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BSI Standards Publication

Intelligent transport systems — Public transport user information

Part 3: Use cases for journey planning systems and their interoperation

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National foreword

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TECHNICAL REPORT

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Intelligent transport systems — Public transport user information —

Part 3: Use cases for journey planning systems and their interoperation

Systèmes intelligents de transport —

Partie 3: Cas utiles pour les systèmes de planification de voyage et leur interopération

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 documents 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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 204, *Intelligence Transport Systems*.

ISO 17185 consists of the following parts, under the general title *Public transport user information*:

— *Part 1: Standards framework for public information systems*

— *Part 3: Use cases for journey planning systems and their inter-operation* [Technical Report]

The following parts are under preparation:

— *Part 2: Data and interface standards catalogue and cross reference* [Technical Report]

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Introduction

ISO/TC 204, *Intelligent Transport Systems*, has been discussing enhancement of surface public transport information provision to surface public transport users including international travellers around the world by using ITS technology.

The responsibility of ISO/TC 204 is make surface public transport more convenient by realizing stress-free surface public transport user information provision, and hence, the technical committee has been working to develop one set of international standard and several technical reports which are defining basic framework and practical uses cases that will fit above current national and regional standards as a reference. The accepted national and regional standards (at this point in time, such as TCIP and TRANSMODEL) will be allowed to define the specific information interfaces such as data format, stop point numbering system, etc. that are necessary to implementation of surface public transport information systems.

The set of International Standard and Technical Reports will be beneficial for all ISO/CEN member countries as well as non ISO/CEN member countries. The International Standard/Technical Reports will be a valuable reference to detail basic framework as well as highlight and encourage use of currently available national and regional standards such as TRANSMODEL, TCIP, and possibly others. The intention is that, by deploying these national and regional standards by other countries or regions, duplication of cost and time is avoidable. For those countries that do not have surface public transport information standards, this approach allows more rapid development and deployment of public transport systems that enhance usability and convenience.

ISO 17185 is specifically set at a higher level, or reference and not aiming harmonize currently available national and regional standards to allow use of these robust standards which are set at various levels (for example implementation specifications versus application level standards) but which also experience widespread acceptance in their regional standards. This International Standard intends to establish a basic solid foundation for surface public transport user information provision framework and is specifically limited to this scope to avoid conflict with those currently available regional standards.

ISO 17185 is intended to be fully consistent with those currently available national and regional standards which may be related to international public transport. In fact, in the case of international surface public transport, public transport operators already have transport-related information systems. However, public transport users, including international travellers, are often not provided with static and real time information including bus/train/tram locations in an appropriate and timely manner. ISO 17185, and its scope and approach, will solve this issue by setting basic framework for public transport information provision while embracing existing national and regional standards.

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Intelligent transport systems — Public transport user information —

Part 3: Use cases for journey planning systems and their interoperation

1 Scope

The purpose of this part of ISO 17185 is to define high level general requirements of journey planning systems by standardizing use cases.

This part of ISO 17185 defines basic requirements for implementing the journey planning system, from the viewpoint that the public transport users should be provided with convenient tool to make his or her journey more efficient ones. In order to realize the desirable journey planning system, public transport information has to be efficiently processed and provided to public transport users in an appropriate way by using currently available regional standards.

This part of ISO 17185 does not standardize specific information interfaces such as data format or a stop point numbering system and so on but currently available regional standards established by regional and national groups are suggested to be applied.

ISO 17185 is composed of the following parts:

— Part 1: Standards framework for public information systems: (International Standard)

— Part 2: Data and Interface standards catalogue and cross reference: (Technical Report)

— Part 3: Use cases for journey planning systems and their inter-operation: (Technical Report)

2 Normative references

There are no normative references.

3 Terms and definitions

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

3.1
administrator
person charged with the installation, configuration, and management of a computer system, network, storage subsystem, database, or application

[SOURCE: ISO/IEC 24775:2011, 2.1.4, modified]

3.2
data
reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing

Note 1 to entry: Data can be processed by humans or by automatic means. [ISO/IEC 2382-1:1998, (01.01.02)]

[SOURCE: ISO/IEC 15944, modified]

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3.3
database
collection of electronically stored descriptive records or content units (including facts, full texts, pictures, and sound) with a common user interface and software for the retrieval and manipulation of the data

Note 1 to entry: The units or records are usually collected with a particular intent and are related to a defined topic. A database can be issued on CD-ROM, diskette, or other direct-access method, or as a computer file accessed via dial-up methods or via the Internet.

Note 2 to entry: Licensed databases are counted separately even if access to several licensed database products is effected through the same interface.

Note 3 to entry: A common interface providing access to a packet of serials or digital documents, usually offered by a publisher or vendor, is also to be counted as database. Additionally, the single serials or digital documents should be counted as serials or digital documents. [ISO 2789:2006, 3.2.10]

[SOURCE: ISO 9707, modified]

3.4
data model
graphical and/or lexical representation of data, specifying their properties, structure, and inter-relationships

[SOURCE: ISO/IEC 11179, modified]

3.5
entity
concrete or abstract thing that exists, did exist, or might exist, including associations among these things

EXAMPLE: A person, object, event, idea, process, etc.

Note 1 to entry: An entity exists whether data about it are available or not. [ISO/IEC 2382-17:1999, (17.02.05)]

[SOURCE: ISO/IEC 15944, modified]

3.6
fare collection
all activities related to the collection of money from passengers

3.7
framework
structure expressed in diagrams, text, and formal rules which relates the components of a conceptual entity to each other

[SOURCE: ISO 19439:2006, 3.3, modified]

3.8
function
intended effect of a system, subsystem, product, or part

[SOURCE: EN 1325-1:1997]

Note 1 to entry: Functions should have a single definite purpose. Function names should have a declarative structure (e.g. “Validate telecommands”), and say “what” is to be done rather than “how”. Good naming allows design components with strong cohesion to be easily derived.

[SOURCE: ISO 16091, modified]

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3.9
functional area
combination of groups and/or elements in a unit that can be used independently

[SOURCE: ISO 16952, modified]

3.10
IC
integrated circuit
a small piece of semiconductive material that contains interconnected electronic elements

[SOURCE: ISO/IEC 2382-1, modified]

3.11
logical data model
data design, that takes into account the type of database to be used, but does not consider means of utilisation of space or access

3.12
management information
information utilized by management or produced to serve a management function

[SOURCE: ISO 6707-2, modified]

Note 1 to entry: In this part of ISO 17185, this term means all activities allowing the company management to collect the information necessary to meet problem-solving needs. Data of operational systems are filtered and aggregated for this purpose, and made available to the user interactively, or in form of pre-defined reports and summaries. Such functions are in principle related to all functional areas of a company, with particular reference to the management of statistical results.

3.13
operations monitoring and control
all activities related to the transportation process, i.e. real-time functions related to the driving and transportation of passengers according to given instructions, including the monitoring of the driving process and its control in case of deviations, as well as all activities that support the driving process (traffic light priority, track switching, bay selection, advance/delay advice, etc.)

Note 1 to entry: Such functions are often assisted by computer-aided tools, known as Automated Vehicle Monitoring (AVM).

3.14
passenger information
activities related to informing the users either on the planned or on the actual transportation services

3.15
personnel disposition
activities related to the mid-term and short-term management of drivers

3.16
scheduling
method of controlling the timing of the execution of a scheduled activity within or represented by a managed object

[SOURCE: ISO/IEC 10164, modified]

Note 1 to entry: In this part of ISO 17185, this term means all activities related to the tactical planning of transportation, splitting into vehicle scheduling, driver scheduling, rostering.

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3.17
use case
sequence of actions that an actor (usually a person, but perhaps an external entity, such as another system) performs within a system to achieve a particular goal

[SOURCE: ISO/TR 25102, modified]

3.18
user
entity that uses ITS services provided by a service provider

[SOURCE: ISO 24101-1:2008, 3.13, modified]

4 Symbols and abbreviated terms

AVL	automatic vehicle location
BISON	Beheer Informatie Standaarden OV Nederland, Netherlands public transport information standards management platform
CEN	European Committee for Standardization
DE	Germany
EU	European Union
GPS	global navigation system
IEC	international electro-technical commission
IFOPT	identification of fixed objects in public transport, CEN published standard (EN 28701)
ISO	international organization for standardization
ITS	intelligent transport systems
JP	Journey planning
NaPTAN	National Public Transport Access Nodes, GB national system for uniquely identifying all the points of access to public transport in GB
NEPTUNE	French standard (PR NF 99-506) for format describing public transport routes
NeTEx	Network Exchange, EN TC278 WG3 standard currently in development and the goal is to provide efficient European wide standard for exchanging public transport schedules and related data.
POI	point of interest
PT	public transport
SIRI	service interface for real time information, CEN technical specification (TS 15531)
TCIP	transit communications interface profiles, US standard developed by APTA and is for introducing advanced ITS technologies into public transport to improve safety, security, and efficiency

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Transmodel	CEN standard (EN 12896) for reference data model for public transport information and it provide an abstract model of common public transport concepts and data structures that can be used to build many different kind of public transport information system, including for timetabling, fares, operational management, real time data, journey planning, etc.
TransXChange	GB nationwide standard for exchanging bus schedules and related data

5 General requirement

This part of ISO 17185 describes use cases for journey planning systems and their inter-operation of PT user information provisions for PT users, the customers. For the detailed data and interface standards catalogues and cross reference, which fits to those who do not have their own regional and national standards, refer to ISO/TR 17185-2.

5.1 Importance of PT user information provision

PT service operator shall play an important role in surface transport as the society fully depend upon privately-owned cars has its own limitation such as high environmental impact, increasing number of accidents related to aged drivers, and shrinking economy due to scattered population.

The issue of the current PT to be solved varies country to country or city to city, but the following common vision can be observed. From PT service operator view point, benefit/cost factor can be kept high by deploying ITS technologies such as simple and efficient fare transaction device, priority traffic control signal system, etc. From PT user, the customer, view point, PT use shall be more attractive than driving his/her own cars by improving PT transport speed and reducing PT fare, and by providing attractive PT user information to PT users, the customers.

When providing PT user information, it is important to understand that there are various types of customers and their needs vary between customer types. In local resident, there are two types, one who does not know how to use PT, the other who knows basic information and understands that PT is reliable transport means in time and safety. Usually visitor is not familiar with local PT and convenient, accessible and easy to use PT service and information. Therefore, PT user information provision framework shall be designed to accommodate those various needs.

Various PT information provision projects are under practical use, and the project status reports are commonly shared internationally to improve PT user information provision system continuously throughout the world.

There are several key issues concerning PT when creating “PT user” friendly society, namely;

— attractive PT user information provision to potential PT user, the customers;

— attractive PT contactless card system;

— efficient and attractive PT service in timetabling and service route;

— good relationship between regional transit regulator and PT service operator;

— better relationship between PT driver and PT service operator by deploying ITS technologies.

Therefore, defining basic PT user information provision framework, which is commonly acceptable internationally, is indispensable for both of advanced and emerging countries, where PT user information provision system improvements are needed. This is the purpose of ISO 17185-1.

The PT user information provision service architecture and required standards needed varies country to country and therefore, this international standard is not defining new rules but provide basic framework guide lines which shall be referred when such PT information provision system is implemented.

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This part of ISO 17185 describes detailed use cases of journey planning systems and their inter-operation. For the detailed data and interface standards catalogues and cross reference, which fits to those who do not have their own regional and national standards, refer to ISO/TR 17185-2.

5.2 Objectives of ISO 17185

The objectives of ISO 17185 are defined as follows.

Part 1: Define the high level stakeholder roles and responsibilities and their PT user information exchanges.

Part 2: Define data interface message comparison.

Part 3: Define use cases for journey planning systems and their inter-operation where in the worldwide standards apply and it may include exchange of information using nomadic devices

Overall, in ISO 17185, it describes a framework to facilitate inter-operability of public transport-related information using different national/regional standards, off the shelf of use of standards, help to guide evolution of standards worldwide to a common framework, identify gaps in existing standards and translate between existing standards to facilitate PT users including worldwide travellers.

This is accomplished through, definition of the high level stakeholder roles and responsibilities and PT user information exchange, data and interface message comparisons, use cases wherein the worldwide standards apply.

5.3 Roles and responsibilities of basic actors in journey planning system

As described in ISO 17185-1, the basic actors of PT journey planning system are shown in Figure 1 below. In the basic PT JP (journey planning) system, four major basic actors are defined as shown in Figure 1. This is shown as basic system framework as an example and at actual system implementation phase, some of those actors shall be modified to fit to each countries service requirements and circumstances.

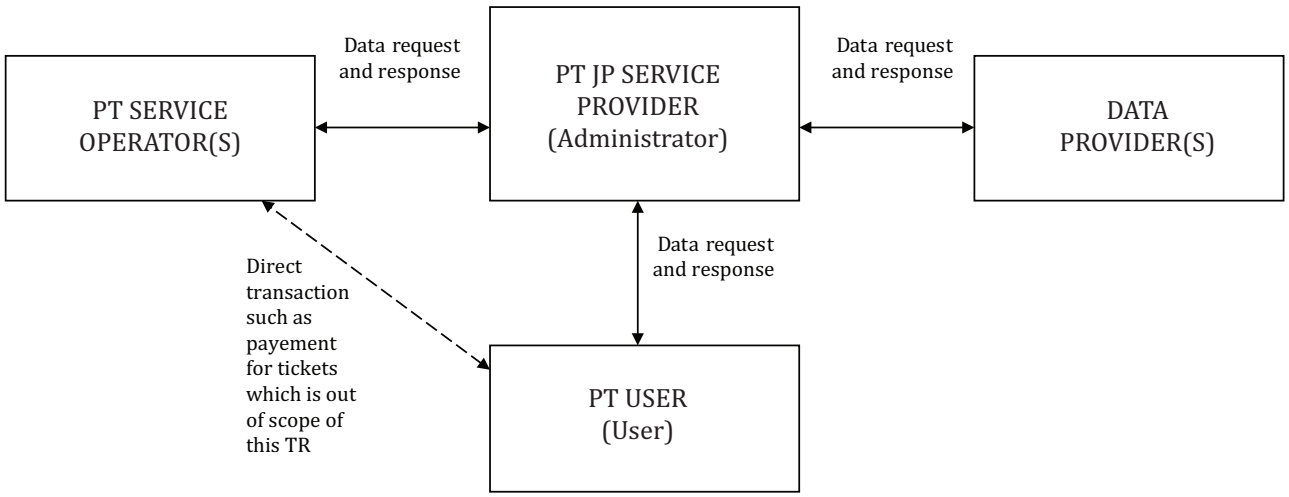

Figure 1 — Basic actors in PT JP system

5.3.1 PT service operator

PT service operator is an entity who operates PT service and in the PT JP system, its function is to provide accurate and up-to-date PT information, such as bus stop/station, vehicle location, scheduled service, ticketing, fare, reservation status, payment status to PT JP service provider. The PT JP service provider sends PT users seat reservation request to PT service operator and receives request results.

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The PT USER access such information through PT JP service provider. This entity is composed of the following sub actors:

a) transport service provider;

b) transport service manager;

c) transport operation manager.

For more details, refer to ISO 17185-1.

5.3.2 PT JP service provider

PT JP service provider is an entity who gathers single or multiple modes (such as bus, train, airplane, tram, metro) and/or single or multiple PT service operators data and provide value added PT JP service to PT user through internet for PC and mobile device and digital TV network. The PT JP service provider for multimodal is often called multi-modal JP service provider. When data format is deferent from PT service operator to PT service operator, data conversion function shall be added in the data line from PT service operator(s).

Responsible for the provision of PT JP information services to PT users or others. Those services may be including journey route search (such as bus stop/station, route, travel time, fares, mobility restricted information), reservation status, payment status, schedules service, ticketing, vehicle location, etc. The major communication link to PT user is currently done through internet with WEB service.

Administrator of PT JP service provider shall perform the system maintenance for updating the system database and improving the services quality.

5.3.3 Data provider

Data provider is an entity who gathers multiple type of information, such as interchange information, such as length and time of foot path between stop points, stairs, escalators, lifts, information for challenged people (or people with big suite case, baby buggy, etc.), disruption information to escalators, lifts, blockages of corridors, access to stop points, etc., graphs for calculating pedestrian (and optional park and ride and cycle and ride) routes from and to the PT station, disruption information for the foot path from and to the stations (plus optional park and ride, cycle and ride, cycle, etc.), addresses, POIs, regional names, zoom able background maps for display. This actor may be private sector or municipal, state, federal government body.

5.3.4 PT user

PT user is a human who use PT service. When a PT user provides geographical location data such as GPS location data to PT JP service provider, the PT user can receive real time route navigation service through mobile device such as smart phone. The PT user is responsible to plan/define journey plan, find best transport route, re-plan journey when needed. In the use cases description defined in 5.4.4, it is described as “user”.

5.4 Use cases description of journey planning system

The use case descriptions of the journey planning systems and their inter-operations shall be defined as shown below. Use cases defined in ISO 17185 are described as informative purpose only and in the real implementation of the journey planning systems, some of these use cases shall be modified to fit each PT service requirements and circumstances.

These use cases described in this part of ISO 17185 do not preclude any “presentation layer” format such as web, mobile web, interactive voice response (phone), or kiosk. A presentation layer represents user interface capabilities as shown in Figure 2 below.

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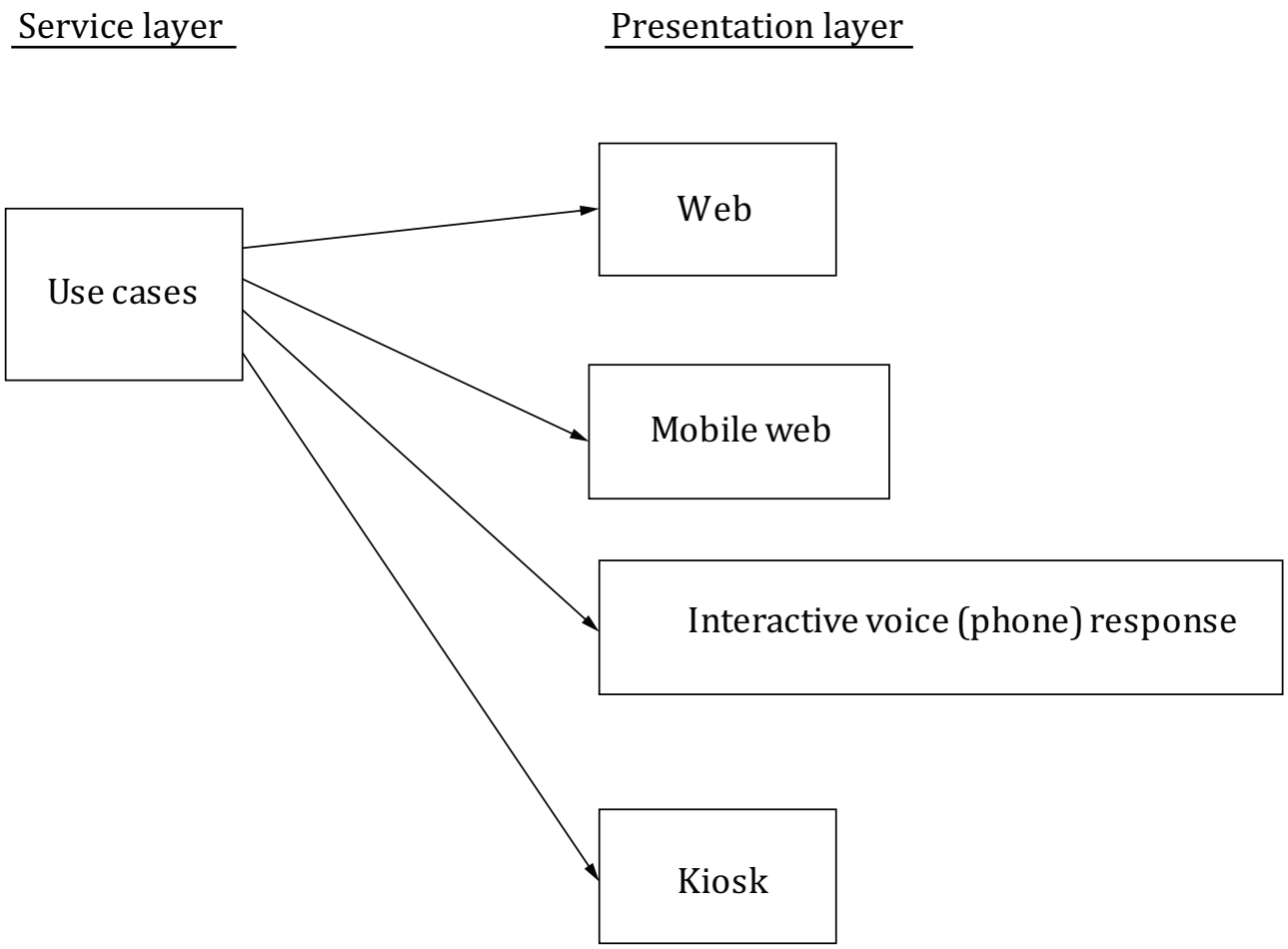

Figure 2 — Service layer and presentation layer

5.4.1 Methodology used for the use case definition

Each use case definition is described in same type of table as shown below. This table shows what each item means. Although these use cases are described based upon a PC web type presentation layer service interface, when implement the journey planning systems, all other modes of presentation methods can be adopted, such as mobile web, interactive voice (telephone) response and kiosk.

Use Case	**Name of each use case**
Description	Brief description of system inter-action when this use case is performed
Actor	Who initiate to make the system start this use case into action
Assumptions	Condition right before this use case has been started
Interactions	Step by step description of system inter-actions when this use case is performed
Results	Description of the result right after this use case has been performed
Issues	The statement of issues to make this use case perform better; System improvements Service improvements Performance improvements
UML diagram	Use case diagram. Following is shown for journey planning system general use case.

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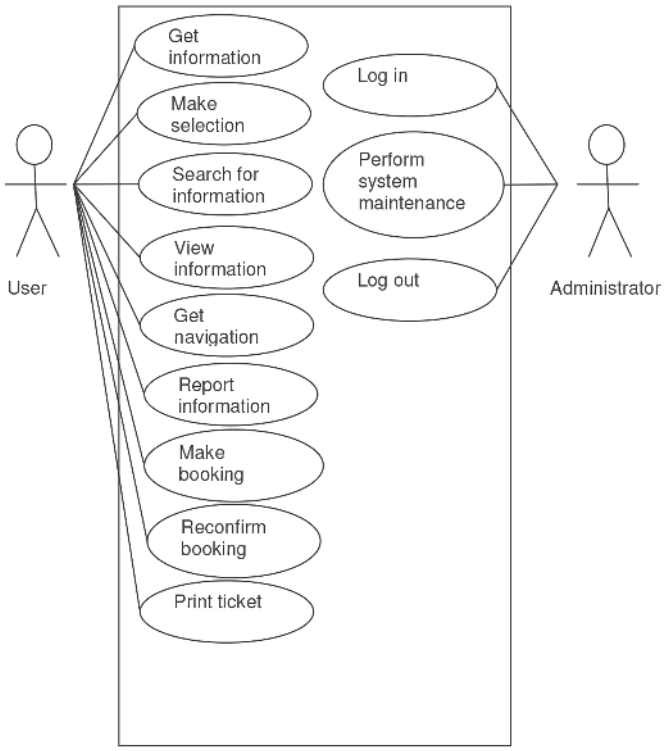
Use Case	Name of each use case
	

5.4.2 Use case categorization

In this part of ISO 17185, following use cases are defined. Each use case can be categorized as follows:

a) User use cases

1) Read Instructions : information
2) Select Type of Public Transport : selection
3) Select Departure stop/station : selection
4) Select Destination stop/station : selection
5) Select Via stop/station : selection
6) Select Date : selection
7) Select Time : selection
8) Select Preference : selection
9) Select Combination Type of Walking and Driving : selection
10) Select Walking Speed : selection
11) Select Preference of Wheelchair Use : selection
12) Search for Journey : search
13) Search for Next Departure Service : search
14) Search for Previous Departure Service : search

This key user interface of journey planning system will include most of these selection menus (2) through 11)) on same window so that users can easily and conveniently do their preference selection for journey planning search in a convenient way.

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15) View Journey on Map : information

16) View Real Time Route Navigation : information

17) Search for Return Journey : search

18) Return to New Search : search

19) View Scheduled Service Information : information

20) View Real Time Service Station/Stop Information : information

21) View Real Time Route/Line Information : information

22) View Detour Information : information

23) View Incident Information : information

24) View Delay Information : information

25) Report User Real Time Information : report

26) View User Reported Real Time Information : information

27) View Vehicle Location on Map : information

28) View Seat Availability : information

29) Book Seat Reservation : reservation

30) Reconfirm Seat Reservation : information

31) Confirm Payment Status : information

32) Print Ticket : print

Subscription (push type status information) information

b) Administrator use cases

1) System Log-in : operation

2) Add Stop/Station : maintenance

3) Delete Stop/Station : maintenance

4) Commission Stop/Station : maintenance

5) Close Stop/Station : maintenance

6) Add Route/Line : maintenance

7) Delete Route/Line : maintenance

8) Open Route/Line : maintenance

9) Close Route/Line : maintenance

10) System Log-out : operation

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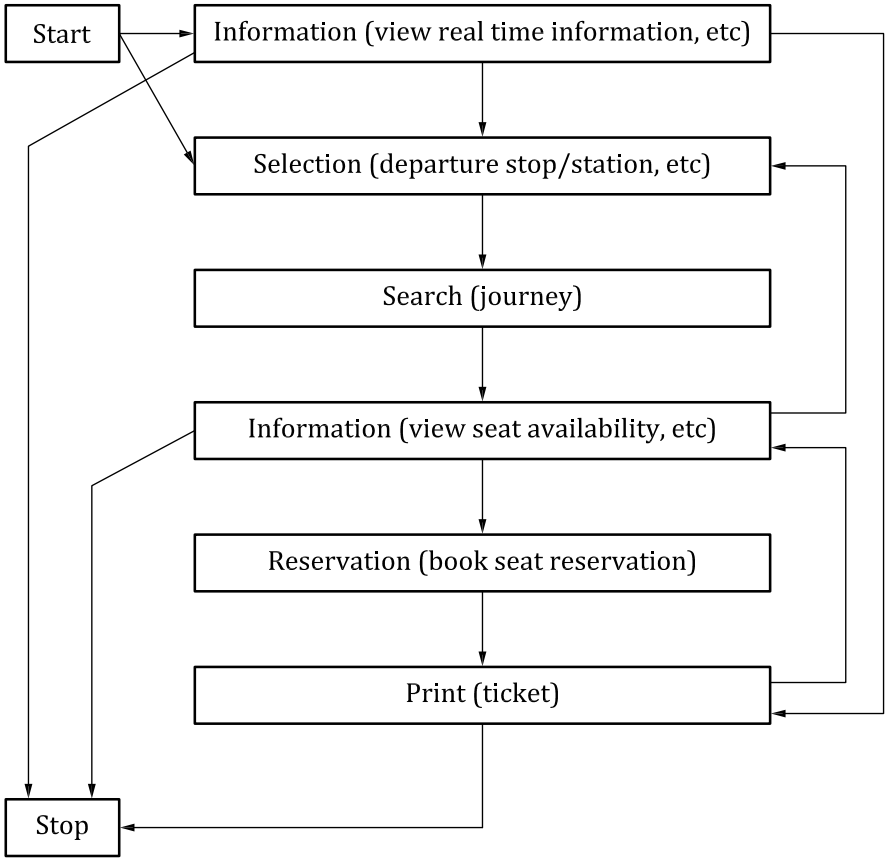
5.4.3 Operational scenario

Following operational scenario can be expected when journey planning system is in use. The use case category types defined in 5.4.2 are used for simple expression of each scenario.

a) User operational scenario

1) Before departing for journey



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