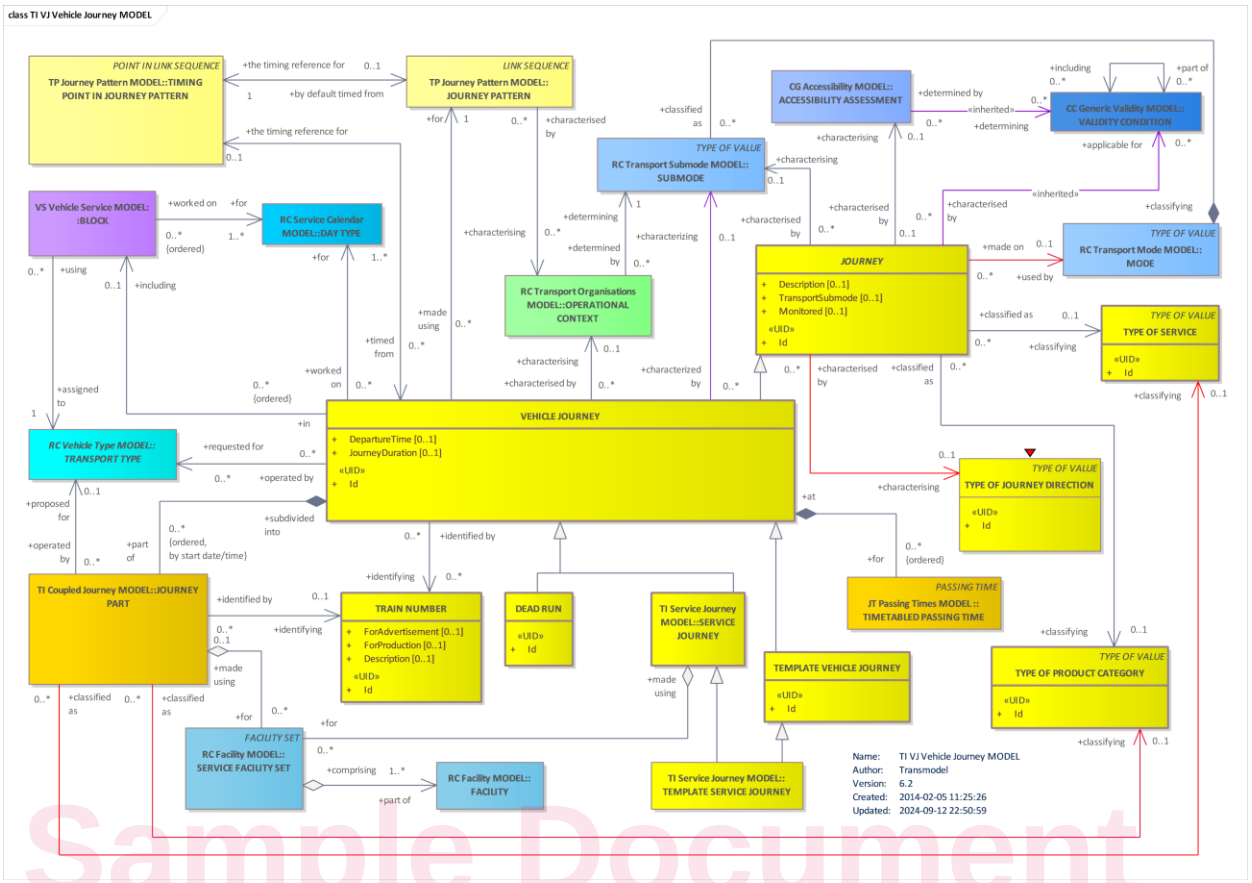

Figure 2 — Vehicle Journey MODEL

5.3.1.2 Vehicle journey notice assignment

For passenger information (or sometimes driver information) purposes, it is often useful to attach remarks to various parts of the supply (a point, a line, a section, etc.). For instance, the fact that a shortened journey pattern is used exceptionally may be emphasized. Such remarks are usually printed as footnotes on public timetables at stops, timetable booklets or, for driver information, on driver cards.

The entity NOTICE (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology). describes such remarks. It may concern any entity, e.g. a whole LINE, or a GROUP OF POINTS.

More frequently, a NOTICE will be assigned to a JOURNEY PATTERN, a COMMON SECTION (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology), or even a specific VEHICLE JOURNEY. In such a case, the same NOTICE often will be assigned to several objects (e.g. to several consecutive VEHICLE JOURNEYs).

Moreover, the validity of a NOTICE, for instance on a JOURNEY PATTERN or a COMMON SECTION, may be restricted from a POINT IN JOURNEY PATTERN, or to another POINT IN JOURNEY PATTERN.

The entity NOTICE ASSIGNMENT (see EN 12896-1, Public transport - Reference data model - Part 1: Common concepts) describes these spatial or operational assignments. Only the most frequent assignments are represented in the model. Other may be added using the same construction.

A NOTICE ASSIGNMENT may be subject to various other conditions of validity (such as DAY TYPE, TIME BAND), represented by VALIDITY CONDITIONs.

A NOTICE has a different meaning than a DESTINATION DISPLAY (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology). The first is designed to specify some characteristics of a journey or a journey pattern which are likely to evolve. They are in most cases printed in leaflets but may also be queried by dynamic trip planning tools. A DESTINATION DISPLAY corresponds to stable information attached to a JOURNEY PATTERN, for instance the destination announcement displayed on bus head signs

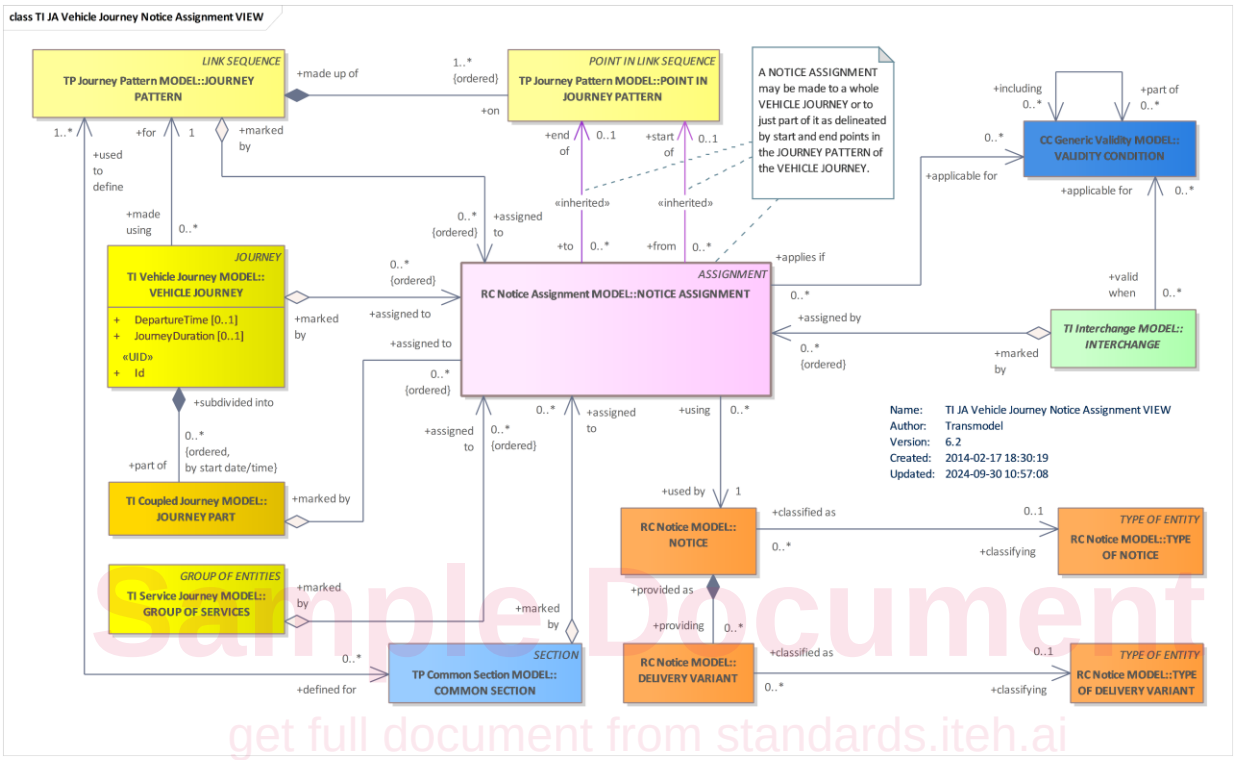

Figure 3 — Vehicle Journey Notice Assignment – VIEW

5.3.2 Service journey

5.3.2.1 Service journey – Conceptual model

A SERVICE JOURNEY is a VEHICLE JOURNEY on which passengers will be allowed to board or alight from vehicles at stops. There are several different possible ways to define SERVICE JOURNEYs, in particular the two following:

— as the service between an origin and a destination, as advertised to the public;

— as the longest service during which a passenger is allowed to stay on the same vehicle.

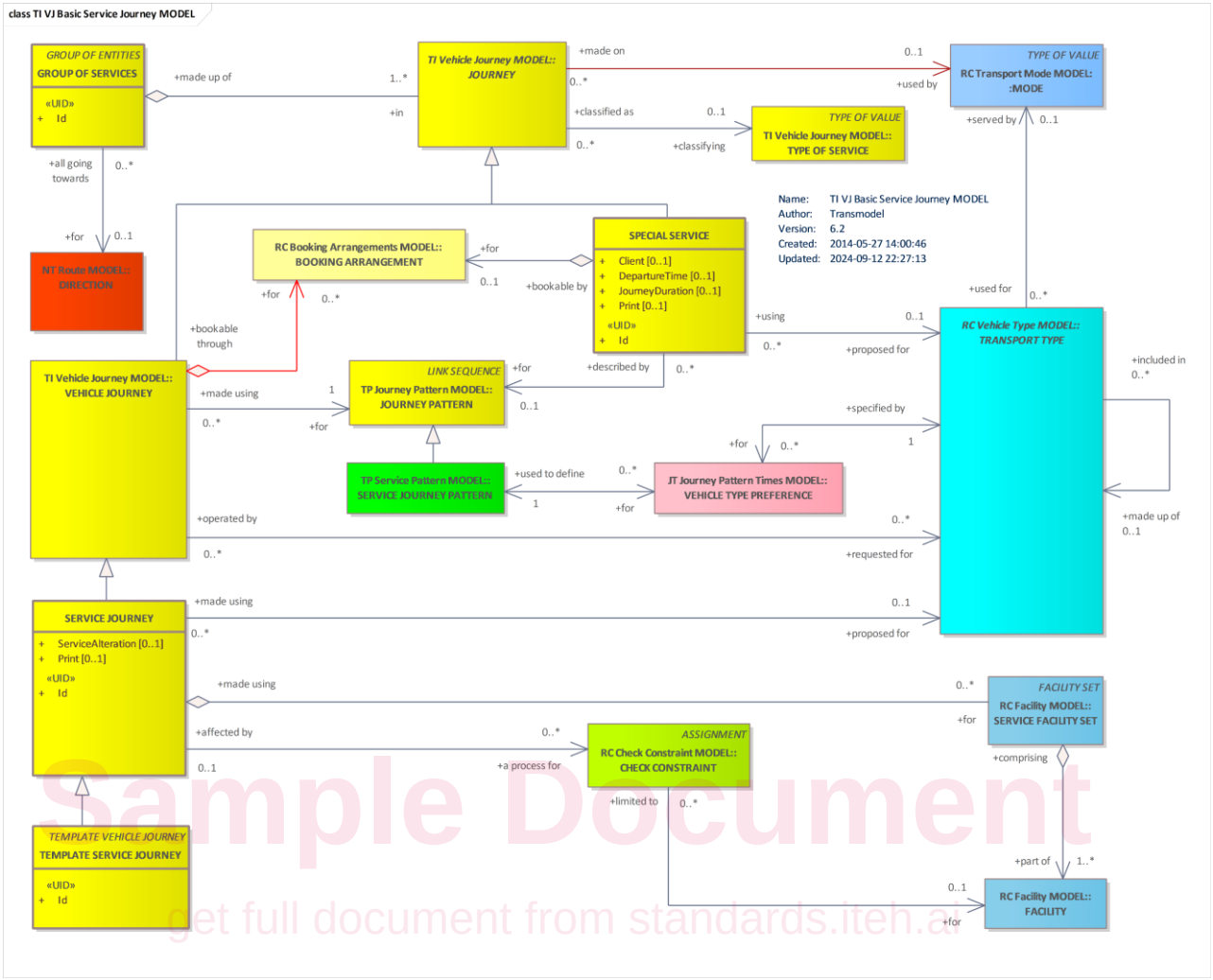

Figure 4 — Basic Service Journey MODEL

In addition to the distinction between SERVICE JOURNEYs and DEAD RUNs, operators may wish to classify VEHICLE JOURNEYs by further criteria. For these purposes a TYPE OF SERVICE may be assigned to a VEHICLE JOURNEY, which would express other common properties (e.g. “journey at the maximum load period”).

A default VEHICLE TYPE (see EN 12896-1, Public transport - Reference data model - Part 1: Common concepts) may be proposed for a journey, chosen according to the time of day at which a SERVICE JOURNEY takes place, and the ROUTE and JOURNEY PATTERN (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology) it covers. The proposed VEHICLE TYPE preferably will be taken into account by the scheduling algorithm used to compile blocks of vehicle operation. The choice of such a preference may take into account a ranked list of VEHICLE TYPEs for each SERVICE JOURNEY PATTERN. This is described by the class VEHICLE TYPE PREFERENCE, depending on a particular SERVICE JOURNEY PATTERN, for which a priority ‘rank’ is given for each VEHICLE TYPE, for each DAY TYPE and TIME DEMAND TYPE.

SERVICE JOURNEY INTERCHANGE (the scheduled possibility for transfer of passengers between two SERVICE JOURNEYs at the same or different SCHEDULED STOP POINTs) occurring on the SERVICE JOURNEY and facilities (grouped in a SERVICE FACILITY SET) available for the SERVICE JOURNEY, are also important related information, especially when advertising to the public.