Interreg
Alpine Space
LinkingAlps
European Regional Development Fund

EUROPEAN UNION

Deliverable D.T1.2.1
Short version

Use Case Definition (short report)

Version: 3.0

Dissemination level: Public

WP: WP T1 Ex-ante analysis and development of methods for pilot service

Author: AustriaTech (ATE)

Date: 14.09.2020

http://www.alpine-space.eu/linkingalps

Document Information

Authors

Name	PartnerNo	Organisation
Bettina Neuhäuser	1	ATE
Katharina Helfert	1	ATE
Bernhard Monschiebl	1	ATE
Michael Zangl	1	ATE
Daniela Gamper	1	ATE
Matthias Günther	12	SBB

Peer-Reviewer

Name	PartnerNo	Organisation
Andreas Partusch	5	VAO

Document History

Date	Version	Dissemination
13.01.2020	V0	-
20.01.2020	V0.1	-
21.01.2020	V0.2	-
22.01.2020	V0.3	Project partners
10.02.2020	V0.4	Project partners
17.06.2020	V0.5	Project partners
27.08.2020	V1.0	Project partners
08.09.2020	V2.0	Project partners
14.09.2020	V3.0	Project partners
14.09.2020	V3.0_short_version	Project partners

Preface

Acronym:	LinkingAlps
Title:	Innovative tools and strategies for linking mobility information services in a decarbonised Alpine Space
Project number:	740
Start Date:	01-10-2019
End Date:	31-06-2021
Call number:	4th call
Priority:	Priority 2 - Low Carbon Alpine Space
Specific objective:	SO2.2 - Increase options for low carbon mobility and transport

Abbreviations

Abbreviation	Definition
ATE	AUSTRIATECH
AEV	Transport and Energy agency Canton Grison
ARIA	Regional Agency for Innovation and Purchasing Ltd
BLIC	Consulting company for control, information and computer technology GmbH
Cerema	Centre d'Etudes et d'expertise sur les Risques, l'Environnement, la Mobilité et l'Aménagement - Centre For Studies and Expertise on Risks, Environment, Mobility, and Urban and Country planning
CMTo	Metropolitan City of Turin
FoT	Federal Office of Transport
LINKS	LINKS Foundation - Leading Innovation & Knowledge for Society
NAP	National Access Point
RRA-LUR	Regional Development Agency of the Ljubljana Urban Region
SBB	SBB Swiss Federal Railways
STA	South Tyrolean Transport Structures
UM-FGPA	University of Maribor
VAO	Traffic Information Austria
VTG	Verkehrsverbund Tirol GesmbH

Active system	The active system integrates the routing information from several local journey planners to a combined seamless route. It is composed of a passive system and a Distributing system. It communicates through an OJP interface. It's a journey planning engine with OJP capabilities. Via the distributing system it is able to detect journeys through adjacent or remote regions and able to create OJP Trip Composition (alias OJP Router).
Adjacent region	Region which is adjacent to the local region and has its own "local" journey planning systems.
Adjacent system	Alias for neighboring system; participating System of an adjacent region.
Distributing system	System that distributes journey planning enquiries to other systems. It sends the request for journey-parts through areas to the corresponding passive servers, receives the responses and is able to create OJP Trip Compositions. It has the knowledge about gazetteers and is able to collect information about exchange points for the whole system.
End user	User of an "end user application". It is a person asking for journey planning information by using an end user application. It is the enquirer of a journey plan with a start, an end point and some travel preferences.
End user application (synonymously for 'End user application')	It is the application used by the end user to have access to JP information generated by the Distributed Journey Planning Service (DRJP). It can be a third party application connecting by OJP interface to a Participating system or the User Interface participating system. The provider of the end user applications are the, so called, "OJP users" in the LinkingAlps project.
Enquierer	The end user asking for information.
Enquirer system	Alias home system.
Estimated data	A predicted arrival or departure time of a particular means of transport at a particular stop. In case of real time data it can change several times during the journey.
Exchange point	Stop or stations where the trip leg of one system is connected to the trunk leg of another system. This includes regional stops which match with stops for long distance or regional stops from adjacent regions. Exchange points are mainly but not exclusively located at borders and in bigger cities.
Exchange point data base	A repository, a view on a database or a service that is able to list the relevant exchange points of the distributed service. It can be a static system-wide database or be generated dynamically with requests for exchange points to the responding services.
Gazetteer	directory of common objects across the local journey planner systems and its system borders. It enables the active system to find the passive system for all geolocations (stops, stations, POIs, address etc.). The gazetteer acts system-wide.
Home system	The Participating system called by the end user application. It is the system that take care of the end user travel information request and provide an answer.

Journey	A movement of a traveller from a start point to an end point by using one or more transport modes.
Journey Planner (JP)	A system that is calculating the journey for a given request. It is able to accept requests directly from end-user services. It is a generalization of OJP Router and OJP responder.
Journey Planning System (JPS)	Alias for Journey Planner.
Local Journey Planner (LJP)	A system with a routing engine and access to multimodal data with a particular local, regional or national coverage; “local” underlines its focus on a specific coverage that is limited. LJPs have no transregional (or distributed) OJP routing capabilities.
Local region	The territory covered the journey planner / home-system, which can plan trips itself without information from other systems.
Long distance traffic	Crosscountry interchange. Supported by trains and crosscountry travelling coaches.
Long distance transport connection	The trunk legs of the routes that connect at least 2 OJP systems. They are used to connect two neighboring or remote systems. Exchange points are defined along the trunk leg which define all the neighboring systems.
Neighbouring system	Alias for adjacent system.
OJP Implementer	Travel information service provider that is implementing an OJP service exchange (in most cases on the back-end system of an end user service).
OJP Interface	Application Programming Interface (API) based on CEN/TS 2017: OpenAPI for distributed journey planning and specified in D.T1.5.1 Specification of the API interface (including a LinkingAlps OJP Profile).
OJP Responder	Alias for passive system.
OJP Router	Alias for active System.
OJP User	End-user service provider that is using OJP services from local JPs to provide an end-user service
Open Journey Planning (OJP)	Standard for communication for distributed journey planning.(CEN/TS 17118:2017)
Participating system	A local journey planner being part of the OJP system architecture and the appropriate OJP service
Passive system	A Local journey planner (LJP) with a OJP interface (API) being able to respond to requests from distributing systems. It is an information source within the system without distributed journey planning capabilities. It communicates through an OJP interface as a responding system. alias OJP responder, responding system.
Public transport services	Service that allows people to travel. The service is for public usage.
Real time data	The real time of a particular means of transport at a particular stop; only sent after the arrival/depature of the vehicle at a particular stop.

Remote region	Region which is not adjacent to the local region. A remote region is covered by a local LJP.
Remote system	Participating system of a remote region .
Responding system	The generalized term for a system that responds to questions from the distributing system
Schedule data	planned data for public transport services
Server	Program that provides special services that can be used by other programs.
Service	Technical, self-sufficient unit that bundles related functionalities into a complex of topics and makes them available via a clearly defined interface.
System	Delimitable "structure" consisting of various components which can be regarded as a common whole due to certain ordered relationships between them.
Trip	Alias Journey.
Trip leg	The local part of a trip which is calculated by a single Local Journey planning system.
Trunk leg	The “trunk” leg are long-distance transport connections that interlink Journey planning systems
Linking Alps Distributed Journey Planning Service (DRJP)	Is a network of existing local, regional or national travel information services (routing platforms) that collaborate on the basis of CEN OJP exchange interface (CEN/TS 2017: openAPI for distributed journey planning) in order to exchange travel information and routing results. A web-based communication network between the participating systems needs to be established as the systems are physically remote. A universal common interface for exchanging requests between the participating services needs to be specified and implemented at all participating systems.
OJP Profile	The LinkingAlps OJP Profile aims to define a specific subset of (XML) data elements following a clearly arranged structure in accordance with the OJP standard (CEN/TS 17118:2017) and defined using XML schemas. The schemas include all functionalities required for an OJP interface in order to enable communication with the LinkingAlps distributed journey planning system. In this sense the LinkingAlps OJP Profile defines the content and the structure of the information content as well as the physical exchange format.

Table of Contents

Table of figures

Table of tables

1 Introduction

1.1 Scope of the report

This report describes the main use cases of LinkingAlps with regard to the application of the Linking Alps Distributed Journey Planning Service (DRJP). The **two main use cases (short distance travel and long distance travel)** both cover different scenarios that provide the basis for demonstrating cross-border and transnational (multi-region) linking of services in the Alpine region. The defined scenarios provide the basis for end user application tests performed in the course of the demonstration and evaluation activities in WP T2. The use cases are designed such as the needs of travellers, **tourists and commuters as the main target group**, are well reflected in the description of the scenarios and in a way that it is possible to evaluate functionality and quality aspects towards the end-user of the DRJP. The use cases also need to take into account the objective of the Alpine Space Programme and its expectations towards the project. Therefore, the use cases should be in line with the description of Output O.T2.1., a transnational service based on distributed OJP services.

1.2 Focus on end user services

The project is primarily working on the back-end side of a decentralised travel information system, i.e. the OJP services. Nevertheless, the OJP services need to be integrated into an end user application in order to merge the information from the various sources and integrate it into a seamless journey plan or journey plan update. An integration of the OJP services is foreseen at the active systems.

While the system architecture is looking at the technical model of the decentralised service, defining the system parts, roles and responsibilities/functionalities, the use cases shall define the end product (output) from an end user perspective.

Nevertheless, the specified use cases should also provide relevant information to steer the technical developments and the development of the service architecture and should provide a reference for the evaluation in the pilot. Regarding the latter, required functionality purposes from an end user perspective should be covered as well. In order to provide a basis for this evaluation, it is important to understand how the information flow works.

1.3 End user expectations

This chapter emphasizes on **typical expectations of an end user who is considered using an end user service** that is able to request and provide information to and from the DRJP system. It

should be noted that the following criteria rather provide a comprehensive overview than a detailed list of requirements a DRJP enabling end user service should be capable of.

The end user of a LinkingAlps end user service is expecting the provision of a seamless, transnational routing result from an indicated origin point to a desired destination of a trip, which is based on multimodal travel options.

The end user is expecting to be able to adjust and fine-tune the route characteristics via selection criteria, which cover:

- Travel options (modes)
- Departure and/or arrival time
- Trip characteristics (e.g. fastest, shortest)
- Number of changes and time of stop overs
- Accessibility
- Luggage and carry on items (e.g. over-sized luggage, sport equipment, wheel chair)

The end user should be able to input the origin point and the desired destination either as:

- Point at the map (coordinates)
- Postal addresses
- Point of interest (e.g. hotel, sight)
- Stops

The provided route is expected to be illustrated on a map for the end user to navigate (minimum) and is expected to be optionally supported by a detailed list of route information (e.g. names of stops, exchange points) (optimum).

Incidents and delays on the provided route are expected to be communicated to the end user. This service can either be provided via updated, real-time information services, highlighting delays and obstructions along the route (minimum) or by providing the end user with notifications of delays or obstructions (optimum) and adjusted route suggestions.

In accordance with the project goal to raise awareness of low-carbon mobility solutions, the end user would like to receive information on the carbon foot print of the trip (e.g. emission balance).

The language of the provided end user application is expected to be in the administrative language(s) of the home systems and in English.

The calculated route is also expected to be available offline.

End users who are using an end user application mainly for touristic purposes expect an end user application to provide information on:

- POIs along the route (e.g. sights, landmarks)
- Service facilities (e.g. public toilets, ATMs, touristic info points / centres)
- Ticketing

To highlight the transnational character of the route service, end users are provided the possibility to receive a notification when crossing borders between countries (selection criteria).

End users who are using the application mainly for commuting expect the app to offer the possibility to save frequently enquired / the last routes.

2 Use case details

2.1 Content of use cases

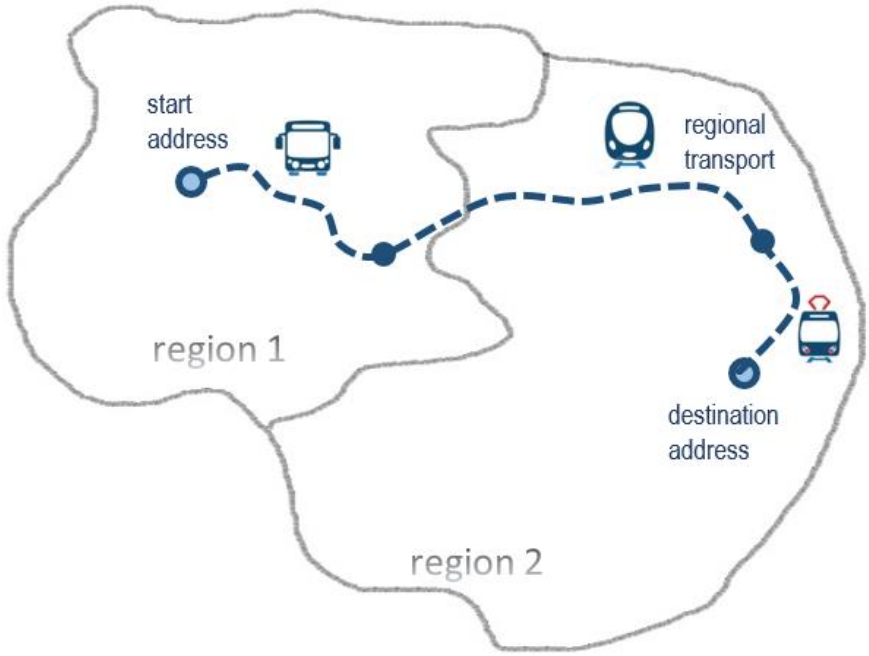
Use cases are defined by the following aspects:

- Title
- Identifier
- Goal of the use case
- Description
- Actors
- Covered information and data
- Process flow
- Scenarios[1]

[1] The full version of Deliverable D.T1.2.1 further specifies use case specific scenarios in more detail.

2.2 Use case 1: Short distance

Title	Short distance (linking two different journey planners)
Identifier	UC1
Goal	Linking of services between two different regions covering short distance journey planning to show a typical commuting routing service.
Description	With Use Case (UC1), Linking Alps will show the basic functionality of its "Linking of Services" approach from the different service providers. UC1 will demonstrate routing over two neighboring regions. The regions in this context are service areas of a transport association or of a tariff association. UC1 will allow an end-user application to connect to one of the service providers routing engines offering not only routing within this one single region but also offering interregional routing between different regions. This allows end user applications to extend a traveller information service to neighboring Linking Alps areas by connecting to just one routing engine of the Linking Alps service providers. The solution offers multimodal public transport information with real time information if available. Nevertheless, it will still keep functionality if only static information is available for some reason for parts of the journey or the complete journey. Since UC1 focuses on short distance journeys, its target group will be travellers which are assumed to be more knowledgeable of the different public transport options and routes but maybe want to know more traffic information before or during the journey to adapt their route accordingly.

	 **Figure 1: Short distance use case (UC1)**
Actors	• End user application(s) • Two different journey planners (at least one active system and another active or passive system) - Journey planners from SBB, STA, VAO, ARIA, CMTo or LUR)

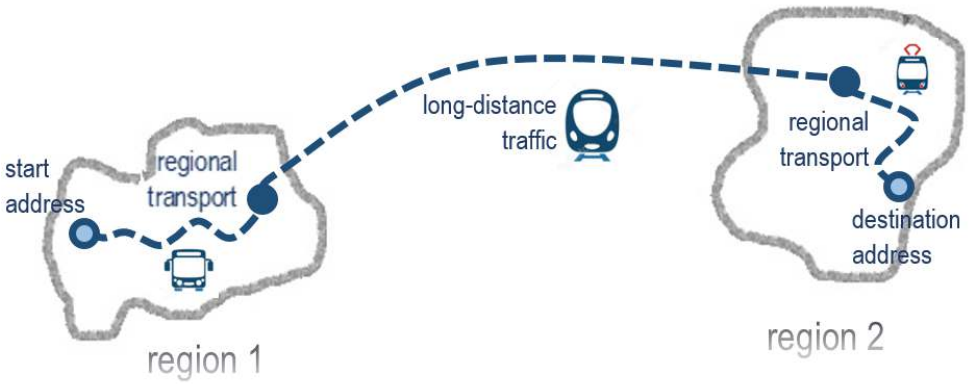
Covered information and data	<u>Mandatory:</u>
	• Travel modes supported
	  ○ Public transport e.g.: train, bus, tram, underground, etc.
	  ○ Walking
	• Multimodal routes (door-to-door)
	• Planned departure and arrival times (static data)
	• Transport operator
	• Changes (location of the changes)
	• Number of changes and time of stop overs (static data)
	
	<u>Optional:</u>
	• Actual departure and arrival times (real-time data)
	• Actual number of changes (location information) and time of stop overs (real-time data)
	• Accessibility information for special needs user
	• Luggage and carry on items (e.g.: wheelchair carriage)

Scenarios	**Scenario 1.1: Real time routing:** Routing with real time information for every trip leg available. **Scenario 1.2: Static routing:** Routing when only static information is available for at least one trip leg. **Scenario 1.3: Cross-border walking route between two exchange points Routing Gap:** Routing demonstrating the crossing of regional borders with a short walking distance between PT trip legs.

Table 1: Use case 1 – Short distance

2.3 Use case 2: Long distance

Title	Long distance (linking a minimum of two journey planners with a long-distance routing option in-between)
Identifier	UC2
Goal	Linking of services between two different regions covering long distance journey planning to show a typical tourist routing service.
Description	UC2 will demonstrate routing over two or more regions with long-distance travel routes included. The regions in this context are service areas of a transport association or of a tariff association. UC2 will allow an end user application to connect to one of the service providers routing engines offering not only routing within this one single region but also offering interregional routing between different regions. This allows end user applications to extend the traveller information service to the complete Linking Alps areas by connecting to just one routing engine of the Linking Alps service providers. The solution offers multimodal public transport information based on static data. UC2 focuses on long-distance journeys and its target group will be travellers (primarily tourists), which are assumed to use the service via the end-user application mainly four touristic purposes for planning long-distance journeys to regions abroad some time in advance of a trip.

	 **Figure 2: Long distance use case (UC2)**
Actors	• End user application(s) • At least two different journey planners (at least one active system and other active or passive systems) • Journey planners from SBB, STA, VAO, ARIA, CMTo or LUR

Covered information and data	<u>Mandatory:</u>
	• Travel modes supported
	  ○ Public transport e.g.: train, bus, tram, underground
	  ○ Walking
	• Multimodal routes (door-to-door)
	• Planned departure and arrival times (static data)
	• Transport operator
	• Changes (location of the changes)
	• Number of changes and time of stop overs (static data)
	
	<u>Optional:</u>
	• Accessibility information
	• Luggage and carry on items (wheelchair carriage)

Scenarios	**Scenario 2.1: Two-part long-distance journey planning:** Linking of two journey planners including long-distance routing **Scenario 2.2: Multi journey planning:** Minimum of three journey planners involved

Table 2: Use case 2 - Long distance

3 Possible end-user applications for LinkingAlps demonstration

Associated to the use cases defined in this report, the LinkingAlps project partners work on the provision of end user applications. The active systems of the DRJP are working on the integration of information from all OJP services. At least one system is expected to further provide an interface to an end user service, either via their own journey planners or also via third-party services and applications. The following chapter provides information of a planned end user service, with the intent to make the DRJP available to the end user through applications for both web and mobile devices.

3.1 LinkingAlps as part of the mobility portal südtirolmobil of STA - Bozen

A goal of a distributed routing systems is to make cross-border routing available to end users via various journey planners. In the case of STA - Bozen for the South Tyrol area, a distributing system developed in the LinkingAlps project, processes and makes available timetable information from other partner systems through an OJP interface developed in LinkingAlps. While enriching the service from STA Bozen with the information from other systems, the data quality standard of the information in the regional area, i.e. in South Tyrol, which the end user is "accustomed" to, should be maintained.

In terms of the end user GUI, a first idea was to activate the LinkingAlps service area with a checkbox: If the checkbox is OFF, the currently used EFA API will be requested, as before. If the checkbox is ON, the OJP interface will be requested. The rest of the GUI should remain the same for the user. So the end user actually does not notice anything. Possibly there will be a hint text, which describes the function of these switches.

The screenshots below show first drafts of the new mobility portal *suedtirolmobil.info*, which was successfully released on August 26, 2020. Updates, improvements and new features will follow constantly. This includes the OJP interface integration.

3.2 Illustrations of the mobility portal südtirolmobil of STA - Bozen

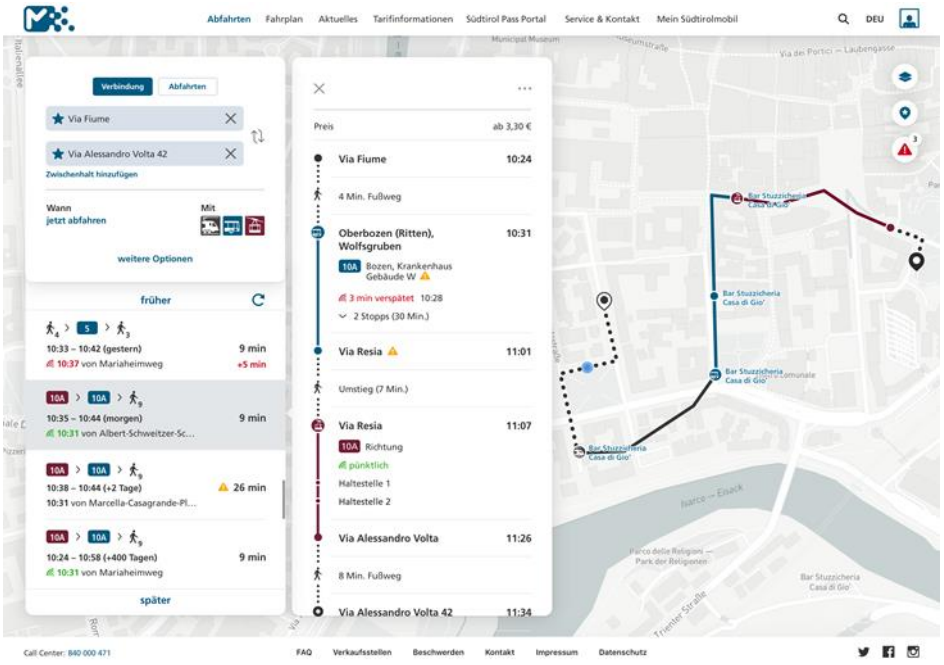


Figure 3: Illustration of the südtirolmobil end user web application

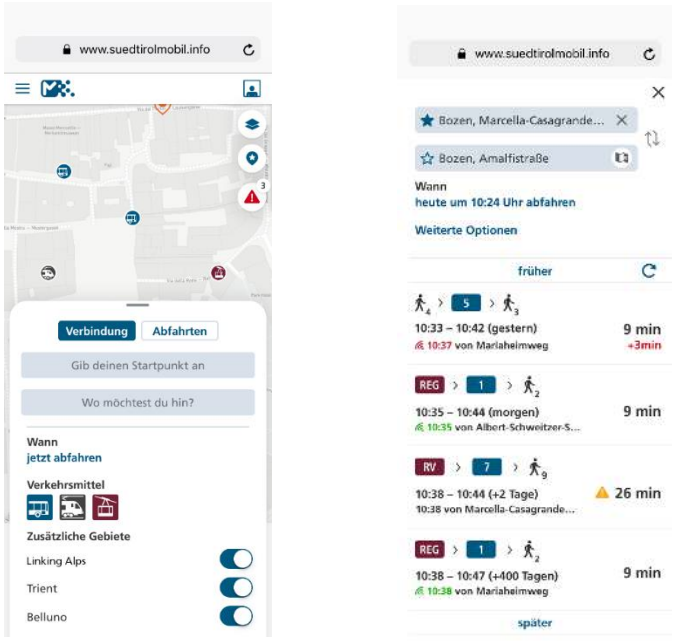


Figure 4: Illustrations of the südtirolmobil end user mobile application

4 Outlook

4.1 Link to relevant target groups

The presented use cases and scenarios illustrate the principal routing possibilities offered by a capable DRJP end user service via an application (e.g. web service, mobile app).
End users who are using such an application are considered primarily to be provided with traffic and traveller information **for touristic (Tourists) or commuting (Commuters) purposes.**
Tourists expectations are reflected primarily by the two scenarios defined in **use case UC2 - Long Distance.** This use case highlights the transnational character of a DRJP end user service by providing the possibility of requesting multimodal door-to-door routing across the alpine region via a single service - not only between bordering regions, but also on an international scale and over longer distances, which are usually requested by tourists of any kind. This service encourages touristic travellers to shift their demand towards sustainable and low-carbon mobility options, especially when travelling cross-border (regional and national) for touristic purposes.
Commuters expectations are reflected by the three scenarios defined in **use case UC1 - Short Distance.** This use case illustrates the possibilities of a DRJP end user service towards the information usually requested by commuters who are repeatedly travelling across bordering regions. Commuters are assumed to be more knowledgeable of the different routing options for their commute, but request traffic and traveller information shortly before or during their journey to adapt their route accordingly. A DRJP enabled end user service allows for requesting real-time route information (e.g. actual departure and arrival times of actual modes) on seamless multimodal door-to-door routes via a single application.

4.2 Relevance for technical use cases (demonstration and evaluation)

This deliverable thus emphasizes on relevant use cases and scenarios to be further demonstrated and evaluated in the course of the activities conducted in work package WP2 'Development, demonstration and evaluation of a pilot service'.
Further technical specification towards the implementation and demonstration of the defined use cases and scenarios will be detailed in deliverable D.T2.1.1.