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STREETLIFE

Steering towards Green and Perceptive Mobility of the Future

WP6 – City Pilot Planning and Evaluation

D6.1 Specification of city pilots for the first STREETLIFE operation and evaluation

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Executive Summary:

Deliverable D6.1 describes how the three STREETLIFE pilots in the city of Berlin, Rovereto and Tampere have commonly organized and carried out their initial work on the definition of the pilots. Partners participating in the pilots have defined a common set of procedures for the early specification of the pilots, and the cluster of partners operating within each pilot have executed those procedures locally. The focus of this first WP6 deliverable is on establishing the scope of the pilot, Each pilot cluster has investigated the technology available in each pilot site and how it can be integrated for the need of that pilot, and has taken into account the specificity and the peculiar mobility situation and priorities of each city. Based on the collected information, each pilot has devised a set of scenarios that will be addressed by the pilot, and has started to analyse their impact on the technological innovation that will be delivered by the STREETLIFE project, throughout the project and across its various Work Packages. This deliverable documents this process and its results at Month 4 of the project.

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Specification of city pilots for the first STREETLIFE operation and evaluation

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ABBREVIATIONS

BER	The Berlin pilot
CO	Confidential, only for members of the Consortium (including the Commission Services)
D	Deliverable
DoW	Description of Work
EV	Electric Vehicle
FP7	Seventh Framework Programme
FLOSS	Free/Libre Open Source Software
GUI	Grafical user Interface
IPR	Intellectual Property Rights
MGT	Management
MS	Milestone
OS	Open Source
OSS	Open Source Software
O	Other
P	Prototype
PU	Public
PM	Person Month
PUM	“Piano Urbano di Mobilita`” - Urban Mobility plan of the city of Rovereto
R	Report
ROV	The Rovereto pilot
RTD	Research and Development
SW	Software
TRE	The Tampere pilot
WI	Work Item
WP	Work Package

Y1	Year 1

PARTNER NAME CORRESPONDING TO ABBREVIATION IN STREETLIFE DOW

Fraunhofer	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
FBK	Fondazione Bruno Kessler
SIEMENS	Siemens AG
DFKI	Deutsches Forschungszentrum für Künstliche Intelligenz GmbH
AALTO	Aalto University
DLR	Deutsches Zentrum für Luft- und Raumfahrt
CAIRE	Cooperativa Architetti e Ingeneri - Urbanistica
Rovereto	Comune di Rovereto
TSB	Berlin Partner for Business and Technology
Tampere	City of Tampere
Logica	CGI Suomi Oy

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1. Introduction

Deliverable D6.1 reports the work done by the STREETLIFE consortium on the definition of the scope and content of the three pilots in the city of Berlin, Rovereto and Tampere. In the STREETLIFE consortium, each pilot is carried out by a subset of the partners (the *"pilot cluster"*) that participate in Work Package 6. For the Berlin pilot (BER), the cluster is composed of DLR, Fraunhofer, and SIEMENS; for the Rovereto pilot (ROV) the cluster is composed of CAIRE, FBK, and Rovereto; for the Tampere pilot (TRE) the cluster is composed of AALTO, Logica, and Tampere.

1.1. Objectives of the deliverable

The partners involved in each cluster have carried out two different kinds of work that are reported here. First of all, they have devised and agreed on a common set of procedures to be used to specify the content and scope of the three city pilots. Then, the cluster of partners operating within each pilot has executed those procedures locally. The results are early specifications of the pilots, which reflect the current understanding – four months into the project – of the mobility situation and priorities that are peculiar to each city; those early specification also reflect the most beneficial ways to exploit the ICT assets that exist within each pilot site and are available to each pilot cluster, in order to develop mobility-related innovations that cater to those city priorities.

A major focus of these early pilot specifications is the establishment of the scope of the pilot. Each pilot cluster has investigated the technology available in each pilot site and how it can be integrated for the need of that pilot. Based on the collected information, each pilot has devised a set of scenarios that will be addressed by the pilot, and has started to analyse their impact. The impact is twofold: internally to the STREETLIFE project, the pilot scenarios will drive the technological innovation that will be delivered by throughout the project and across its various Work Packages; with respect to the municipalities involved in the pilots, the scenarios are supposed to impact a number of well-defined city-level Key Performance Indicators (KPIs). Each of these KPIs is measurable as an effect of the execution of the pilot, and has an effect in turn, on the project-wide KPIs and intended strategic benefits to urban sustainable mobility, which represent the main goal of the STREETLIFE project and will be used to evaluate it in Work Package 8.

This deliverable documents the procedures established for pilot specification, and the early pilot specifications resulting from those procedures for the BER, ROV, and TRE pilot at Month 4 of the project. These early specifications are intended as work-in-progress, and they will incrementally mature and be fine tuned by each pilot cluster throughout the work of WP6. In particular, the pilot specifications will be revised at the end of the first iteration of the project, and augmented with the accumulated knowledge coming from that iteration; as such, the revised pilot specification will be used to drive both the pilot execution and the innovation activities of the other STREETLIFE Work Packages during the second project iteration.

1.2. Outline of the deliverable

This document describes the specifications for the BER, ROV and TRE pilots. We have organized it so that each Section describes a separate element of the pilot specifications, and the content of each pilot related to that element is presented in a separate sub-section. The deliverable discussed the various elements of the pilot specifications in the Sections listed below.

In Section 2, we describe the activities carried out in the pilot sites, as well as among the partners in each cluster pilot, to survey the ICT assets that can be leveraged for the purpose of the project; the survey activities have resulted in a list of available mobility-related data sources, and a list of software assets and technologies. In Section 3 we describe the scenarios that have been devised by each pilot cluster as the vehicles and case studies to innovate sustainable city mobility in each city, and evaluate the ICT solutions produced in the project. In Section 4, we have collected an early set of ideas for the requirements that the afore mentioned scenarios impose on said ICT solutions, and on the technical Work Packages of the STREETLIFE project; those early requirements ideas also represent an initial input to the requirements engineering activities included in Work Package 2. In Section 5, we describe the collaborative process through which the Consortium has derived from the afore mentioned pilot scenarios a set of Work Items that are going to drive the development of STREETLIFE software, and its deployment, execution and evaluation in the first project iteration. Each Work Item represents a individual unit of work that will be carried out during the first project iteration; together, they represent our plan for technical work for the first iteration at the time of writing. Work Items are variously allocated to the project Work Packages; they are also traceable back to the requiring pilot scenarios. In Section 6, we discuss the engagement strategies that each partner cluster intends to put into effect, to recruit early adopters of the STREETLIFE technologies for all the various types of actors defined in the scenarios. Early adopters will become testers and evaluators involved in the first iteration of the pilots in each of the three cities. Finally, in Section 7, we offer some conclusions.

2. SURVEY OF TECHNOLOGY IN PILOT SITES

2.1. Purpose

All of the three pilot sites have a significant legacy of innovation in the field of sustainable urban mobility. STREETLIFE intends to leverage, build upon, and innovate the technologies already in use or otherwise available in each pilot site; this is not only a good practice, but also a practical necessity to ensure that the STREETLIFE technological results can be accepted, put to work, evaluated and adopted within each pilot site.

For that reason, the first activity we have carried out has been a survey of the existing ICT support to mobility that is present in the pilot sites, or available through the STREETLIFE partners that participate in each pilot, and the selection of which among said technologies can be fruitfully integrated within the design of the STREETLIFE information system.

The survey we report in the rest of this Section is twofold: one part of it deals with the spectrum of mobility-related data sources that exist at each site, in particular those data sources whose access is open (e.g. as Open Data or Open Services), or data sources that are in the ownership or availability of any of the partners involved in the pilot; the other part deals with software assets, that is software technologies that offer functionality that can be used for - and should be integrated in - the STREETLIFE mobility information system, which are either already deployed at the pilot site or can be provided by any of the pilot partners.

2.2. Survey of available mobility-related data sources

We present the results of the site survey with respect to the data sources for STREETLIFE in a tabular form for each pilot. To facilitate consultation of data sources information, we provide below a legend for those tables; in particular, data sources referring to the same mobility topic or theme are highlighted with the same colour code. Colour codes are shown in Table 1. The kinds of data shown in the table also represent categories of information that are of particular importance for the goals of the project, and which are necessary to enable – together – the functionality of STREETLIFE.

The full records - for all data sources in each pilot – were collected according to a common template, which is made available in Appendix A: Data Source Collection Template.

Table 1: legend - color codes for the types of mobility-related data sources.

Maps and cartography
Public transport information
Points Of Interest
State Tracking (including traffic)
External events
User information
Environmental information
City statistics

2.2.1. Berlin pilot site

Table 2: Data sources for the Berlin pilot.

ID	Type	Name	Definition	format	availability
BER-DS1	static	City road network	road network	Detail Network Berlin (Berliner Detailnetz), shapefiles, Mapinfo	In use
BER-DS2	static	City street network	street names, numbers	Detail Network Berlin (Berliner Detailnetz), shapefiles, Mapinfo	In use
BER-DS3	static	City bicycle roads	bike lane network	Detail Network Berlin (Berliner Detailnetz), shapefiles, Mapinfo	In use
BER-DS4	static	promenading and hiking routes	route coordinates	Detail Network Berlin (Berliner Detailnetz), shapefiles, Mapinfo	In use
BER-DS5	static	Rural roads	map of walk and bike paths (from GPS)	Detail Network Berlin (Berliner Detailnetz), shapefiles, Mapinfo	In use
BER-DS6	static	Bus (public transport) routes	bus timetables, stops, routes and shapes	GTFS	Available
BER-DS7	static	Trains routes	train timetables, stops, routes and shapes	GTFS	Available
BER-DS8	static	Street level parking	location of street-level parking facilities and parking meters	CSV	Available
BER-DS9	static	Car parking garages	location and capacity of parking garages	CSV	Available
BER-DS10	static	Car sharing pick-up points	location of pick-up points	SOAP/Proprietary	In use
BER-DS11	static	Bicycle sharing pick-up points	location of pick-up points	SOAP/Proprietary	In use
BER-DS12	dynamic	Parking garages availability	free available places in parking garages	SOAP/Proprietary	Available

BER-DS13	dynamic	Car sharing state	current position of available vehicles	SOAP/Proprietary	In use
BER-DS14	dynamic	Bicycle sharing state	current position of available bicycles	SOAP/Proprietary	In use
BER-DS15	dynamic	Car flows	past and real time information about road traffic	WMS	In use
BER-DS16	static	Accidents	historic Information on accidents	SOAP/Proprietary	Available
BER-DS17	dynamic	Road works	crowdsourced information on road works	SOAP/Proprietary	Available
BER-DS18	dynamic	Cultural and commercial events	Information about current events and their location	SOAP/Proprietary	Available
BER-DS19	dynamic	User preferences	captured using the interaction with the system	SOAP/Proprietary	Available
BER-DS20	dynamic	Air pollution	air pollution on a city level	FTP/Proprietary	In use
BER-DS21	static	Statistical information	population, tourism, economics	TBD	Availability TBD

2.2.2. Rovereto pilot site

Table 3: Data sources for the ROV pilot.

ID	Type	Name	Description	format	availability	Ownership	Notes
ROV-DS1	static	City road network	road network	OSM	In use	Open Data	
ROV-DS2	static	City street network	street names, numbers	ESRI shape files (SHP)	In use	Open Data	
ROV-DS2-b	static	City street guide	city street info (queries)	WMS, WFS	In use	Open Service	
ROV-DS3	static	City bicycle roads	bike lane network	OSM	In use	Open Data	Integrated with ROV-DS1

ROV-DS4	static	Rural roads	map of walk and bike paths (from GPS)	GPX	In use	Open data	
ROV-DS5	static	Bus (public transport) routes	bus timetables, stops, routes and shapes	GTFS	In use	Open data	Shapes are also available but not as Open data
ROV-DS6	static	Trains routes	train timetables, stops, routes and shapes	GTFS	In use	Open data	
ROV-DS7	real time	Real time bus (public transport) information	delays, timetable changes	JSON/Proprietary	Availability TBD	TBD	
ROV-DS8	real time	Real time train information	delays, timetable changes	JSON/Proprietary	In use	Open service	
ROV-DS9	static	Street level parking	location of street-level parking facilities and parking meters	JSON/Proprietary	Availability TBD	Rovereto municipality	Currently being compiled by the City of Rovereto
ROV-DS10	static	Car parking garages	location and capacity of parking garages	JSON/Proprietary	Available	Rovereto municipality	
ROV-DS11	static	Car sharing pick-up points	location of pick-up points	JSON/Proprietary	Available	TBD	
ROV-DS12	static	Bicycle sharing pick-up points	location of pick-up points	JSON/Proprietary	Available	Rovereto municipality	
ROV-DS13	dynamic	Parking garages availability	free available places in parking garages	JSON/Proprietary	In use	Open Service	
ROV-DS14	dynamic	Car sharing state	current position of available vehicles		Availability TBD	Car Sharing Trentino	
RVO-DS15	dynamic	Bicycle sharing state	current position of available bicycles	Web API	Availability TBD	Province of Trento	

ROV-DS16	dynamic	Car flows	past and real time information about road traffic	DBF	Availability TBD	Province of Trento, Rovereto municipality	
ROV-DS16-b	dynamic	Car flows	ESTIMATED car flow	DBF, SHP	Availability TBD	Rovereto municipality	
ROV-DS17	real time	Bike flows	past and real time information about traffic on bike lanes	TBD	Availability TBD	Rovereto municipality	
ROV-DS18	dynamic	Bike floating data	Data captured by bike fleet	TBD	Availability TBD	TBD	
RS-DS19	dynamic	Road incidents	Accidents, road works, traffic jams and detours	JSON/Proprietary	In use	Province of Trento	
ROV-DS19-b	historical	Accidents	historic Information on accidents	Web API	Available	TBD	
ROV-DS20	dynamic	Weather	weather condition and forecast	Web api	Available	Province of Trento	
ROV-DS21	dynamic	Crowd sourcing	users input information about bus delays, accidents, etc.	JSON/Proprietary	Available	TBD	
ROV-DS22	static	User profile	static personal information	REST API	Available	User	
ROV-DS23	dynamic	User preferences	captured using the interaction with the system	REST API	Available	User	
ROV-DS24	dynamic	Social networks	In-system social network	REST API	Available	User	
ROV-DS25	dynamic	Air pollution	air pollution on a city level	Web API	Available	Province of Trento	
ROV-DS27	static	CO2 emission	formula to determine carbon footprint	TBD	Availability TBD	TBD	Must develop within STREETLIFE
ROV-DS28	historical	Various statistical information about the city	population, tourism, economics	Web API	Available	Province of Trento	

2.2.3. Tampere pilot site

Table 4: Data sources for the TRE pilot.

ID	Type	Name	Description	Format	Availability	Ownership	Notes
TRE-DS1	Static	Road and street network	City maps	ESRI shapefiles or mapinfo, rasters	In use	Open data	
TRE-DS2	Static	Digiroad	National traffic network	ESRI, XML	In use	FTA license	
TRE-DS3	Static	Maps of Finland	Map data of national land survey of Finland	ESRI, raster	In use	Open data	
TRE-DS4	Static	Tampere street addresses	Locations of street addresses (street&number -> coordinates)	text	In use	Open data	
TRE-DS5	Static	Bicycling network	Bike route network	JSON, GML2, GML32, SHAPE-ZIP, CSV	In use	Open data	
TRE-DS6	Static	Bus (public transport) routes	Bus timetables, stops, routes and shapes	GTFS	In use	Open data	
TRE-DS7	Static	Kalkati.net	Bus timetables and stops in national standard form	XML	In use	Open data	
TRE-DS8	Dynamic	Route planning API	Routing service	Web API XML/Proprietary	In use	Open service	
TRE-DS9	Real time	Tampere public transport SIRI	Real-time status of buses and bus stops, general messages	SIRI XML	In use	Open service	
TRE-DS10	Real time	Trains on the map API	Real-time status of national trains	XML/RSS feed	In use	Open service	
TRE-DS11	Static	Parking meters	Location of sparking meters	MID / MIF	In use	Open data	
TRE-DS12	Static	Parking halls	Parking hall locations and capacity	Datex II	TBD	Finnpark Oy	
TRE-DS13	Static	Bike parks	Location and description of bicycle parking places	JSON, GML2, GML32, SHAPE-ZIP, CSV	In use	Open data	Consistent identification of data under

							development
TRE-DS14	Static	Street lights	Location and technical details of street lights	CSV	In use	Open data	
TRE-DS15	Static	Traffic lights	Locations and metadata about traffic lights	JSON, GML2, GML32, SHAPE-ZIP, CSV	In use	Open data	
TRE-DS16	Dynamic	Parking hall status	Free capacity of parking halls	Datex II	TBD	Finnpark Oy	Open interface under development
TRE-DS17	Dynamic	Traffic light state	Location and operational status of street lights	TBD	In use	Infotripla Oy	
TRE-DS18	Dynamic	Traffic flow	Real time information about road traffic flow	Proprietary XML	In use	Infotripla Oy	Changes to Datex II during 2014
RS-DS19	Static	Tampere city road and street works	Road and street construction work data	GML	In use	Open data	
TRE-DS20	Dynamic	Road conditions	Road surface conditions on main roads from the national Digitraffic service	Web API	In use	Open service	
TRE-DS21	Dynamic	Road incidents and accidents	Incident information (location, description) from the national Digitraffic service	Web API	In use	Open service	
TRE-DS22	Dynamic	Weather	Weather conditions and forecast from Finnish MeteoroLogical Institute	WMS, WFS	In use	Open service	
TRE-DS23	Dynamic	Crowd sourcing	User location and motion from a mobile application	Datex II	TBD	User	
TRE-DS24	Dynamic	User preferences	Captured using the interaction with the system	REST API	In use	User	
TRE-DS25	Static	CO2 emission	Formulas for carbon footprint	HTML	In use	Open data	

TRE-DS26	Historical	Official Tampere city statistics	geography, climate, population, tourism, economy, etc.	HTML	In use	Open Data	

2.3. Survey of available mobility-related software assets

Each pilot site has carried out a survey study regarding the software assets that are either already operational in the pilot site, and relate to the support of the city mobility, or are available to the various STREETLIFE partners in the pilot cluster, and could be integrated within the STREETLIFE information system.

The outcome of this survey activity has produced a rich catalogue of such software assets, which cover a spectrum of needs and functionality. Their integration and inter-operation as software components within a general blueprint architecture for the STREETLIFE information system needs to be studied and specified within WP2, which is devoted to common architectural design.

Hereby, we provide a synthesis of the survey – per pilot site – within the following Tables. We have used a template for the collection of this information, which can be found in Appendix B: Software Asset Collection Template. We also situate the surveyed software assets within the major functional areas that exists in STREETLIFE, using the following informal diagram, and corresponding colour codes for the items reported in the tables.

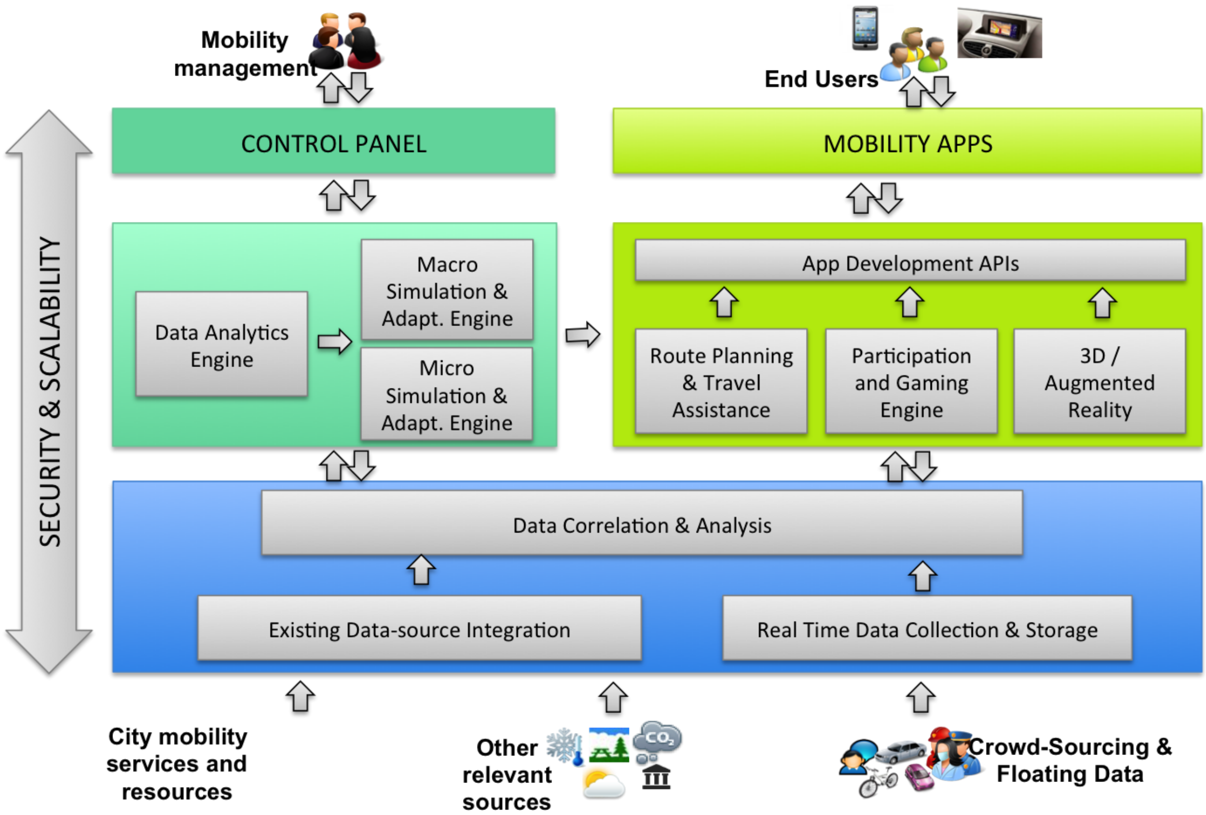

Figure 1: functional blocks of the STREETLIFE mobility information system.

2.3.1. Berlin pilot site

Table 5 : Software assets available to BER pilot for integration in the STREETLIFE architecture

Name	Functional block	Technology	Ownership	License	Accessibility	Notes
Open Data Platform	Control Panel, simulation and analytics	Java portlet technology (Liferay). Using CKAN (written in Python) as metadata registry. Java written library acts as middleware and connects CKAN and Liferay portal by using CKAN REST API	Liferay portlets and middleware library Fraunhofer FOKUS	FOKUS Open Data Platform: Affero GNU GPL v3.0 CKAN: Affero GNU GPL v3.0	Partners can use the source code of the Open Data Platform. Source code is available as open source at GitHub (https://github.com/fraunhoferfokus/GovData/)	
Mobility Data Cloud	Control Panel, simulation and analytics	Java servlet REST services. No realtime data at the moment. Cloudfoundry as PaaS infrastructure	Fraunhofer FOKUS	No license	Free access	
VSimRTI	Micro Simulation & Adapt.	Java	Fraunhofer FOKUS	Research License	Binaries are available at http://www.dcaiti.tu-berlin.de/research/simulation/	

	Engine				
CLM-Traffic Simulation (City Lifecycle Management TM)	Meso Simulation & Adapt. Engine	model is implemented in *C++* and *C#* and integrated in CLM platform using web service (*Jason*)	Siemens, CT RTC AUC	No license	Depending on pilot specific what-if scenario use cases, applications and results of simulation can be provided
MMIR App Development Framework	basic components of multimodal (mobile) interaction systems, Mobility App layer	JavaScript, HTML5, CSS3 and a range of existing W3C markup languages, Apache Cordova to build native mobile applications using HTML, CSS and JavaScript.	DFKI, open source (MIT License)	MIT License	The source code is available at https://github.com/mmig/mmir-starter-kit
OpenRide	App Development APIs, Route planning	Java. Android client	Fraunhofer FOKUS	AGPL v3	Free Access according to AGPL v3. Sourcecode is open source (http://sourceforge.net/projects/openride/)
Identity Provider (IdP)	Security	Java and exposed as	Open source –	CDDL 1.0.1	Free access

		WSDL webservice	Fraunhofer FOKUS		
Policy Enforcement Point (PEP)	Security	Java in XACML 3.0 Framework	Open source – Fraunhofer FOKUS	Enterprise-java-xacml: Apache License 2.0	Free access
Policy Decision Point (PDP)	Security	Java in XACML 3.0 Framework	Open source – Fraunhofer FOKUS	Enterprise-java-xacml: Apache License 2.0	Free access
Policy Administration Point (PAP)	Security	Java in XACML 3.0 Framework	Open source – Fraunhofer FOKUS	Enterprise-java-xacml: Apache License 2.0	Free access
WS-SecurityPolicies	Security	Java in XACML 3.0 Framework	Open source – Fraunhofer FOKUS	Enterprise-java-xacml: Apache License 2.0	Free access

2.3.2. Rovereto pilot site

Table 6: Software assets available to ROV pilot for integration in the STREETLIFE architecture.

Name	Functional block	Technology	Ownership	License	Accessibility	Notes
Multi-modal route	Route Planning &	Java exposed as REST	SmartCampus/	OSS Apache 2.0	Free access to source	

planner	Travel Assistance	service	SAYservice		code, executable or service
SmartCampus PaaS	App development and Service Execution Environment	CloudFoundry	SmartCampus	OSS Apache 2.0	Free access to source code, executable
SmartCampus Client	App development APIs	Android and Java	SmartCampus	OSS Apache 2.0	Free access to source code, executable
Viaggia Rovereto	Mobile App	Android and Java	SmartCampus	OSS Apache 2.0	Free access to source code, executable
SmartCampus Open Services	Data integration and storage	Java and REST	SmartCampus/ SAYservice	OSS Apache 2.0	Free access to source code, executable
Cube Simulator	Simulation engine	proprietary	proprietary http://citilabs.com	Commercial license owned by CAIRE	TBD

2.3.3. Tampere pilot site

Table 7: Software assets available to TRE pilot for integration in the STREETLIFE architecture.

Name	Functional block	Technology	Ownership	License	Accessibility
Multi-modal route planner	Route planning	Mixed technologies combined to a web application and API	Logica / Tampere City*	Logica Propietary	Open data API interface
Bicycle route planner	Routing along bike network	Mixed technologies combined to a web application	Logica / Tampere City*	Logica Propietary	Open data API interface
Bus traffic real-time monitor	Web application for monitoring bus locations and stops	Mixed technologies combined to a web application	Logica / Tampere City*	Logica Propietary	Open data API interface

SIRI bus traffic API	Bus traffic tracking and tracking data integration	Mixed technologies combined to a web API	Logica / Tampere City*	L ogica Propietary	Open data API interface
Geogoding / reverse geocoding	Address and POI mapping with coordinates	Mixed technologies combined to a web API	Logica / Tampere City*	Logica Propietary	Open data API interface
Map services	Raster map databases and services	Mixed technologies combined to a web API (WMS, tiles)	Logica / Tampere City*	Logica Propietary	Open data API interface

*Offered as a service to City of Tampere by Logica. Logica owns the software and copyright of all proprietary source code

2.4. Comparison and coverage across pilot sites

Our survey activity had a twofold goal: on the one hand, it aimed to construct an inventory of the local data and technology options that can influence the functionality and design of the STREETLIFE information system, and the consequently the opportunities it may have to impact mobility habits and policies in the three pilot sites; on the other hand, it aimed to reveal any significant gaps in data or technology that must be necessarily filled to enable a successful design, implementation and execution of the pilots.

The survey of data sources ensured us that the three pilot sites have available a wide array of mobility-related data, which show a good coverage with respect to the categories of information that are likely to be useful for the STREETLIFE purposes. Coverage is similarly good with respect to other dimensions, such as the open availability and access to most data source, and the type of mobility data (static, dynamic, or real time). One interesting observation is that all the three pilots – although with some differences - have at the current stage only very limited access to *crowdsourcing and floating data*. This, however does not represent a particular problem; in fact, integration of this type of information, and is usage together with other data from different mobility-related data sources is one of the innovative aspects that STREETLIFE wants to pursue, and how to achieve this goal in general, as well as within the specific context of each pilot, will be addressed in WP3, jointly with WP6.

The survey of software assets has made evident that the three pilots also have a wealth of ICT assets already deployed as legacy, or otherwise available. The technologies with which those assets are implemented are varied, which may represent an integration challenge, in case interoperability among different technologies is sought, and when trying to reconcile and compose the different assets into a common architecture for the STREETLIFE mobility information system as a whole, which can in turn be instantiated within each pilot in a coherent way, and reified with the assets identified in the survey as the architectural components.

The coverage of the main functional blocks is also quite different across the three pilots, in a number of ways. First of all, some of the existing assets fit neatly within one of the functional block we have envisioned, whereas others are comprised of several pieces of functionality that crosses over multiple blocks. Moreover, the areas of functionality that are potentially covered by the set of ICT assets that are currently available to each pilot are very diverse. This is to be expected; however, it reinforces the need for a common blueprint within which these differences can be reconciled, and which can guide the development of the STREETLIFE instantiation of each pilot, based on filling the gaps that are recognizable within such a blueprint architecture for that given pilot. In this sense, the survey activity of the ICT assets represents a very important input for the architectural definition activities of WP2.

3. EARLY PILOT SPECIFICATIONS

The current specifications of the city pilot are represented by a set of scenarios that have been conceived and written by the partner in the corresponding pilot cluster. These are intended – as mentioned earlier – as early specifications and a work-in-progress, as our collective understanding of - on the one hand – the specific needs and opportunities for improving urban mobility in each pilot site through ICT innovation, and – on the other hand – the full reach and impact of the solutions developed by the STREETLIFE consortium is necessarily imperfect at this early stage, and is going to become incrementally more mature as the project progresses and delivers those solutions.

3.1. STREETLIFE scenario specification

Pilot scenarios have been elicited by means of a scenario template that has been developed by FBK, and shared and validated among all partners. The template allows for a high-level description of the scenario in a narrative form, the identification of actors and stakeholders that shall interact with the STREETLIFE system in the context of that scenario, and the finer-grained derivation of multiple use, which represent the main technical interactions of the actors with the STREETLIFE technology that supports that scenario.

The scenario template also enables the collection of fine-grained, scenario-specific KPIs that are tightly linked to the execution and evaluation of each pilot scenario. Finally, the template allows to sketch any early requirements ideas that derive naturally from the use cases; we report separately on those requirement ideas in Section 4.

The process of devising the scenarios with the support of the template has been carried out among the partners of each pilot cluster in a collaborative fashion. Each cluster took into account the ICT assets present in its pilot site, as per the survey activities described in Section 2 and their results. Moreover, the expertise available internally to each pilot cluster, in particular within the municipalities involved in each pilot, about the current state of the urban city mobility was a major source of inspiration for the definition of pilot scenarios. The scenarios have gone through some rounds of refinement internally to the cluster, and have been presented to the rest of the STREETLIFE partners to elicit feedback. They have finally been approved as the early specification of the pilots, which shall drive the first iteration of development of the project.

3.2. Scenarios and use cases for BER pilot

The main objectives of the STREETLIFE Berlin pilot address the following topics:

- CO_2 reduction by modal split change towards “greener” modes
- Increasing safety for cyclists
- Improve city transport quality and efficiency

The STREETLIFE Berlin pilot scenario distinguishes two complementary system viewpoints:

i.) End users - “consuming” STREETLIFE services and applications and
ii.) Transport system and service operators - providing, supporting or managing services and applications.

Multiple independent interactions, route choices, and any kind of feedback of STREETLIFE end users have an effect on the situation of the Berlin transport system (e.g. altering transport demand, mode choice, occupation, etc.). To know about actual (monitored) and expected (simulated/forecasted) impact of those interactions is of great importance for transport planners, decision makers and service operators. Thus, within the Berlin pilot site end user generated impact on the overall transport situation will be translated into easy-to-use/easy-to-interpret KPIs to be shown and constantly monitored at operators’ work stations.

Consequently, the description of the Berlin pilot site scenarios is twofold. In the following we document both end-user and operator/management scenarios.

3.2.1. End-user scenarios

In the scenarios collected in this Section, the main actor and principal stakeholder involved is always an end user of the STREETLIFE system, as deployed in the city of Berlin. For convenience, we will use in the remainder a consistent and exemplar profile of such end user, called *Silke.*

Stakeholders/actors list: end user / citizen

Silke is a full-time employed project manager in Berlin. She is generally interested in new technologies and innovations. In particular, in the field of urban mobility, she is interested in new options and services as she has to commute every day from her home in Berlin-Friedrichshain (a modern and dynamic residential quarter close to downtown East) to her office in the outskirt science campus Berlin-Adlershof. Even though Silke owns a car, she likes to ride bicycle at good weather conditions and holds a public transport subscription and a car and bike sharing member ship. She is trying to combine business and private activities as much as possible. While using a mixture of available transport means, her main mobility target is to find an optimal balance between travel duration, costs, emissions, and comfort. She owns a modern smartphone provided with permanent Internet access.

3.2.1.1. Pre-trip planning (PTP) and on-trip itinerary surveillance

Scenario ID: BER-PTP

Narrative: When pre-planning the day, its activities, necessities and appointments at home Silke is using an App connected to the STREETLIFE system. In this respect, the STREETLIFE App is to be considered as a multi-modal traveller advisor, combining different mode options within one trip from a given point A to a given point B. At this particular day Silke has to go to work and has an appointment at the evening in Berlin-Charlottenburg (close to downtown West). Having access to Silke’s STREETLIFE user profile, the App is proposing to take the public transport (PT). The App is taking into account actual and forecasted weather and traffic situation. As rain is forecasted for the morning and the traffic situation between the city center and Adlershof is bad due to various construction sites and a heavy traffic load, modes “bike” and “car” were disregarded. Nevertheless, costs and the carbon footprint is calculated and shown for all modes by the STREETLIFE App. In the App Silke is choosing the proposed PT connection (Bus → S-Bahn → Bus) and confirms to follow and monitor this itinerary.

The bus from home arrives on schedule, but due to a light accident on its route the bus gets in jam. This causes 15 minutes extra travel time. Via GPS Silke’s smartphone is tracked by the STREETLIFE system; the system calculates that the planned itinerary cannot be followed and sends automatically an updated itinerary proposing to leave the bus at an earlier station and to use another S-Bahn and connection bus. While using different PT means Silke is assessing the quality and reliability of this trip’s modes via the App.

The scenario instantiates the following use cases:

3.2.1.1.1. Use Case: trip planning

Use Case ID: BER-PTP-1
Primary Actor: end user, STREETLIFE system

Use Case Description: Supports end user planning and evaluating a trip with regards to pre-defined assess criteria (e.g. costs, carbon emissions, duration, length, etc.) by using a mobile device or a PC both connected to the internet. It may be called by an individual end user or by a STREETLIFE system service component.

Preconditions:

- Access to multi-modal routing planner available
- STREETLIFE user registration with preferences
- STREETLIFE App installed or internet access to STREETLIFE website
- End user location is available

Trigger: end user calls corresponding App or website function

Basic flow:

1. user starts trip-planning App
2. sets origin and destination coordinates
3. selects one or several user preferences
4. routes will be calculated by the STREETLIFE system
5. user selects favourite option/route

Alternative flow:

1. user enters STREETLIFE system web site
2. users authenticates at STREETLIFE service (log-in)
3. user selects trip-planning engine
4. sets origin and destination coordinates
5. selects one or several user preferences
6. routes will be calculated by the STREETLIFE system
7. user selects favourite option/route
8. user select route distribution option (print, mail, …)

3.2.1.1.2. Use Case: Carbon footprint (CFP) advisory

Use Case ID: BER-PTP-2
Primary Actor: end user

Use Case Description: Allows the estimated calculation for the carbon footprint for available modes of a planned trip. It may be called directly by the trip planner or will run as a standalone service, enable STREETLIFE users to play with the mode options and evaluate their carbon impact.

Preconditions:

- STREETLIFE user registration with preferences
- STREETLIFE App installed or internet access to STREETLIFE website

Trigger:

- end user calls corresponding App or website function
- end user uses pre-trip planning (CFP is automatically calculated for integrated modes)

- web site service called

Basic flow:

1. User requests trip itinerary for available mode options (using the trip-planner)
2. CFP returns carbon emission for available modes

Alternative flows: standalone service at web site used for evaluating mode options

3.2.1.1.3. Use Case: Itinerary tracking and adjustment

Use Case ID: BER-PTP-3
Primary Actor: end user

Use Case Description: Tracks itinerary of a pre-planned and on-going trip, informs user about derivation and suggests alternatives and adjustments.

Preconditions:

- a pre-planned trip is designed and followed
- trip (GPS) tracking connected with the STREETLIFE backend possible
- trip/user confirmed to be tracked while itinerary execution

Trigger: a pre-planned trip is followed and confirmed for tracking

Basic flow:

1. A proposed trip option is selected and followed2.
2. “tracking” is activated and confirmed
3. reachability of main connection points is monitored
4. if needed the trip planning is called automatically by the system calculating new itineraries from current position to planned destination
5. message/updated itinerary is sent for confirmation
6. new itinerary is followed

Alternative flows: activated by pre-defined geographical or itinerary trigger points

3.2.1.1.4. Use Case: Crowd sourcing transport service quality & reliability assessment

Use Case ID: BER-PTP-4
Primary Actor: end user

Use Case Description: Registered STREETLIFE user assessing service quality and act as “crowd sourcer”. User gives feedback on transport system aspects such as service quality (e.g. road or PT cleanliness, PT occupation, PT timeliness, traffic information service quality/reliability, congestions, level of services, etc.)

Preconditions:

- crowd sourcing / feedback infrastructure given
- mode of transport is known and assessable
- user is registered and logged in
- quantitative (e.g. level of service) and qualitative (e.g. survey methods and questionnaire items/feedback categories) assessment criteria defined
- reliability testing procedures defined

Trigger: end user calls corresponding App functionality and creates a new entry/message

Basic flow:

1. registered user uses corresponding App
2. new message/entry is created and sent to a backend server

Alternative flows: User uses STREETLIFE web site service to create new entries or edit/confirms existing

3.2.1.1.5. Use Case: Create user profile with transport preferences

Use Case ID: BER-PTP-5
Primary Actor: end user
Use Case Description: The end user should be able to create one or more profiles and save them for use when planning a trip. A profile can include a combination of different preferences. The idea behind this is to speed up the process of allocating the most suitable route and mode of transportation for the user.
Preconditions: Connection to STREETLIFE system is available (or App is installed on smartphone)

Trigger: end user calls corresponding App functionality

Basic flow:

1. end user enters credentials to access the STREETLIFE system
2. end user creates profile based on his/her preferences
3. end user saves profile

Alternative flows:

1. end user enters credentials to access the STREETLIFE system
2. end user selects predefined preference template
3. end user modifies selected preference template
4. end user saves modified preference template under his profile

3.2.1.1.6. Use Case: End user registration

Use Case ID: BER-PTP-6
Primary Actor: end user
Use Case Description: this Use Case describes how an end-user registers to the STREETLIFE-system. The registration can be done through an App connected to the STREETLIFE-system or directly through the STREETLIFE website. The credentials are shared between both solutions.
Preconditions: Connection to STREETLIFE system is available (or App is installed on smartphone)

Trigger: end user calls corresponding App functionality

Basic flow:

1. end user fills the registration form with personal data and user credentials
2. end user accepts End-User License Agreement
3. end user sends completed registration form to STREETLIFE system

4. STREETLIFE system creates a new user account based on the provided registration form

Alternative flows:

End user registers through a STREETLIFE connected website:

1. end user calls registration function on the STREETLIFE connected website
2. end user accepts End-User License Agreement
3. end user fills the registration form with personal data and user credentials
4. end user sends completed registration form to STREETLIFE system
5. STREETLIFE system creates a new user account based on the provided registration form

Username or e-mail from credentials already exists:

1. STREETLIFE system checks availability of Username or E-Mail of provided credentials
2. Identity Management System responds with a message stating that username or e-mail already exists
3. STREETLIFE system responds to the end user that another username or e-mail address must be chosen.

3.2.1.2. Car Pooling and Incentives

Scenario ID: BER-CPI

Narrative: After finishing work later this day, Silke is using the App connected to the STREETLIFE system again for planning the trip from work to the city center. For possible mode options criteria (costs, duration, CO_2 Footprint, etc.) are calculated and listed with the App. Amongst other, the App is offering to book an electric car sharing vehicle in a very close walking distance. Both, an acceptable travel time at this particular time of the day and the chance to win some “green leave” credits for choosing the most environmentally friendly option convince Silke to go for the car sharing option. Choosing the option the car is reserved. As the reservation is valid for 15 minutes only, Silke rushes to the car after she has published this trip into a car pooling network. On the way to the car Silke is contacted by another member of this social network who wants to join this trip. She agrees and meets the passenger at the car position. The App is editing this trip correspondingly and Silke receives additional credits for sharing the trip.

For entering and starting the car, Silke is using an RFID chip attached to her driving license. Just before starting the trip, Silke is switching the App into the “trip observation mode”. This allows the STREETLIFE system to track the trip and to collect information about traffic situation during the trip. At the Stadt-Autobahn (Berlin City Highway), Silke’s passenger is using the STREETLIFE App to report a traffic congestion at the outbound lanes of the Stadt-Autobahn due to road works. Further credits will be accounted to Silke’s user profile.

Silke parks the car at the trip destination and – if automatically selected by the STREETLIFE system – answers a very short survey about the service quality and reliability. The actual travel time for this trip is compared with the forecasted; the difference is requested to be assessed by Silke. The car is locked with the RFID chip on the driving license.

The scenario instantiates the following use cases:

3.2.1.2.1. Use Case: Car/Bike sharing booking

Use Case ID: BER-CPI-1
Primary Actor: end user
Use Case Description: As a prerequisite, Silke has registered with one or more car sharing companies. She has received the corresponding credentials such as an RFID chip.
Furthermore, the car sharing membership has been registered in the STREETLIFE App.
At the end of the multi-modal route request, Silke selects a routing proposal. If the selected routing proposal contains a stage with a car from car sharing, the STREETLIFE App reserves the car and asks Silke for a confirmation of the car reservation. The STREETLIFE App informs Silke about the duration for which the car reservation is guaranteed. The duration depends on the walking (or travel) distance between Silke's location and the car.

Preconditions: Car/Bike sharing membership available; car sharing membership is registered in STREETLIFE App.

Trigger: end user selects a routing proposal containing car sharing in the STREETLIFE App

Basic flow:

1. User uses STREETLIFE Multi-modal Trip Planning App
2. User selects routing proposal containing car sharing
3. STREETLIFE App reserves car sharing car
4. STREETLIFE App asks user for confirmation of car reservation
5. If not confirmed, selected routing proposal is deleted, STREETLIFE Multi-modal Trip Planning App computes alternative routing proposal, user has to select another routing proposal (step 2).
6. If confirmed, STREETLIFE App informs about duration of guaranteed car reservation.
7. If reservation time expires, STREETLIFE App informs the user about this so that user can react by hoping to be lucky (car is still there and not reserved) or by new trip planning.
8. Depending on the greenness of the selected and booked routing option, the user receives "green leave" credits.

The same flow applies for bike sharing.

Alternative flows: No real alternative flow, but different alternatives at different steps of basic flow possible, especially if user input is done.

3.2.1.2.2. Use Case: Gaming/Incentives

Use Case ID: BER-CPI-2
Primary Actor: end user
Use Case Description: The users of the App can sign-up for an incentive program that enables them to earn "green leafs". Depending on the rules (TBD) the users collect CO2-reduction points that can be exchanged for incentives provided by e.g. public transportation operators. Users can also share and compare their "leafs", which introduces a completion stimulus.
Preconditions:

- Gaming regulations and rules defined

    - Benchmark : historical trips compare with current trip
    - User communities (green leaf groups)
- Gaming engine available and applicable
- Incentives defined and available

Trigger: end user calls corresponding App or website function

Basic flow:

1. user uses trip-planning App
2. selects CO2 reduced connection (attributed with "leaf" points to gain)
3. checks and compares her points with her friends' (within app or via social nets)
4. cashes in incentives for a certain point budget

Alternative flows:

3.2.1.2.3. Use Case: Trip communication and Sharing via Social Networks (Car Pooling Setup)

Use Case ID: BER-CPI-3

Primary Actor: end users

Use Case Description: Silke has configured her STREETLIFE profile with access information to a car pooling group in a social network. She has chosen a routing option which includes a car ride (where she is the driver). The STREETLIFE App offers Silke an easy way to post her car trip stage of the selected multi-modal routing option into her car pooling social network. By pressing "yes", Silke posts her car sharing stage to the car pooling social network. The post includes the estimated travel times and start and destination.
Another user sees Silke's post; he is close to the starting point, he wants to the destination, and that as soon as possible. He contacts Silke through the Car Pooling Social Network whether he can join her for the car sharing stage of Silke's trip.
Silke accepts the car travel companion and sends him a confirmation as well as the meeting point and meeting time. This is done through the Car Pooling Social Network as well.
Silke receives additional "Green Leaves" credits for accepting a travel companion in her car.

Preconditions:

- Car/Bike sharing and Social network membership available
- BER-CPI-3 makes use of BER-CPI-1
- Definition of "green leaves" credits regulation

Trigger: a car/bike sharing trip is planned and confirmed for announcement to Social Networks

Basic flow:

(Steps 1-3 are from BER-CPI-1 [Use Case: Car/Bike sharing booking])

1. User uses STREETLIFE Multi-modal Trip Planning App
2. User selects routing proposal containing car sharing
3. STREETLIFE App reserves car sharing car
4. STREETLIFE App offers to user to post car sharing stage to registered car pooling social network
5. User confirms and posts car sharing stage to car pooling social network
6. User B of car pooling social network responds to car pooling offer from STREETLIFE App from step 5.
7. User accepts User B as travel companion
8. User confirms meeting location and meeting time with user B
9. User receives additional "green leaves" credits

Alternative flows:

- Car Pooling Social Network is replaced by car pooling app (like "Mitfahrerzentrale")
- Posted car pooling possibilities are considered in multi-modal trip planner of other users. Needs to deal with uncertainties of actually doing the trip as planned.

3.2.1.2.4. Use Case: Trip/Route feedback and tracking

Use Case ID: BER-CPI-4
Primary Actor: end user
Use Case Description: The Use Case describes how a user confirms to track his route and how additionally information will be provided to the STREETLIFE system, e.g. road works, road quality, PT quality & timeliness, PT occupation, car & bike sharing service quality, etc.
Preconditions:

- A pre-planned trip is designed, followed and finished.
- The Location Tracking option of the smartphone is activated.
- The end-user has activated the feedback functionality through a "questionnaire" in his user preferences of the STREETLIFE-system.
- The end-user has given the permission that the App is allowed to act in behalf of his STREETLIFE-system identity.

Trigger:

- a pre-planned trip is followed and confirmed for tracking and feedback
- this particular trip/user is selected to be surveyed for evaluation purposes

Basic flow:

1. The end-user selects the "trip observation mode" through an App connected to the STREETLIFE-system.
2. The App starts collecting and sending location data to the STREETLIFE system.
3. The end-user finishes the "trip observation mode" through the App.
4. The App stops sending location data to the STREETLIFE-system.
5. The App presents a questionnaire to the end-user.
6. The end-user fills the questionnaire and sends it through the App to the STREETLIFE-system.
7. The App shows some statistics about the trip.

Alternative flows:

If the App is in "trip observation mode":

1. The end-user reports information on his trip through the user interface of the App.
2. The App sends event information to the STREETLIFE-system.

3.2.1.3. Bike Usage and Incentives

Scenario ID: BER-BUI

Narrative: After her private appointment, again Silke is using the App connected to the STREETLIFE system for planning the trip home. This trip is from Berlin-Charlottenburg (City Center West) to Berlin-Friedrichshain (housing quarter east from city center) crossing the inner city center. Silke is looking for available trip options preferring the fastest. This is public transportation – the S-Bahn goes directly from a nearby station. As connected to a

STREETLIFE local event data base and local social networks, the App is pointing out a big ice hockey match taking place in the O2 arena and an expected high occupation of public transportation, including the line proposed for Silke's trip home. Thus, Silke is opting for the second fastest option as she doesn't like bigger sports crowds in sometimes hyped up moods. The weather is nice. So, Silke is choosing the bike sharing option. The App is guiding her to the next bike sharing station and is proposing the safest route from this position to her home. The route is avoiding or alerting main roads and heavily littered road sections, bigger intersections and accident hotspots for cyclists. Since Silke bought the luxury version that includes also future extensions, the integrated collision avoidance assistant from the future allows communication between mobile devices with installed and active STREETLIFE Apps in cars and in bicycles for avoiding collisions between cars and bicycles. Silke is feeling save while riding the bike and looking forward for further developments which help making urban cycling even safer.

And again, Silke is collecting "green leaves" and "health" credits while enjoying the bicycle ride through the mild summer night. Maybe her account balance is high enough to have a free trip with public transportation or even a shared ride in an EV convertible in the next warm summer night.

The scenario instantiates the trip planning use case (see chapter 3.2.1.1) as well as the following use cases:

3.2.1.3.1. Use Case: Event Info Provision

Use Case ID: BER-BUI-1
Primary Actor: transport system/service operator, STREETLIFE system, external data source provider (event data)
Use Case Description: Event portals in the WWW collect information about events in the city. The event portal provides a first characterization of the events such as time, location, and size of audience. The latter is derived from ticket sales. The transport service operator retrieves this data and enriches its characterization with additional semantics. These semantics are related to the effects of such events to the mobility situation at those locations and are learned from the past. For exceptionally large, rare events such as Olympic Games the semantic enrichment might be done manually.
Preconditions: event data collected in event data base, characterisation model for events

Trigger: event planning, ticket sales

Basic flow:

1. Event portal collects information about events
2. Transport service operator regularly retrieves event data base with time, location, ticket sales (=number of people)
3. Transport service operator enriches characterization of events with information relevant to transport and mobility

Alternative flows:

1. Transport service operator regularly retrieves event data base with time, location, ticket sales (=initial number of people)
2. Data mining in Social networks on current events or events in the near future provides insights about the crowdedness at the location of certain events.

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3.2.1.3.2. Use Case: Events changing mode choice

Use Case ID: BER-BUI-2
Primary Actor: end user
Use Case Description: After a user has planned a trip with the App connected to the STREETLIFE system and confirmed this trip to be tracked and to be adjusted when needed the routing is taking into account mass events via a corresponding STREETLIFE event data base or connected social networks on the way of this trip. In this case and with respect to the preferences defined by the user the traveller is provided with alternative routes and mode options.
If this event and resulting disturbances for the planned trip are already known when planning the trip the routing pays special attention to this event.
Preconditions:

- Social Network information integrated
- Pre-planned trip chosen, active and tracked
- User preferences set and regarded
- Event data base set up and connected

Trigger: end user calls corresponding App or website function

Basic flow:

1. User follows pre-planned and selected itinerary
2. the App is informing about mass events and its implications for this trip
3. route adjustment or alternative options proposed
4. User selects and executes one option and confirms tracking and adjustment

Alternative flows:

1. While planning a trip an event data base is called and mass events in combination with defined user preferences are taking into account for planning this trip
2. user get trip options bypassing this event location(s)

3.2.1.3.3. Use Case: Safe Bike Routing

Use Case ID: BER-BUI-3
Primary Actor: end user
Use Case Description: The bicycle-part of the multi-modal router avoids locations that are dangerous for bicyclists if possible with only small delays. Silke has configured 1) that she wants to avoid dangerous spots and 2) how much delay she is tolerating.
The route is avoiding or alerting main roads and heavily littered road sections, bigger intersections and accident hotspots for cyclists.
Silke activates the positioning in the STREETLIFE App, so that the STREETLIFE App can warn the user if a dangerous location on the path is coming up. Note, there can be still dangerous places on the path due to the limiting maximum additional delay.
Preconditions:

- Bike route chosen
- Bike warnings and hotspots given
- Bicycle safety routing activated.

BER-BUI-3 makes use of use cases BER-BUI-4 (see chapter 3.2.1.3.4) and BER-PTP-3 (see chapter 3.2.1.1.3)

Trigger: end user chooses Mode bike and calls router, or choses multi-modal route with bike included

Basic flow:

1. user activates / configures to use safety routing for bicycle stages
2. user selects routing proposal that contains bicycle stage
3. User takes bicycle, either his own or from a bike sharing station, and starts his bicycle ride.
4. Positioning is activated
5. STREETLIFE App informs user about upcoming accident hotspots, busy intersections, unsafe road conditions, unfavourable lane layouts (no bike lane) etc. Note, no position of user needs to be given to other actor (current position stays local to smartphone of user)

Alternative flows: no hotspot information

3.2.1.3.4. Feasibility study/use case: Collision avoidance/warning – C2X-, STREETLIFE2X-Communications

Use Case ID: BER-BUI-4
Primary Actor: end users
Use Case Description: Within a feasibility study an interaction between car drivers and cyclists is simulated and prototyped. The general idea is to inform car and bicycle drivers automatically about possible critical situation to come by using short range communication technologies. In the test setting, participants have installed and running Apps connected with the STREETLIFE system which alert users to likely cautious conditions and route overlapping/interactions.
Preconditions:

- Use case BER-BUI-3 “Safe Bike Routing” selected and running
- STREETLIFE Apps running at both modes
- Communication channel and protocols defined and established
- Project external functionality can be provided for the project

Trigger:

- Piloting mode only: Apps using function

Basic flow: Not yet defined.
Alternative flows: Not yet defined.

3.2.1.3.5. Use case: Incentive Management

Use Case ID: BER-BUI-5
Primary Actor: end user
Use Case Description: The use case is closely related to BER-CPI-2 (see chapter 3.2.1.2.2). The management function on the App allows the user to manage the gained credits and convert credits to incentives. If provided by the gaming platform, additional functionalities might include exchanging credits between users etc.
Preconditions:

- Gaming platform available and suitable
- Incentives available

Trigger:

- User invokes management
- Platform informs the user on the App about reached incentive levels

Basic flow: User invokes management page on app and manages her credits
Alternative flows:

1. If available on the platform, a push notification is sent to the user about available incentives
2. User acknowledges the notification and changes to the management page of the app

3.2.2. Operator/management scenarios

In the scenarios collected in this Section, the main actors involved are either officials in the city of Berlin who work on managing the city mobility or other third-party operators of mobility-related services, who interact with the STREETLIFE system as deployed in the city of Berlin. For convenience, we exemplify these stakeholders by providing two consistent profiles that are used throughout the related scenarios, which we called *Philipp* and *Kathrin.*

Stakeholders/actors list:

- Transport system operator
- Transport (information) service operator (e.g. car sharing operator)

Philipp is working at the Berlin Traffic Management Center as a Transport System Operator and is responsible for monitoring and evaluating the actual Berlin traffic situation. His main job is to recommend necessary measures and actions on significant changes in transport demand and on severe disturbances of the overall Berlin transport system situation. He is used to work with and to rapidly interpret main KPI, automatically derived from huge amounts of raw data, which help him to “feel the pulse” of the Berlin transport system. The more easy-to-understand information he gets, the better he is able to fine-tune and propose sustainable actions and measures. In his daily business, he is dealing with a huge amount of information. Thus, he does not need another monitor with transport figures and data. He needs reasonably aggregated information to be integrated seamlessly and intuitively into his daily operations and routines.

Kathrin is a Transport Service Operator in Berlin. She is managing a rental bicycle service.

3.2.2.1. Provision of additional information aggregated from STREETLIFE services and applications

Scenario ID: BER-MGMT

Narrative: Philipp is sitting in front of his transport operator panel and watching the status of the Berlin transportation system. All KPI shown at the STREETLIFE monitor are stating normal system performance. All figures are green using the traffic light color code for an easy understanding. An incoming message of a STREETLIFE user is catching his attention to a growing congestion at the Stadt-Autobahn. After a couple of minutes the congestion is grown to more than three kilometers and even feeder roads start to jam. Some KPI for the highway have turned its color into yellow. Philipp is calling the contractual company responsible for road works at this stretch to finish the works soon to allow outbound rush-hour traffic to perform better. He also reports this congestion to the Traffic Information Service Operator who is sitting next to him. In the VMZ, the Traffic Information Service Operator is providing radio stations with latest information about traffic disturbances on close co-operation with the

Transport System Operator. He creates a corresponding TMC message which helps navigation systems to bypass this congestion.

Philipp is being informed about the tonight's ice hockey match in the O2 world with expected road traffic and PT bottlenecks in the late evening hours when the match is finished. Guided by the system he is creating a "system event" by just putting a virtual needle on the map at the position of the O2 arena in Berlin-Friedrichshain. This will help several routing services to advice users about expected disturbances and recommended alternative routes.

Kathrin is managing a rental bicycle service in Berlin. Connected to a local event data base she is being informed about the sports event in the O2 world tonight. When using her instantiation of an App connected to the STREETLIFE system, she is being advised to supply additional rental bikes tonight at bike rental stations close to the O2 world. She is following this advice and adjusts the availability as suggested. Next morning the STREETLIFE system automatically sends a short questionnaire asking for the quality/perceived correctness of the given advice and the actual demand last night.

In the meantime, the congestion at the highway is resolving; corresponding KPI for the Berlin highway system turn into "green" again. When after rush hour the traffic calms down step-by-step one particular STREETLIFE KPI shows how many tons of greenhouse gases were saved today since new and innovative transport and mobility services have been integrated.

The scenario instantiates the following use cases, but it also contributes to use case BER-BUI-1 (see chapter 3.2.1.3.1):

3.2.2.1.1. Use Case: Derivation, Aggregation and Monitoring of main KPI

Use Case ID: BER-MGMT-1
Primary Actor: transport system operator, transport service operator
Use Case Description: This use case allows operators to keep track of the current traffic flow in an urban area. An interactive map highlights points of interests regarding the KPIs. Figures in traffic light colours are indicating the status of the area.
Preconditions:

- Traffic data is available
- Visualization engine of data is available
- KPIs are defined

Trigger: automatically updated

Basic flow:

1. Actor selects the map view and a set of KPIs
2. Aggregation of data
3. Analysis of data regarding the selected KPIs
4. Visualization of data on a map

Alternative flows:

3.2.2.1.2. Use Case: Generation of warnings and service quality feedback

Use Case ID: BER-MGMT-2
Primary Actor: transport system operator, transport service operator
Use Case Description: If the analysis of the data reaches a specific value the status of the area will change. The status represents the situation for the KPIs. Figures in traffic lights

colours are indicating the current status. The actor will be notified by every status change. Changes from a green status to a yellow or red status will be displayed as warnings. The actor can inform the person or company in charge to guide them in solving the situation.

Preconditions:

- Use Case is applicable.
- Thresholds of KIPs defined
- Access to VMZ granted

Trigger: automatically formatted and forwarded/displayed

Basic flow:

1. Notification of status change is flashing up
2. Clicking on the notification gives more details about it
3. Sending information to person or company in charge with advises to solve the problem
4. Changing status to "under examination"
5. If problem is solved, status colour goes back to green.

Alternative flows:

3.2.2.1.3. Use Case: KPI monitoring at STREETLIFE website

Use Case ID: BER- MGMT-3
Primary Actor: transport system operator, transport service operator, end user
Use Case Description: Silke gained a lot "green leafs" today. Now she wants to look up the achievement of STREETLIFE community of today, in comparison to historical data and for motivation to reach the future targets. Silke calls the STREETLIFE website and checks the, e.g., today saved tons of greenhouse gases achieved by using integrated new and innovative transport and mobility services. There might also be a "green leave" benchmark within community, set by highest gain of today´s STREETLIFE App users.
There is also a list of today recognized events and the activated counter measures.
Phillip also uses this website to analyse the impact of these counter measures. He compares the shown emission and traffic KPIs with additional information about e.g. weather and uses this information for improvement of transport services. He can also use this information for back-end services (scenario 2.2).
The involved service operators can verify the usage of offered transportation modes over this web site and improve their services in amount, location and incentives.

Preconditions: Definition, aggregation and accumulation of public KPI for daily on-site presentation

Trigger: automatically formatted and displayed and reasonably updated

Basic flow:

1. Define public KPIs and information that can be selected by web user
2. Graphical visualization of public KPIs, including history and target achievement on web service
3. Update KPI calculation and visualization continuously
4. Use guest book for user recommendations or discussion forum
5. Analyse feedback for system improvement

Alternative flows: active communication to service operator

3.2.2.1.4. Use Case: event based service adjustment and feedback

Use Case ID: BER-MGMT-4
Primary Actor: Transport service operator

Use Case Description: Transport Service Operator adjusts a service according to events and corresponding growing demand and will be provided with a feedback survey to evaluate the quality/correctness of the proposed advice/measure.

Preconditions:

- Transport service operator defines a specific set of event information.
- Given feedback function including KPI definition
- Definition of event characteristics and categories

Trigger: A new local event is published to the STREETLIFE-system.

Basic flow:

1. The STREETLIFE-system transforms the event information for each registered transport service operator in a customized presentation format.
2. The STREETLIFE-system sends notifications to all registered transport service operators.
3. The transport service operator gets notified through an App about the upcoming event.
4. The transport service operator responds to the notification by changing his service availability in the environment.
5. The STREETLIFE-system sends a questionnaire to the transport service operator.
6. The transport service operator fills the questionnaire and sends it to the STREETLIFE-system

Alternative flows: The transport service operator gets notifications through the STREETLIFE website.

3.2.2.2. Back-end Services

Scenario ID: BER-BES

Narrative: Philipp and his colleagues often discuss about “what-if-settings”. What would happen with the Berlin traffic situation, if for instance a city road fee would be implemented in Berlin or if the gasoline prices would increase significantly; what if an increased safety for cyclists or more frequent PT services would convince more car drivers to change to greener modes? What could be achieved in terms of greenhouse gas emissions when radical and innovative transport policies and plans would come into action.

Philipp would really like to know about impacts of possible measures and policies. As this cannot be tested in real-life conditions and such simulation cannot be set up and run in parallel with the operation’s daily businesses, Transport System Operators would like to have assistance in simulating such combinations of measures (so called scenarios).

In a local stakeholder workshop simulation scenarios will be defined and discussed together with the local Transport System Operators. Those scenarios pay special attention to the expectations, needs and wishes of the Transport System Operation as well as to the focus of the STREETLIFE project. This means that a clear added value will be derived from the main goals and objectives of the STREETLIFE project. Jointly defined scenarios will then be simulated, analysed and translated into pre-defined KPI relevant for the Transport Operations. Results (simulation outcomes, KPI, trends and forecasts) will be presented by the Berlin STREETLIFE partners and discussed with the Berlin Transport Operators.

The scenario instantiates use case BER-MGMT-1 (see chapter 3.2.2.1.1) as well as the following use cases:

3.2.2.2.1. Use Case: Scenario simulation

Use Case ID: BER-BES-2
Primary Actor: transport system operator, STREETLIFE Berlin pilot partners
Use Case Description: Each simulation was achieved by modifying data regarding a specific model/policy decision after inspecting the current mobility situation. Micro simulations are used for simulating specific spots in a “short” time range and macro simulations are used for simulate bigger areas for “long” time.
Preconditions:

- Berlin KPIs defined
- Definition of simulation tools and respective requirements
- Input data (e.g. TAPAS) for simulation available

Trigger: in coordination with the Transport System Operation

Basic flow:

1. Select spot or area
2. Select time range
3. Apply respective models/policies
4. Modify data
5. Run simulation

Alternative flows: No alternative flows.

3.2.2.2.2. Use Case: Results presentation, feedback and delivery

Use Case ID: BER-BES-3
Primary Actor: transport system operator, STREETLIFE Berlin pilot partners
Use Case Description: The results are presented on a map showing how the defined models/policies act on the modified data. Depending on how long the defined time range was, the results were shown in real time or in a fast motion way. Finally a result page with before and after KPIs value added calculation is created.
Preconditions:

- Simulation model/policy is applicable
- Data is available and modified

Trigger: in coordination with the Transport System Operation

Basic flow:

1. Application of use cases 3.2.2.1.1 and 3.2.2.1.2 to show the results
2. Calculate KPIs value added

Alternative flows: No alternative flow.

3.2.3. Key Performance Indicators for BER Pilot

The BER pilot distinguishes between strategic KPIs and scenario level KPIs.

Management scenarios do not define specific KPIs; some KPIs will be used in management scenarios. Transport system and service operators will be informed about the impact of STREETLIFE services and aggregations using mainly defined KPIs of end user scenarios. Management scenarios will be evaluated in a rather subjective manner. Operators will be interviewed in order to determine their acceptance of STREETLIFE implementations, applications and services. Therefore, a combination of aggregation, selection and projection of the scenario level and strategic KPIs of end user scenarios will be applied. Thus, transport system and service operators can create a specific view on the various KPIs leading to new knowledge that can be examined in future simulation scenarios or shown on the STREETLIFE website. For example, operators can modify time or geographical constraints of a KPI. Also the operator-centred definition of thresholds is possible and allowing the STREETLIFE system to inform the transport system operator about a critical level of KPIs.

The strategic KPIs for the BER pilot are the following:

- **Modal split**: The modal split describes the trip distribution by different means of transportation. It is one of the essential indicators about the level of success for policies about sustainable urban mobility. For Berlin, a significant increase of non-motorised transport mode usage is targeted.
- **Reduction of carbon emission**: Estimation of carbon emissions that do not get released in the atmosphere, because of the policies and mode choice advisories implemented in the scenarios (PTP, BUI, CPI, MGMT) and with the support of the technologies developed in the STREETLIFE project.
- **Bike cyclist safety**: On a pre-defined scale bike cyclist safety in Berlin is indicated. It can be global or restricted to a smaller area or main bike routes. Since the Berlin Pilot targets to improve the safety for bike cyclist it is a main indicator of the success of the Berlin pilot.

The scenario-level KPIs for the BER pilot are the following:

- **Total number of collected “Green leaves” credits**: The total amount of “green leaves” that the STREETLIFE users collected so far. It can be easily computed through the STREETLIFE database. There is no baseline information available.

- **Service quality satisfaction**: The service quality satisfaction of the STREETLIFE users. Every STREETLIFE user has the possibility to qualitatively evaluate the service quality on a scale to be defined. Therefore, appropriate methods (Questionnaires, interviews) and denominators (sub-indicators) will be defined. The average value of user satisfaction will be computed and extracted as a KPI. The availability of a baseline needs to be checked. Similar existing route planning applications may have service quality satisfaction data that needs to be mapped onto the defined scale.

- **Sharing bikes placed near an event**: The total amount of sharing bikes that a bike sharing provider placed near an event. The KPI is composed of the number of sharing bikes, the event location and the bike sharing provider. The value is collected through a questionnaire to the bike sharing provider. There is no baseline information for this KPI available.

- **Sharing bikes moved near an event**: The total number of used bikes that were placed near an event by the bike sharing provider. The KPI is composed of the number of used sharing bikes, the event location and the bike sharing provider. The value is collected through a questionnaire to the bike sharing provider. There is no baseline information for this KPI available.

- **Number of bike accidents**: The total number of bike accidents in Berlin is collected and updated through the VMZ data pool and through corresponding web services of the Berlin Police Department and Berlin Statistics. The baseline is the number of bike accidents before the Berlin pilot starts.

- **Number of shared STREETLIFE trips**: The total number of shared STREETLIFE trips. A shared STREETLIFE trip is added to the STREETLIFE database if corresponding constraints are fulfilled. The number can be directly extracted from the STREETLIFE database. There is no baseline information for this KPI available.

- **Number of registered STREETLIFE users**: The total number of registered STREETLIFE users can be extracted from the STREETLIFE database. There is no baseline information for this KPI available.

- **Level of service for motorised traffic**: The Level of service is composed of the density, speed, travel time and number of stops of motorised traffic in Berlin. Values are available through the VMZ data pool. A mapping between VMZ data and the STREETLIFE specific color-codes need to be considered. The VMZ provides near real-time and historical data. The historical data is used as a baseline.

- **Level of service for public transport**: The Level of service is composed of the frequency, availability, reliability, occupation rate, activity and usage of public transport in Berlin. Values are available through the local public transport provider data pool. A mapping between local public transport provider data sets and the STREETLIFE specific color-codes need to be considered. The local public transport provider provides near real-time and historical data. The historical data is used as a baseline.

- **Number of carbon-friendly trips**: The total number of STREETLIFE trips replacing conventional cars by non-motorised transport modes. Mode choice information can be extracted from the STREETLIFE database, but has to be merged with self-assessing information about mode replacements by the user. No baseline information is available.

- **Number of bike trip**s: The total number of bike trips executed by STREETLIFE users. The value can be extracted from the STREETLIFE database. No baseline information is available.

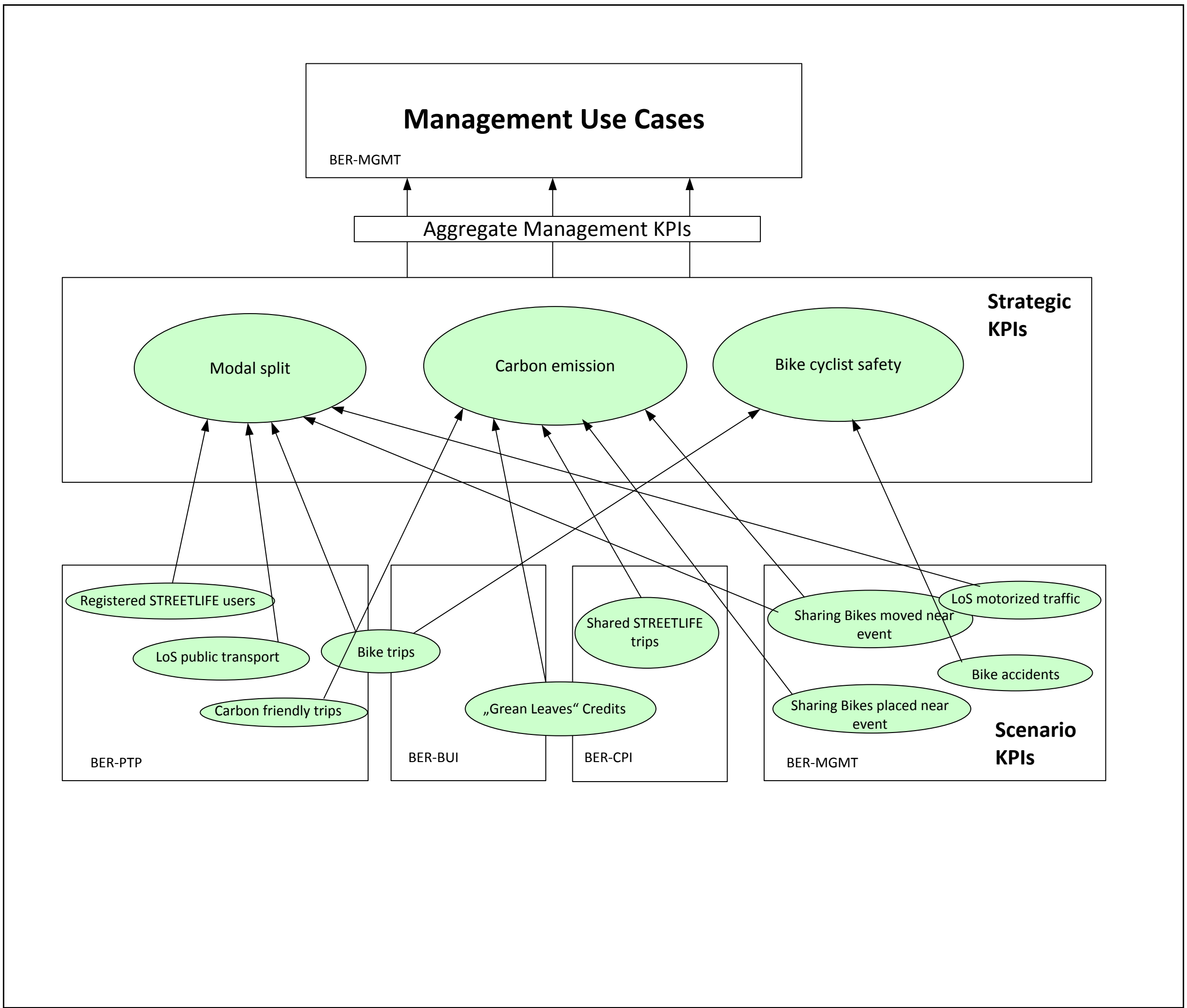

Figure 2: Berlin Pilot KPI Scheme

3.3. Scenarios and use cases for ROV pilot

The basis for Rovereto scenarios is the Urban Mobility Plan (PUM, in brief) that CAIRE and the Municipality of Rovereto have developed together in the last two years. During the development of the PUM, the active involvement of Rovereto citizens was sought at specific junctures, so that citizens could have the chance to participate with suggestions and criticism to the redaction of the Plan.

The scenarios for the ROV pilot that we present in this Section are in large part related to some of the mobility topics that were most cited in those meetings with the Rovereto citizens; another criterion is that we selected scenarios that - on paper – have the lesser burden on the Municipality of Rovereto from the economic point of view, and whose mobility benefits can be achieved by using and developing ICT solutions, with minimal infrastructure and systemic investments (or none).

3.3.1. Scenario – Sharing Bikes

Scenario ID: ROV-BS

Narrative: The Rovereto municipality has developed a urban bike sharing system whom offers the following options to its citizens:
1) 20 bikes that are available to citizens free of charge and without supervision or control (1st generation of bike sharing);
2) 16 bikes that citizens can use with a specific key in 3 stations placed in three strategic parking lots, which are the exact places where the users will have to return each bike after their use (2nd generation bike sharing called “Centro in Bici”);
3) N electric bikes located in M recharging stations available with a badge with the only condition of leaving them to one of the recharging stations (3rd generation bike sharing called “Bicincittà”, to be deployed in the second quarter of 2014). The return station doesn’t have to be the same station where the user took the bike. The Bicincittà system provides information on the pick-up and return stations of the bikes, in addition to other statistical information.
The city has decided to equip itself with the necessary equipment and support (such as GPS devices on the shared bikes) to track usage some of the vehicles participating in this service, which will be the subject of the STREETLIFE pilot.

Tiziana is a Rovereto citizen who has recognized that the bike sharing service can support her daily need of short-term and short-distance urban transportation. She is also environmentally conscious and intends to participate in the bike-sharing program to improve the quality of life and promote sustainable mobility in her city. Given the varied offering of bike-sharing options, Tiziana would like to interact with the STREETLIFE system with a mobile app, to be able to decide what is the most convenient bike that she can use for a given trip, as soon as she decides to take that trip, and to seamlessly reserve that bike. She would also like to be able to get a sense of the environmental and health benefits achieved with each taken bike trip, and to communicate feedback about the service when needed.

Cristian works in the mobility management office of the municipality of Rovereto, and is invested in the day-to-day monitoring and management of the bike sharing service. He is interested in consulting an up-to-date dashboard for the service, which must report and synthesize for him sufficient information to understand, among other things, the following aspects of the service.

- Where bikes are used (most common routes in the city)
- In case of 1st generation bike sharing, detect the locations where they are left, so that the bikes can be recovered by a mobility mgmt. crew and brought back where they can be easily picked up by the next user (e.g. in strategic places downtown)
- How much they are used (km) and when they are used most (times of day)

Moreover, Cristian is also responsible for the analysis of the bike sharing system, and for planning how the offering of bike sharing by the municipality of Rovereto shall change in the future (for example as an effect of increased awareness and usage by citizens like Tiziana, following the deployment of STREETLIFE bike sharing mobile app). Cristian is especially interested in the following analysis and decision support on the part of the STREETLIFE mobility dashboard.

- evaluate the actual effectiveness of the mobility options offered by the bike sharing service and decide whether it should be continued, as well as which of the three different options currently available are likely to be the most useful and popular;
- estimate how many shared bikes for each option need to be injected in the city traffic system to fulfill citizens’ demand and needs;

- evaluate how many bikes – for each category – need to be tracked in order to compromise between costs and effectiveness of the system, and have sufficient resolution and accuracy in the bike sharing dashboard.

In this scenario, the STREETLIFE system will support both Tiziana’s needs for an efficient way to access the bike sharing service, and Cristian’s needs, both for effective reporting of the state of the service and the vehicles, and for analysis and decision support.

Stakeholders/actors list:

- Individual citizen (exemplified by Tiziana): needs to be able to find the bikes positioned in the city
- Mobility manager (exemplified by Cristian): wants to be able to carry out a number of analyses on bike usage in the city.
  Added value: can make management decisions on optimal provision of the bike service; can get information on the most popular bike routes to define priorities in the development of the network of cycling roads; affects KPIs … (if any)
- Mobility mgmt. crew: want to track and account for bikes

This scenario instantiates the following use cases.

3.3.1.1. Use Case: Find Bikes

Use Case ID: ROV-BS/1
Primary Actor: Citizen

Preconditions: Tiziana has the STREETLIFE mobility app installed on her smart phone

Trigger: Tiziana has opened “Available bike” screen in STREETLIFE app

Basic flow:

1. Tiziana inspects available bikes on a map, within a radius centered around its current position (the radius is specified within the STREETLIFE app)
2. Tiziana selects the bike she is interested in picking up and reserves it for a short period of times (n minutes) specified within the STREETLIFE app
3. Any other STREETLIFE users looking at that bike are notified that the bike is currently in a reserved state and in how many minutes the reservation will expire
4. Tiziana collects the bike and uses it
5. Tiziana leaves the bike at a new location
6. When Tiziana is finished using the shared bike, she has the option to send to the system feedback about her trip: feedback includes her satisfaction with the service, the condition of the bike (e.g. it my need repair, or has a flat tire) and will also include information about the new state of the vehicle (free) and its location at the end of Tiziana’s trip.
7. The STREETLIFE system acknowledges Tiziana for her green mobility choice, and sends her a notification stating the number of “green leaves” she has accumulated with this particular trip. The notification also includes a report with salient statistic of the trip, such as distance, speed, estimated Kcal burned and other customizable information.

8. The STREETLIFE system and the mobile app record and accumulate this information within Tiziana's profile

Alternative flows:
1.1. If there are no available bikes, Tiziana has the option to signal this to the System, specifying place and time
2.1. If Tiziana does not find any convenient bikes around her position, she has the possibility to signal this to System, specifying place and time

3.3.1.2. Use Case: Retrieve Bikes

Use Case ID: ROV-BS/2
Primary Actor: Mobility manager (secondary actor: mobility management crew)

Preconditions: bike locations are being monitored by the STREETLIFE system

Trigger: Cristian has opened the bike monitoring console of his STREETLIFE mobility dashboard

Basic flow:
1. Cristian inspects e-bike usage
2. Cristian manager identifies unused e-bike and marks them
3. System produces an e-bike retrieval plan and route
4. Cristian issues retrieval plan to mobility mgmt. crew
5. Mobility mgmt. crew picks up and relocates unused bikes according to the retrieval plan
6. System monitors retrieval and signals changes to Mobility mgmt. crew member (e.g., bikes that start being used again while the recovery procedures is under way)
7. Cristian inspects the progress of the retrieval procedure through a real-time retrieval report

3.3.1.3. User Case: Improve Bike usage

Use Case ID: ROV-BS/3
Primary Actor: Mobility manager

Preconditions: e-bike usage is being monitored by the STREETLIFE System

Trigger: Cristian has opened the bike monitoring console of his STREETLIFE mobility dashboard

Basic flow:
1. Cristian inspects statistics and routes of bike usage
2. Cristian decides how many bikes are needed for the different categories and where they should be located
3. Cristian manager decides optimal usage of GPS devices for the different categories of bikes
4. System produces a bike placement plan
5. Cristian issue an up-to-date bike placement plan to mobility mgmt. crew

Comments:

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This use cases has overlap and/or can be chained to ROV-1/2: differences are:

- Retrieval of bikes is a periodic and frequent activity; the bike traffic analysis may be a less frequent or sporadic activity
- Retrieval plan only predicates on bikes currently on the ground; placement plan also predicate on other aspects like changes in the service capacity, service locations and total number and type of bikes in circulation.

3.3.2. Scenario – Car Pooling to Work

Scenario ID: ROV-CP
Narrative: Rovereto is the main town of a group of municipalities called Valle Vallagarina. The 80% of commuters who enter in Rovereto every day are coming from Valle Vallagarina. The main roads of entrance into the city and the most common work places of commuters are pretty much recognizable in the urban structure. This situation is an ideal pre-condition to promote ICT solutions that deploy a car pooling service aimed at helping workers-commuters specifically, and which can promotes and incentivize home-to-work-to-home mobility in a sustainable and convenient manner.

Marco lives in Valle Vallagarina, about 25 Km outside Rovereto, but has just been hired by company XYZ in Rovereto. He is environmentally-conscious, and would also like to save money on his daily trips to and from work.
Annapaola is also a commuter from Valle Vallagarina, who has been long employed by company XYZ. She is a habitual car commuter (about 20 Km away from Rovereto). However, because of family reasons she uses her car only on Mondays, Wednesdays and Fridays.
Davide is also a habitual car commuter to Rovereto. He is not an employee of XYZ, but works in the immediate vicinity (in the same industrial district)
Marco, Davide and Annapaola are registered in the STREETLIFE community of trusted passenger and drivers. The community allow them to ask, offer and negotiate a car ride, specifying any personal details and preferences, and the origin and the destination of the trip. The community is organized as a social network which includes friends and acquaintances, as well as "liked" fellow travellers who have successfully shared a ride in the past. It also includes co-workers in the same company, in order to facilitate co-workers to find one another when organizing their car pooling trips. Companies like XYZ are also able to actively subscribe to the service, which allows them to organize campaigns and initiatives to incentivize their employees to use the STREETLIFE car pooling service in order to improve their environmental and social performance.
Cristian, who works in the mobility management office of the municipality of Rovereto is tasked with promoting the car pooling service , with the goal of reducing the number of circulating vehicles. Cristian can arrange awards and incentives for both individual commuters, like Marco and Annapaola, and enterprises, like company XYZ. Cristian can also use the STREETLIFE dashboard to monitor the progress and efficacy of the car pooling service and the promotion campaigns.

Stakeholders/actors list:

- Commuters (exemplified by Marco, Davide and Annapaola): offering or searching a ride for their trip

- Mobility mgmt. officer (exemplified by Cristian): evaluates the benefits coming from a policy aimed at spreading car-pooling in terms of traffic reduction with the engagement of citizens and enterprises
- Enterprises (exemplified by company XYZ): they want to improve their reputation and be more attractive to their employees

This scenario instantiates the following use cases.

3.3.2.1. Use Case: Find a carpool ride

Use Case ID: ROV-CP/1
Primary Actor: Commuter / passenger

Preconditions: Marco has the STREETLIFE mobility app installed on the smart phone and is registered as a car pooler (passenger).

Trigger: Marco has opened a "Find a ride" screen in STREETLIFE app

Basic flow:
1. Marco specifies his itinerary, including end points and date and time for the requested carpool ride; he can add other details, for example, the fact that he is an employee of XYZ
2. Marco issues the "find a ride" request
3. STREETLIFE car pooling service finds a match to Marco's request
4. Marco is contacted through an in-app notification by a Annapaola, a fellow STREETLIFE car pooler (driver)
5. Marco accesses and examines Annapaola's driver profile maintained by STREETLIFE
6. Marco and Annapaola negotiate and agree upon the terms of the ride
7. Marco accepts the ride and issues a confirmation through the app
8. App sets and send appointment reminder to Marco and Annapaola

Alternative flows:
1.1 Car ride requests can be single, or recurring; in Marco's case, he issues a recurring request (5 days a week)
3.1 The system can present to Marco also partial matches; in this case, Annapaola is a partial match that covers three out of five days of Marco's commuting needs
3.2 The system strives to offer to Marco additional (secondary) matches to maximize the coverage of his commuting needs; in this case, the system finds another partial match with Davide
3.3 Marco can pursue his partial matches and ride offers in any order
4.1 Depending on the Marco's contact settings in its STREETLIFE user profile, Marco can be notified via email or SMS, or other preferred forms of notifications.
5.1 If Marco is not satisfied by the driver's profile of Annapaola, he declines the ride offer
5.2 Marco's carpool ride request remains active in the system, and the system looks for another match
7.1 if Marco and Annapaola do not agree on the terms of the ride, Marco declines the ride offer
7.2 Carpool ride request remains active in the system, and the system looks for another match

3.3.2.2. Use Case: Offer a carpool ride

Use Case ID: ROV-CP/2
Primary Actor: Commuter (driver)

Preconditions: Annapaola has the STREETLIFE mobility app installed on the smart phone and is registered as a car pooler (driver).

Trigger: Annapaola has opened an "Offer a ride" screen in STREETLIFE app

Basic flow:
1. Annapaola searches for and examines rides requests that are currently active and unread, and filters them with respect to the affiliation to company XYZ
2. Annapaola selects Marco's ride request, and accesses Marco's passenger profile
3. Annapaola issues carpool ride offer to Marco
4. Annapaola and Marco negotiate the terms of the ride
5. Annapaola accepts to offer the ride and issues a confirmation through the app
6. App sets and send appointment reminder to both Annapaola and Marco

Alternative flows:
1.1 Annapaola does not find any rides requests that she is interested in
1.2 Annapaola can add a car pool offer to the system, specifying its parameters (days available, itinerary, times, her company, and more)
4.1 if Marco and Annapaola during negotiation realize it is convenient for them to arrange this car pooling ride as a frequent trip, they can mark the ride in the STREETLIFE system as a recurring ride
5.1 If Annapaola is not satisfied with the passenger's profile she passes on that requests and marks it as read
5.2 if Annapaola and Marco do not agree on the terms of the ride, Annapaola takes back the ride offer and marks the corresponding ride request as read

Comments:
The ROV-2/2 use case assumes the driver (Annapaola) actively browses active ride requests. A possible variant is *ride matching* in which the driver does not have to browse through active ride requests, but rather gets notified by the system of any incoming ride requests that match her preferences or some other criteria she has set in her profile.

3.3.2.3. User Case: Get a carpool ride

Use Case ID: ROV-CP/3
Primary Actor: Passenger

Preconditions: Annapaola and Marco have arranged terms of a ride using the STREETLIFE system. (see Use Case ROV - 2/1)

Trigger: Annapaola and Marco meet at arranged place.

Basic flow:

1. Marco goes to the arranged place
2. When they are in the proximity of one another, Marco and his driver Annapaola complete rendezvous with the support of their STREETLIFE mobile apps.
3. Marco sends a confirmation to the STREETLIFE car pooling service that the ride has begun and is aligned with the pre-arranged details
4. At the end of the trip, Marco pays Annapaola the fare suggested by the system, if any
5. Marco informs the system that the trip ended correctly
6. Marco accumulates a number of "green leaves" for the trip, as computed by the STREETLIFE system
7. Marco sends to the STREETLIFE system his feedback about the ride and the driver. This feedback is recorded by the system

Alternative flows:
2.1 Marco rejects the ride because his driver Annapaola doesn't fulfil one or more of the pre-arranged details of the ride, which results in feedback about the driver being recorded by STREETLIFE
2.2 Annapaola rejects the ride because her passenger Marco doesn't fulfill one or more of the pre-arranged details of the ride, which results in feedback about the driver being recorded by STREETLIFE
6.1 At any given time, Marco and Annapaola can mark/unmark the ride in the STREETLIFE system as a recurring ride and set/cancel recurring appointments on their STREETLIFE apps

3.3.2.4. Use Case: Give a carpool ride

Use Case ID: ROV-CP/4
Primary Actor: Commuter

Preconditions: Annapaola and Marco have arranged terms of a ride using the STREETLIFE system. (see Use Case ROV – 2/2)

Trigger: Annapaola and Marco meet at arranged place.

Basic flow:
1. Annapaola goes to the arranged place
2. When they are in the proximity of one another, Annapaola and her passenger complete rendezvous with the support of their STREETLIFE mobile apps.
3. Annapaola sends a confirmation to the STREETLIFE car pooling service that the ride has begun and is aligned with the pre-arranged details
4. At the end of the trip, Annapaola receives from Marco the fare suggested by the system, if any
5. Annapaola informs the system that the trip ended correctly
6. Annapaola accumulates a number of "green leaves" for the trip, as computed by the STREETLIFE system
7. Annapaola sends to the STREETLIFE system her feedback about the ride and the passenger. This feedback is recorded by the system

Alternative flows:

2.1 Annapaola rejects to offer the ride because the passenger Marco doesn’t fulfil one or more of the pre-arranged details of the ride, which results in feedback about the passenger being recorded by STREETLIFE
2.2 Marco rejects the ride because the driver Annapaola doesn’t fulfil one or more of the pre-arranged details of the ride, which results in feedback about the driver being recorded by STREETLIFE
6.1 At any given time, Marco and Annapaola can mark/unmark the ride in the STREETLIFE system as a recurring ride and set/cancel recurring appointments on their STREETLIFE apps

3.3.2.5. Use Case: Commuter Profile

Use Case ID: ROV-CP/5
Primary Actor: Commuter

Preconditions: Marco has the STREETLIFE mobility app installed on the smart phone and is registered as a car pooler (passenger).

Trigger: Marco has opened his/her profile in STREETLIFE app

Basic flow:
1. Marco sends to the system features needed for his/her identification
2. Marco informs the system about the starting place of his recurring trip
3. Marco informs the system about the ending place of his recurring trip
4. Marco informs the system about the time of his recurrent trip
5. Marco informs the system about his affiliation with company XYZ
6. Marco informs the system about his preferred contact option
7. Marco sets any other preferences in his car pooling profile
8. Marco sets his preference about the visibility and privacy of the details his STREETLIFE car pooler profile

Alternative flows:
3.1 Marco gives input to the system about his/her workplace and/or other recurring destinations as “favourite places”
3.2 Marco gives infos to the system about his/her common routes
8.1 Marco changes the safety features in his/her profile (who can see and what)

3.3.2.6. Use Case: Incentives of Car Pooling to Work

Use Case ID: ROV-CP/6
Primary Actor: Enterprises; city Mobility Manager

Preconditions: Cristian in the Rovereto mobility management office establishes a car pooling incentive campaign, which is agreed upon with company XYZ.

Trigger: Cristian and company XYZ create the campaign within the STREETLIFE system

Basic flow:

1. Cristian and the mobility manager of company XYZ establish a reward structure in order to incentivize participation to the car pooling service, and organize it as a game, in which “green leaves” points are gained by commuter employees of company XYZ, and associated to awards, bonuses and benefits for the employees who gain the most points.
2. Cristian and the mobility manager of company XYZ decide the start and end dates of the incentive or the period for the counting “green leaves” points
3. Cristian and the mobility manager of company XYZ declare the winners or the virtuous users, publish the results on the Municipality website and notify them to all the users
4. Cristina and the mobility manager of company XYZ announce and deliver the awards at a public event

Alternative flows:
Enterprises, and the municipality can operate either individually or in partnership to create the reward structure

Comments:
A variant of use case ROV-CP/7 is one in which such campaigns are not organizes in between employees of a single company but among companies. In this case, “green leaves” points earned by individual employees of a company are accumulated as a total for their company.

Use Case: Evaluate and plan car pooling
Use Case ID: ROV-CP/7
Primary Actor: Mobility Manager Office

Preconditions: Cristian wants to take a decision about the implementation of a permanent support by the municipality to the car pooling service or about a new system of rewards and incentives to promote it

Trigger: Cristian has access to the STREETLIFE dashboard where it can read the statistics and data of the car pooling service

Basic flow:
1. Cristian enters into the STREETLIFE dashboard system
2. Cristian analyzes the historical and current data and the characteristics of actual use of car pooling service trough the statistical tools provided by the dashboard
3. Cristian submits the new strategy by the municipality to promote car pooling between commuters, enterprises or individual citizens and quantifies the costs
4. Cristian publishes the new strategy
5. Enterprises and citizens can comment on the new strategy
6. Enterprises are choose how to adhere to the STREETLIFE-supported initiatives that make up the new strategy

Alternative flows:
5.1 Cristian analyzes the suggestions written by the users
5.2 Cristian can modify and update the strategy

3.3.3. Scenario 3 - Park&Ride (P+R)

Scenario ID: ROV-PR

Narrative: The historical center of Rovereto today suffers from a heavy traffic pressure. Rovereto wants to improve the accessibility to the center of the town, and, at the same time, decrease the number of motorists who drive through the central area and look for parking there.
Cristian, in the city mobility management office, is tasking with arranging P+R facilities that increase the utilization rate of parking lots located outside, or at the border of, the town center, and give citizens and visitors who want to reach the historical center a variety of more sustainable ways to do that, such as public transport, bike, or simply walking.
Davide is a car driver who uses the STREETLIFE mobile app to plan in advance his journey to the center of Rovereto. Davide is presented with different travel options, including P+R multimodal routes. Davide may or may not decide to accept the P+R option right away; in both cases, he saves her itinerary on the STREETLIFE system and subscribes to STREETLIFE notifications that are relevant to the chosen route.
Later, during the course of Davide's planned trip towards the town center, he receives timely notifications regarding the projected availability of parking spaces in the town center (or lack thereof), about the congestion level of the chosen route, or about particular incidents (e.g. road works, road accidents, traffic closures of the center due to special events or circumstances etc.) that may have occured; based on these events Davide may be advised and directed to use the closest P+R to her intended destination.
Parking and traffic aides (so-called "ausiliari del traffico") in the center of the town and at P+R facilities are responsible for collecting relevant state information and incidents as they observe them on the ground, and to record it in STREETLIFE, so that they can inform Cristian in the mobility management office of the town.
Cristian reviews the information originated on the ground and collected within the STREETLIFE dashboard, and can decide to issue notifications to drivers like Davide via the STREETLIFE system, so that they are delivered timely to their STREETLIFE mobile apps. The notifications will include advice on which P+R facility to use and its projected degree of utilization, and will stress the cost and the possible savings of the alternative route, taking into account factors related to car traffic vs. P+R multi-modal option; for that, functions that take into account costs of time, fuel, parking and public transport services will be leveraged.
In case of special events taking place in the center of the city, Cristian can put in place a policy to keep the center close to incoming traffic, and will also be able to recommend to drivers like Davide through the STREETLIFE system the use of P+R as the principal option to reach the center. This is achieved by operating on the settings and weights of the STREETLIFE multimodal routing service.
Cristian can also leverage the STREETLIFE dashboard to analyze the projected utilization of the "Ride" services at the various P+R locations and plan for changes in the capacity of those transport options to satisfy the fluctuating demand of citizens and visitors who want to use P+R to reach the town center.

Stakeholders/actors list: (they are going to represent the actors in the set of use cases that can be derived from this scenario)

- car driver (exemplified by Davide): citizen or visitor looking for convenient ways to reach the center of the town and for easier-to-find parking space
- Parking and traffic aides: want to track the traffic situation in the town center, and account for availability and utilization of P+R facilities
- Mobility mgmt. officer (exemplified by Cristian): wants to implement policies and promote motorists' behaviors that reduce vehicle pressure on the town center

This scenario instantiates the following use cases.

3.3.3.1. Use Case: planned P+R

Use Case ID: ROV-PR/1
Primary Actor: Car driver

Preconditions: Davide is planning her car trip using the STREETLIFE app and multi-modal routing service

Trigger: the mode chosen for the trip is private care and the destination is in the central area of the town that is pre-defined and recorded in STREETLIFE as traffic-sensitive

Basic flow:
1. Davide asks STREETLIFE multi-modal router to find an itinerary for her trip
2. the STREETLIFE system returns the requested car itinerary but also shows the possibility of finishing the car leg of the trip at one of the P+R facilities and continue with alternative transportation means
3. Davide can explore the P+R option and obtain more information through the STREETLIFE app
4. Davide decides to take the P+R option and saves the corresponding itinerary
5. Davide's choice to use P+R is recorded in the STREETLIFE system.

Alternative flows:
2.1 depending on the policies put in place by the city mobility management office, the prominence of the P+R option as proposed by the STREETLIFE system may vary
4.1 Davide may decide to not choose the P+R option and to opt for the original private-car-only itinerary.
4.2 that choice is also recorded in the STREETLIFE system.

3.3.3.2. Use Case: on-the-fly P+R

Use Case ID: ROV-PR/2
Primary Actor: car driver

Preconditions: Davide is in the process of carrying out his car trip to the town center, which was saved and recorded in the STREETLIFE system

Trigger: an accident or traffic congestion or other similar event is reported in the vicinity of the trip destination.

Basic flow:
1. Davide receives an in-app notification about the event from the STREETLIFE system
2. The notification suggests to Davide to re-route to a nearby and available P+R facility
3. Davide accepts the change
4. The STREETLIFE app and route planning service re-route Davide's trip, by choosing a suitable P+R facility and re-computing the new, multi-modal itinerary for the trip
5. Davide accepts and saves the new itinerary

6. The STREETLIFE system records that decision

Alternative flows:
3.1 Davide does not accept the change
3.2 That choice is also recorded by the STREETLIFE system

3.3.3.3. Use Case: on-the-ground P+R support

Use Case ID: ROV-PR/3
Primary Actor: parking and traffic aide

Preconditions: the parking and traffic aide is assigned to a P+R facility; the parking and traffic aide is equipped with a STREETLIFE app that enables it to send notifications to the STREETLIFE system

Trigger: the parking and traffic aide makes observations on the ground that need to be reported

Basic flow:
1. The parking and traffic aide periodically reports about the utilization rate of the parking lot in her assigned P+R facility
2. The parking and traffic aide reports about any anomalous traffic conditions within the portion of the traffic-sensitive area of the town center that is in the vicinity of her assigned P+R facility
3. The parking and traffic aide periodically reports about the utilization, presence and capacity of alternative means of transportation that can be taken by citizen at the P+R facility to reach the town center

Alternative flows:
2.1 The parking and traffic aide may also report at any time about occurrence of any outstanding incidents that impact the car traffic in the vicinity of her assigned P+R facility

3.3.3.4. Use Case: P+R alert

Use Case ID: ROV-PR/4
Primary Actor: mobility manager

Preconditions: Cristian, in the mobility management office of the city has available a STREETLIFE dashboard reporting on the state of the P+R facilities in the city that surround the city center

Trigger: the STREETLIFE dashboard enables Cristian to become aware of a situation developing on the ground that calls for his attention

Basic flow:
1. Cristian can browse and analyze the notifications issued by the parking and traffic aides
2. Cristian decides to issue an alert notification to car drivers
3. Cristian composes the notification

4. the STREETLIFE system finds all car drivers whose saved car-only itineraries are likely to be impacted by - or of interest to – the alert
5. the STREETLIFE system computes alternative routes for those impacted drivers, which exploit the P+R options
6. the STREETLIFE system issues the alert to the impacted car drivers, and it associates it to the suggested alternative route

3.3.3.5. Use Case: Evaluate and plan park and ride

Use Case ID: ROV-PR/5
Primary Actor: Mobility Manager Office

Preconditions: Cristian has to take a decision about changes in the implementation of P+R system of the city: for example, whether to extend or change the P+R areas, improve the “ride” services, review the fares, and so on

Trigger: Cristian has access to the STREETLIFE dashboard where it can read and analyze the statistics and data of the P+R service

Basic flow:
1. Cristian enters into the STREETLIFE dashboard system
2. Cristian analyzes the P+R use data
3. Cristian simulates the impact of the alternative purposes through the STRETTLIFE simulator, integrated in the dashboard, which enables him to play with a number of parameters (for example, rates system, generic cost function for car trips, time efficiency of public transportation, capacity of P+R parking lots, capacity of “ride” options, etc.)
4. Cristian designs a new strategy to increase or improve the P+R use by the citizens
5Cristian carries out the new strategy

Alternative flows: none

3.3.4. Key Performance Indicators for ROV Pilot

The level of effectiveness of the mobility choices and policies enabled by STREETLIFE in the ROV pilot will be measured by means of selected Key Performance Indicators (KPIs).

In the ROV pilot, we distinguish between *strategic KPIs* - which represent high-level goals that the city of Rovereto has defined for itself in its PUM, and which must be pursued for the improvement of the urban mobility - and *scenario-level KPIs* – which are directly linked to the objectives of the scenario chosen for the ROV pilot, and directly evaluate its development and its impact. Both types of KPIs must be quantifiable with appropriate metrics; moreover, it must be possible to establish links between scenario-level KPIs and strategic KPIs (and the corresponding metrics).

The strategic KPIs for the ROV pilot are the following:

- **Modal split**: the modal split describes the trip distribution by different means of transportation. It is one of the essential indicators about the level of success for policies about sustainable urban mobility. The **baseline** that is available for the modal split in the municipality of Rovereto (data from year 2001), and is as follows: for trips that begin and end inside Rovereto we have 23% on foot, 10% on public means of transport, 6% by bike, and the rest (61%) by private car. The modal split for trips towards Rovereto from outside the city is as follows: 70% by private cars, 25% with public means of transport (with 5% remaining undetermined), whereas in 2001 bicycle was not used at all from people traveling to Rovereto from other municipalities. The percentage of 69% of total trips made with private cars is the same for trips starting from Rovereto and headed outside the city, with 21% of those trips used public transportation (with 10% remaining undetermined).

- **Reduction of carbon emissions**: we will quantify this KPI by estimating the savings in carbon emissions that do not get released in the atmosphere, because of the policies implemented in the chosen scenarios (bike sharing, car pooling, park & ride) and the adoption of those policies by citizens of, and travellers to, Rovereto who use the support of the technologies developed in the STREETLIFE project.

The scenario-level KPIs are the following:

- **Bike sharing trips**: number of times people use the various available forms of bike sharing to take a trip within the municipality of Rovereto. To obtain a **baseline** for this KPI we will collect data at the beginning of the STREETLIFE pilot, and evaluate the variation at the end of the pilot.

- **Bike sharing distance**: total distance in KM covered by bike-sharing bicycles. To obtain a **baseline** for this KPI we will collect data at the beginning of the STREETLIFE pilot, and evaluate the variation at the end of the pilot.

- **Bicycle flows**: number of bike passages measured counted by some bike counters that have already been installed by the city of Rovereto on the most common routes in the city. Right now we don’t have a baseline for this, the idea is to take the data as the beginning of the STREETLIFE project as a baseline, and see the variation from there.

- **Car pooling users**: number of registered users in the car pooling platform offered within the STREETLIFE system for the ROV pilot;

- **Car pooling transactions**: number of times a ride has been requested and/or offered through the STREETLIFE system for the ROV pilot

- **Car pooling trips**: number of car pooling trips that have actually taken place with the support of the STREETLIFE system for the ROV pilot;

- **Car pooling distance**: total distance in KM covered through the car lifts that have taken place with the support of the STREETLIFE system for the ROV pilot;

- **Park & Ride usage**: difference in the levels of occupation in the city parking lots selected for the experimentation of Park & Ride with the support of the STREETLIFE system for the ROV pilot. The **baseline** for the KPI can be derived from the historical parking lot occupation data that is documented in the parking plan of the city of Rovereto.

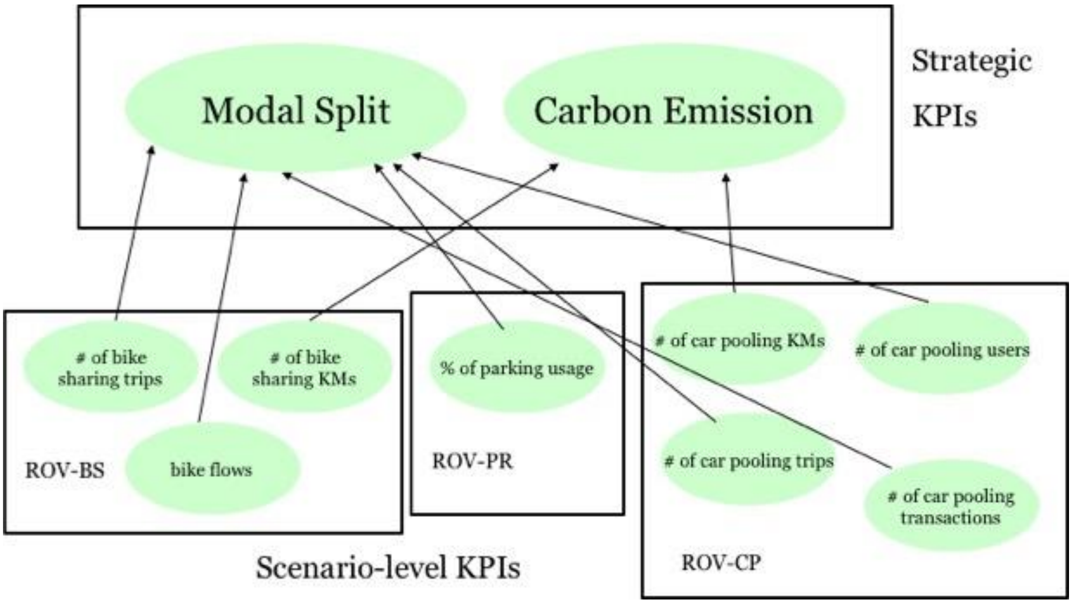

Figure 3: relations between scenario-level and strategic KPIs.

3.4. Scenarios and use cases for TRE pilot

The main overall goal for the TRE pilot is to promote the smooth flow of public and non-motorised traffic, as well as parking, by exploiting ICT innovations and developing intelligent transport. That is going, in turn, to improve environmentally friendly transport and transport safety in the municipality of Tampere.

Technically speaking, a principal objective of Tampere pilot is to release a new public transport routing service, with low-latency real-time support and extensive set of convenient, easy-to-use features, making it an optimal route planning tool for all citizens utilizing existing Tampere mobility service platforms. The services developed within STREETLIFE shall also be available for third party developers via an open API.

3.4.1. Scenario - Existing IT systems

Scenario ID: TRE-01

Narrative: A city council takes a step toward a "smart city" and decides to exploit IT systems in order to provoke citizens to use public transportation and other environment-friendly means for travelling. In one hand, the council and other organizations have already invested significant amount of money to the existing IT systems. On the other hand, the possible transition to improved mobility management should be cost-efficient and risk-free. As a conclusion, they decided to integrate new data sources to the existing recently purchased real-time system and implement add-ons for the data handling.

Stakeholders/actors list:

- City council: wants to use existing IT systems to its full extent
  Added value: can increase delivered mobility information by reusing existing IT systems.

3.4.1.1. Use Case**:** Reuse IT systems

Use Case ID: TRE-1/1
Primary Actor: City council

Preconditions: City council has existing journey planner and public transportation real-time system.

Basic flow:

1. City council assesses the current functionality of existing real-time public transportation information system.
2. City council assesses the current functionality of existing journey planner
3. City council builds necessary integrations in order to pass more data sources and real-time feed to journey planner and real time passenger information system

3.4.2. Scenario- Multimodal real-time Journey Planner

Scenario ID: TRE-02

Narrative: Liisa is a middle-aged office worker living in a rural area near Tampere. She travels daily from home to work via a route that has three legs. The first one is from home to a bus stop, the next one is from the stop to the city center and the last one is from the center to the office. The mode of transportation varies most in the first leg: sometimes she walks, sometimes she takes the car. Different factors, like the weather, her mood and schedule, are affecting her choice of transportation at that time. Then again, switching from the second leg to the third one is the most hectic part as she has many buses to choose from. Liisa thinks that the real time information helps her to make her mind throughout the journey. For example, the weather information -- especially for the journey back -- helps her to make a choice for the first leg, whereas the low latency in the schedule information is most helpful in the third one. To put it more concretely, when Liisa looks at the mobile application at the stop, she is impressed how fluently the real time data flows into her device. For instance, she can see that the stop display, the mobile application and real bus operations are all in synchrony and that enhances her trust to the public transport.

A 3rd party developer wants to provide a fancy-looking real time routing application for the end-users, i.e. the citizens. The developer is willing to concentrate on user-interface and user-experience rather than the data integration or computation. In other words, the developer wants to have an API that takes users requests and preferences as an input and returns a multi-modal journey plans as outputs. In addition, the API provides functionality for getting real time information of the plans, for example, departure times of buses from a specific bus stop, exceptions occurred in certain routes, and so on.

Stakeholders/actors list:

- Individual citizen: multi-modal real time journey plans helps citizens to make optimal travelling decisions in their daily life.
  Added value: increase the usage of the public transportation
- City and business: Congestion is reduced.

Added value: the traffic flow is improved in the city and, in addition, parking space issues at business offices are reduced as people use not only their cars but also other transportations.

- A developer community: open API enables developers to focus on their applications.
  Added value: Facilitates the development of new third party public transportation applications.
- End-users: open API fosters a rapid evolution of the routing applications
  Added value: Lack of public funding does not prevent new applications to be created.

3.4.2.1. Use Case: Find multi-modal real-time affected journey

Use Case ID: TRE-2/1
Primary Actor: Citizen

Preconditions: Citizen has a web browser in her phone/tablet. The latency in real-time data flow is low.

Trigger: Citizen (aka the user) has opened Tampere Streetlife journey planner web page

Basic flow:

1. System gets the coordinates of user's current location and uses it as a starting point.
2. System automatically uses earlier collected target locations as end points of the journey.
3. User approves a preselected location and press search journey button.
4. System shows the multi-modal real-time affected journey plan to the user.
5. Real-time data in the mobile application is in synchrony with actual stop displays and buses

Alternative flows:

1. If the user does not want to use preselected locations, she is able to make a location search manually. In the search, she can use addresses, bus stop numbers or she can do it from the map.

3.4.3. Scenario - Transportation flow management

Scenario ID: TRE-03

Narrative: <u>The Public Transport Authority</u> (PTA) wants to slightly shift some traffic from the city centre to bus stops nearby. In order to do so, they decreased the algorithmic costs of the specific bus stops a bit. The net effect was that a portion of the traffic started to shift from the hot-spots and hence released some pressure from the centre.

Stakeholders/actors list:

- PTA: Wants to adjust traffic flows with existing tools. Congestions are reduced.
  Added value: Distribute traffic flows to multiple stops in city center.

3.4.3.1. Use Case: Mitigate congestions in main bus stations

Use Case ID: TRE-3/1

Primary Actor: PTA

Preconditions: Journey Planner management console has mechanisms to alter goodness values (or transfer penalty margins) of stops.

Trigger: PTA changes the goodness value of a stop

Basic flow:

1. PTA officer alters the goodness value of a stop in Journey Planner management console.
2. PTA officer submits the request to journey planner.
3. Journey planner changes the goodness value in the routing network.
4. The new parameters are used in routing whenever users are requesting route suggestions.

3.4.4. Scenario - Park & Ride

Scenario ID: TRE-04

Narrative: The more urban car transport reduces, the less CO2 emissions are produced in overall. In order to decrease the emissions and increase the awareness of alternatives, people who mostly use their cars rather than the public transport should be motivated to use tools that give different options for the transportation. Park&Ride is a tool of that kind. It may help people to make the first step on the road that leads them to leave their car home in the first place.

Matti is a manager in a company called Laser Square. His days are long and busy. Despite of that, he likes to go to the movies once a week. The movie theatre is located in the city centre to where he drives by car. Occasionally, he has found it a bit stressful to find a parking lot before the movie begins. Matti has noticed it to be very useful to fetch a journey plan that suggests not only the route, but available parking lots as well. After he has chosen the plan, he may purchase a parking ticket. Now, Matti knows where to drive and what the schedule is.

A 3rd party developer wants to provide a functionality that gives an option for the end-user to plan a "mixed-in" journey in which both private and public transportations are available. For example, the user may first drive his own car, park it and continue the journey with a bus. The developer requires an API and a back-end that is aware of available parking lots in real time and is able to apply that information in the provided journey plans.

Stakeholders/actors list:

- Individual citizen: Park&ride supported journey plans helps citizens to make optimal travelling decisions in their daily life.
  Added value: increase usage of public transportation
- A developer community: open API enables developers to focus on their applications.
  Added value: Facilitates development of new third party public transportation applications.
- End-users: open API fosters a rapid evolution of the routing applications

Added value: Lack of public funding does not prevent new applications to be generated.

3.4.4.1. Use Case: Make park & ride journey

Use Case ID: TRE-4/1
Primary Actor: Citizen

Preconditions: Citizen has a web browser in her phone

Trigger: Citizen (aka the user) has opened Tampere Streetlife journey planner web page

Basic flow:

1. System gets the coordinates of user's current location and uses it as a starting point.
2. System automatically uses target locations collected earlier as end points of the journey.
3. User approves a preselected location.
4. User enables a "use park&ride" option and presses the search journey button.
5. System shows the multi-modal real-time affected journey plan to the user.

Alternative flows:

If the user does not want to use preselected locations, she is able to make a location search manually. In the search, she can use addresses, bus stop numbers or she can do it from the map.

3.4.5. Scenario - CO2

Scenario ID: TRE-05

Narrative: A modern citizen plans every day trips very reactively: she adapts swiftly to the changes in schedules and switches one plan to another without a problem. In addition, she is well-aware of the environment. Hence, one of the key indicators in journey plans is the CO2 emission. She wants to see the information about the emission whenever making a decision which plan to choose. She also wants to tune the suggested plans according to her "CO2 preferences". From time to time she might want to check her overall emission compared to some reference emitters.

Stakeholders/actors list:

- Individual citizen: makes it possible to take CO2 emissions into considerations whenever making travelling decisions.
  Added value: Reduces overall CO2 emissions created by the citizens.

3.4.5.1. Use Case: View journey plans CO2 emissions

Use Case ID: TRE-5/1
Primary Actor: citizen

Preconditions: Citizen has a web browser in her phone

Trigger: Citizen (aka the user) has made journey plan request

Basic flow:

1. System calculates an optimal journey plan based on user's input
2. System calculates CO2 emissions based on the transport types in the journey plan and the formulas estimating CO2 emissions of the public transportation.
3. System shows emissions to the user. The information is next to the journey plans offered.

3.4.6. Key Performance Indicators for TRE Pilot

In the TRE pilot, we distinguish between *strategic KPIs* - which represent high-level improvements of the sustainable urban mobility that STREETLIFE wants to tackle - and *scenario-level KPIs* – which are directly linked to the objectives of the scenarios chosen for the TRE pilot, and directly evaluate its development and its impact.

In the context of the TRE pilot, a baseline for the KPIs will be derived from the data that is available from interviews and studies that are conducted yearly as a part of normal traffic planning and passenger satisfaction program in the city of Tampere. Interviews are routinely conducted by means of Internet surveys, as well as traditional pen-and-paper surveys inside public transport vehicles. For example the latest passenger satisfaction study for Internet and mobile services, which was carried out in December 2013, will provide an excellent baseline for the STREETLIFE project, and for evaluating the impact and success of the TRE pilot. STREETLIFE with its real time guidance aims at creating more and better informed travellers, and it will be very interesting see the effect on modal shift, a strategic KPI for the City of Tampere.

The strategic KPIs for the TRE pilot are the following:

- **Modal split:** Measured increase of public transport users and decrease of private traffic in the city centre. Baseline and measurements are part of normal traffic planning and passenger satisfaction program in City of Tampere.

- **CO2 emissions**: we will quantify this KPI by estimating the savings in carbon emissions that do not get released in the atmosphere, because of the policies implemented in the chosen scenarios for the TRE pilot and the adoption of those policies and the related transportation habits by citizens of Tamoere who use the support of the technologies developed in the STREETLIFE project.

- **Cost efficiency** in the implementation of new mobility services and applications. Baseline is set by the TRE-01 scenario. STREETLIFE is able to use existing Tampere systems, datasets and API's in a fluent way.

The scenario-level KPIs are the following:

- **Direct feedback from citizens - Travelling feels faster**. Baseline is set by the December 2013 passenger satisfaction study for internet and mobile services. Measurements are through STREETLIFE interviews and as a part of normal traffic planning and passenger satisfaction program in City of Tampere.

- **Direct feedback from companies - Parking helped**. Baseline is derived from the normal traffic planning and passenger satisfaction program in City of Tampere. Measurements are through STREETLIFE interviews and as a part of normal traffic planning and passenger satisfaction program in City of Tampere.

- **Direct feedback from open data developer community - New API's are useful**. Measurements are through STREETLIFE interviews for the ITS Factory developer community and ecosystem. Are the API's easy to use, how many new apps have been created?

- **Passenger satisfaction**. Baseline is set by the December 2013 passenger satisfaction study for Internet and mobile services. The measurement is comparison to the December 2013 Passenger satisfaction after STREETLIFE Tampere pilot.

- **Measured increase of routing service users**. Baseline is set by the December 2013 passenger satisfaction study for internet and mobile services. The measurement is comparison to the December 2013 Passenger satisfaction after STREETLIFE phases.

3.5. Cross-pilot considerations and synergies

The scenarios conceived by each pilot cluster provide a varied view of what STREETLIFE as a project can achieve, and show how it can impact the advancement of sustainable mobility in the three pilot sites in different ways and at different levels. Some of the scenarios reveal very specific facets of what innovation in urban mobility means in each individual pilot site. However, there are also opportunities for synergy in the development of the solutions that will be deployed in the three pilots.

Some of the most important of these opportunities derive from similarities among scenarios. For example, the BER and ROV pilots both address car pooling and bike sharing – although with differences related to each city's specificity – which opens the possibility of designing many of the necessary solutions and support in a common way, and re-using the corresponding implementation. Similarly, both the ROV and TRE pilots have scenarios that deal with Park & Ride with similar use cases and concerns. Early and direct consequences of these overlaps can be traced to the requirements ideas that have been extracted from the early analysis of the scenarios, which we present in Section 4, and which obviously present several overlaps; and also to the work items that we have defined as units of work and project planning, which we present in Section 5, and which will drive the progress of the research and pilot work packages in the first iteration of the STREETLIFE project

Significant synergy across pilots also exists in the area of KPIs. KPIs are fundamental facets of the pilots, and are going to drive a critical and significant part of pilots' development work. Commonality with respect to KPIs does not stop with the fact that among the sets of chosen scenario-level as well as strategic KPIs there are many overlaps; it is also important to consider how the necessary software infrastructure to support collecting the corresponding metrics, calculating KPIs values from those metrics, and analysing them for evaluation is work that can be conceived and developed in a uniform way.

Finally, more opportunities for synergy derive from the cross-cutting concerns that remain independent from the specific scenarios conceived for each pilot, and represent common issues and needs that need to be addressed across all of them. Cross-cutting concerns that are of particular relevance to STREETLIFE, and which will be addressed commonly, are security and privacy considerations. These aspects will be elaborated upon in WP2 and WP3, being both architectural and data-oriented in nature. From the WP6 point of view, the scenarios and use cases developed in this document have the role of artefacts for security and privacy requirements elicitation, risk assessment and threat analysis. Special attention is required with respect to cross-pilot privacy issues, whenever different legal requirements of three different countries are involved. Thus, not only the functional requirements can be different also “what is allowed” and how far security and privacy measurements must be implemented in order to fulfil the legal requirements can vary for each pilot. However, the project must strive to handle these varied requirements in a uniform way.

Some security and privacy aspects that need to be elaborated and are derived from the scenarios above include the following:

- Integrity, authenticity and accuracy of sensor data.
- Respecting privacy needs of the user’s personal data.
- Authenticity of STREETLIFE interfaces.
- Authorized access to STREETLIFE system components.

The similar security and privacy aspects of all three pilots will be worked out and integrated in the blueprint architecture. The pilot-specific security solutions will be propagated to the responsible tasks in WP7 for the implementation and in WP6 for supervision and evaluation.

4. Requirements Ideas from Pilot Scenarios

At this very early stage in the project and in the life cycle of the pilots, a complete specification of user and system requirements for the STREETLIFE information system remains out of reach, and is also premature. As the scenarios selected for the pilots and the related use cases become more mature, they will incrementally present an array of user and system requirements. Those requirements will drive the innovation pursued in Work Packages WP3, WP4 and WP5, and will be ultimately satisfied at the level of the STREETLIFE software architecture and embodied in its various components (see WP2).

Nevertheless, since the scenarios devised for the three pilots and described in Section 3 represent a major source for STREETLIFE requirements, and since the feasibility of each scenario hinges upon the development of the technical features that support it, it has been possible from the beginning of the scenario definition activity to recognize and highlight a number of *requirement ideas*, that is, embryonic indications of requirements that seem of particular significance as scenario enablers, which we have collected and which we present below, with traceability to the corresponding scenario and pilot. These requirements ideas represent an important input for further requirements elicitation and analysis activities, in particular for Task T2.1.

Below, we list these requirements ideas as they have been harvested by means of the scenario description templates, and through the preliminary analysis of those scenarios carried out by the pilot cluster partners of BER, ROV, and TRE, respectively. The reader can notice that some of the requirement ideas may be repeated in more than one of the Tables below, or may have significant overlaps. This is natural, because the consolidation of the requirement ideas we report into a requirements specification proper is going to occur as part of Task T2.1

4.1. Requirement ideas originated from BER scenarios

Table 8: Requirements ideas originating from BER scenarios.

Req. Idea	Category	Description	Scenario	Use case
BER-RI-1	MUST	an app MUST be able to support multi-modal route planning	PTP	BER-PTP/1
BER-RI-2	MUST	The app MUST calculate the total monetary costs of a particular trip regarding any transportation mode.	PTP	BER-PTP/1
BER-RI-3	MUST	The app MUST support German and English language	PTP	BER-PTP/1
BER-RI-4	MUST	The app MUST be able to compute the carbon footprint for every planned route trip.	PTP	BER-PTP/1
BER-RI-5	MUST	The app MUST differentiate between users following a trip and users not following a trip.	PTP	BER-PTP/3
BER-RI-6	MUST	The app MUST be able to push user location continuously into the STREETLIFE system	PTP	BER-PTP/3
BER-RI-7	MUST	The STREETLIFE system MUST know the current traffic situation in Berlin.	PTP	BER-PTP/3
BER-RI-8	MUST	A computation of alternative routes while a user is on trip MUST be triggered by specific events. An event can be for example a traffic jam, delay of public transport or a specific user preference.	PTP	BER-PTP/3
BER-RI-9	SHOULD	The computation of actual necessary mode of transport SHOULD consider the user preferences. These user preferences MAY be predefined or given by the user directly. For example a user MAY be able to define not to use the bike on rainy days.	PTP	BER-PTP/3
BER-RI-10	MUST	A user MUST be able to give service quality feedback after finishing his trip. Those quality criteria MAY be road or personal transport cleanliness, public transport occupation, etc.	PTP	BER-PTP/4

BER-RI-11	MAY	A user MAY create and edit several profiles each with a different set of preferences. For example predefined preference templates like stay dry, low (to zero) carbon footprint, fastest connection, low cost and safety	PTP	BER-PTP/5
BER-RI-12	MAY	A user MAY be able to save the preferences under different names.	PTP	BER-PTP/5
BER-RI-13	MAY	The STREETLIFE system MAY be able to reason and self-learning from previous user-behaviour and preferences when suggesting route trips.	PTP	BER-PTP/5
BER-RI-14	SHOULD	The STREETLIFE system SHOULD have a centralised Identity Management System for end-user.	PTP	BER-PTP/6
BER-RI-15	MUST	A corresponding App and a STREETLIFE connected website MUST share the same Identity Management System.	PTP	BER-PTP/6
BER-RI-16	SHOULD	Validation of the registration form SHOULD be checked on the app or on the website directly due to performance reasons.	PTP	BER-PTP/6
BER-RI-17	SHOULD	A user MUST be able to authenticate to the STREETLIFE system. A user SHOULD authenticate through username/password or email/password credentials. Other authentication methods MAY be implemented.	PTP	BER-PTP/6
BER-RI-18	MUST	The Integrated mobility platform MUST be highly available.	PTP	BER-PTP/6
BER-RI-19	SHOULD	An app SHOULD be able to reserve a particular sharing car.	CPI	BER-CPI/1
BER-RI-20	MUST	The user MUST confirm a car sharing reservation.	CPI	BER-CPI/1
BER-RI-21	MUST	An app MUST be able to offer alternative routes to the user on particular events like the user forgot the RFID chip for car sharing or time expiration of reservation guarantee.	CPI	BER-CPI/1
BER-RI-22	MUST	The STREETLIFE system MUST be able to assign points to a user’s trip. The amount of points MUST depend on the value of reduced carbon emission of the user’s trip.	CPI	
BER-RI-23	SHOULD	The user SHOULD be able to add other STREETLIFE user as friends to his profile.	CPI	BER-CPI/2
BER-RI-24	MUST	A STREETLIFE App SHOULD act in behalf of	CPI	BER-CPI/4

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		the user's STREELIFE system identity.		
BER-RI-25	MUST	The STREETLIFE system MUST be able to store event data. An event data may contain time information, location information, expected number of people, etc.	BUI	BER-BUI/1
BER-RI-26	MUST	The STREETLIFE system MUST consider the role of a transport service operator.	BUI	BER-BUI/1
BER-RI-27	MUST	A transport service operator MUST be able to add event information to the STREETLIFE database.	BUI	BER-BUI/1
BER-RI-28	MUST	The quality, reliability and integrity of the provided event information MUST be ensure for its whole lifetime.	BUI	BER-BUI/1
BER-RI-29	SHOULD	An event SHOULD have a characterisation in order to describe the type of event. For example sport event.	BUI	BER-BUI/1
BER-RI-30	MUST	The computation of a route MUST consider the stored event information if an appropriate user preference is available.	BUI	BER-BUI/2
BER-RI-31	MUST	The STREELIFE system MUST be able to collect/store/retrieve bicycle accident hotspots, busy intersections, unsafe road conditions, unfavourable lane layouts etc.	BUI	BER-BUI/3
BER-RI-32	MUST NOT	Information about bicycle accident hotspot, busy intersections and so on MUST NOT endanger bicyclist. For example optical signals can distract bicyclist, audio signals through earphones have an impact on perception of acoustic traffic signals.	BUI	BER-BUI/3
BER-RI-33	MAY	The STREETLIFE App MAY provide mechanisms providing appropriate warning procedures for collision detection and avoidance between a bicyclist using the STREETLIFE App and other road users.	BUI	BER-BUI/4
BER-RI-34	SHOULD	The STREETLIFE system SHOULD be able to push notifications about available incentives of a particular user to the user via appropriated mechanisms. For example directly to the activated app or e-mail.	BUI	BER-BUI/5
BER-RI-35	MUST	Every defined KPI MUST be able to visualise in an appropriate manner on a map.	MGMT	BER-MGMT/1
BER-RI-36	SHOULD	The derivation of local CO2 emissions to global SHOULD be possible through scaling up	MGMT	BER-MGMT/1

		methods.		
BER-RI-37	MUST	The STREETLIFE system MUST be capable of compute, generate and visualise warnings if some KPI reaches or exceed predefined thresholds.	MGMT	BER-MGMT/2
BER-RI-38	MUST	The public STREETLIFE website MUST be able to visualise public KPI information for end user. There MUST be a mechanism for admins to define or remove public KPIs.	MGMT	BER-MGMT/3
BER-RI-39	MUST	The STREETLIFE system MUST have a user feedback or social functionality like guest books or discussion forum.	MGMT	BER-MGMT/3
BER-RI-40	SHOULD	The public KPIs SHOULD be actualised continuously if presented to the user.	MGMT	BER-MGMT/3
BER-RI-41	MUST	A transport service operator MUST be able to subscribe to a specific set of event notification of the STREETLIFE system. He can be notified via appropriate mechanisms.	MGMT	BER-MGMT/4
BER-RI-42	MUST	The STREETLIFE system MUST provide the means to create a micro or a macro simulation environment. The definition of simulation environment MUST cover the selected spot or area, a time range, a model or policy, rules and modified traffic data.	BES	BER-BES/2
BER-RI-43	MUST	The STREETLIFE system MUST provide an API and a data format for exchange/transform real time data into simulation data.	BES	BER-BES/2
BER-RI-44	MUST	The STREETLIFE system MUST be capable to visualise the simulation results in an appropriate manner.	BES	BER-BES/3
BER-RI-45	MUST	The input and the output of a simulation MUST be comparable.	BES	BER-BES/3

4.2. Requirement ideas originated from ROV scenarios

Table 9: Requirements ideas originating from ROV scenarios.

Req. Idea	Category	Description	Scenario	Use case
ROV-RI-1	MUST	be able to identify bikes that are free for use; that is, MUST be able to distinguish between bikes that are in use but not currently moving and bikes that are not being used	ROV-BS	ROV-BS/1

ROV-RI-2	MUST	allow user to issue a short-term “bike reservation” (i.e., mark the bike as unavailable to other users of the app for a short period of time)	ROV-BS	ROV-BS/1
ROV-RI-3	MUST	be able to record end points of each bike trip	ROV-BS	ROV-BS/1 ROV-BS/3
ROV-RI-4	MUST	be able to differentiate between citizens’ bike trips and movement of bikes trhat are being retrieved and re-located by the mobility management crew	ROV-BS	ROV-BS/2
ROV-RI-5	SHOULD	be able to record the route followed during each bike trip	ROV-BS	ROV-BS/3
ROV-RI-6	MUST	be able to present aggregated statistics on usage and routes of bikes	ROV-BS	ROV-BS/2
ROV-RI-7	MUST	be able to support the mobility manager’s decisions on bike placement	ROV-BS	ROV-BS/3
ROV-RI-8	SHOULD	be able to support the mobility manager in carrying out “what-if” scenarios	ROV-BS	ROV-BS/3
ROV-RI-9	MUST	be able to register a user with her personal profile to the car pooling service	ROV-CP	ROV-CP/1
ROV-RI-10	MUST	be able to define contact preferences for the car pooling service	ROV-CP	ROV-CP/1
ROV-RI-11	MUST	be able to specify the initenrary for her ride request	ROV-CP	ROV-CP/1
ROV-RI-12	MUST	track the ride requests that are issued via the app through a set of states	ROV-CP	ROV-CP/1
ROV-RI-12	MUST	System MUST be able to record and retain data on rides that are agreed upon and confirmed through the STREETLIFE system	ROV-CP	ROV-CP/1
ROV-RI-13	SHOULD	support the in app negotiation of the ride terms and record item	ROV-CP	ROV-CP/1
ROV-RI-14	MUST	be able to record successful vs. unsuccessful carpool ride requests by each registered Commuter	ROV-CP	ROV-CP/1
ROV-RI-15	MUST	issue reminders for confirmed appointments for carpool rides	ROV-CP	ROV-CP/1
ROV-RI-16	SHOULD	interface with the user’s calendar for such reminders	ROV-CP	ROV-CP/1

ROV-RI-17	MUST	be able to browse through the currently active ride requests	ROV-CP	ROV-CP/2
ROV-RI-18	MUST	be able to search among the currently active ride requests based on certain criteria such as itinerary, time and more	ROV-CP	ROV-CP/2
ROV-RI-19	MUST	be able to insert information about recurrent trips including frequency (days and times) of such recurrent trip	ROV-CP	ROV-CP/2; ROV-CP/3; ROV-CP/4
ROV-RI-20	SHOULD	be able to set alerts in the system, to be notified of ride requests that satisfy her search criteria	ROV-CP	ROV-CP/2
ROV-RI-21	MUST	be able to mark ride requests as read	ROV-CP	ROV-CP/2
ROV-RI-22	MUST	be able to mark ride requests with other (personal) tags	ROV-CP	ROV-CP/2
ROV-RI-23	MUST	be able to check and know the details about the trip planned	ROV-CP	ROV-CP/3; ROV-CP/4
ROV-RI-24	MUST	be able to check and know the details and feedbacks about the driver/passenger involved in the ride	ROV-CP	ROV-CP/3; ROV-CP/4
ROV-RI-25	MUST/SHOULD	be able to inform the system about the beginning of the ride	ROV-CP	ROV-CP/3; ROV-CP/4
ROV-RI-26	MUST	be able to release a feedback about the driver/passenger or the ride	ROV-CP	ROV-CP/3; ROV-CP/4
ROV-RI-27	MUST	be able to input into the system the features needed for identification	ROV-CP	ROV-CP/5
ROV-RI-28	SHOULD	be able to input into the system his/her recurrent starting place of a trip	ROV-CP	ROV-CP/5
ROV-RI-29	SHOULD	be able to input into the system his/her recurrent ending place of a trip	ROV-CP	ROV-CP/5
ROV-RI-30	SHOULD	be able to input into the system his/her recurrent time of a trip	ROV-CP	ROV-CP/5
ROV-RI-31	SHOULD	be able to give inputs to the system about his/her workplace and/or other recurrent destinations	ROV-CP	ROV-CP/5
ROV-RI-32	SHOULD	be able to input infos to the system about his/her common routes	ROV-CP	ROV-CP/5
ROV-RI-33	SHOULD	be able to mark a trip into the system as a very frequent one	ROV-CP	ROV-CP/5

ROV-RI-34	MUST	be able to read into the system the updated standings of the gamification system	ROV-CP	ROV-CP/6
ROV-RI-35	MUST	be able to know the basic personal informations of the users in order to contact them when the game end	ROV-CP	ROV-CP/6
ROV-RI-36	SHOULD	be informed directly (notifications) about the terms of the game, the rewards,	ROV-CP	ROV-CP/6
ROV-RI-37	MUST	be informed about how many bonus points has gained and how many bonus points she needs to reach the reward	ROV-CP	ROV-CP/6
ROV-RI-38	MUST	Mobility Mgmt Office MUST be able to access the dashboard and use its instruments	ROV-CP	ROV-CP/7; ROV-PR/5
ROV-RI-39	MUST	Mobility Mgmt Office MUST be able to query the system to extract specific statistics	ROV-CP	ROV-CP/7; ROV-PR/5
ROV-RI-40	SHOULD	STREETLIFE system SHOULD be able to update the input data in the city simulator	ROV-CP	ROV-CP/7; ROV-PR/5
ROV-RI-41	MUST	The STREETLIFE app MUST be able to show the alternatives (car-only vs. P+R) together to its users	ROV-PR	ROV-PR/1; ROV-PR/2
ROV-RI-42	SHOULD	The STREETLIFE app SHOULD be able to provide additional information about the P+R option (such as the cost and time trade-offs etc)	ROV-PR	ROV-PR/1
ROV-RI-43	MUST	The STREETLIFE routing service MUST be able to provide the multi-modal P+R route even if the user has not original specified public transport or alternative transport means among the preferences for the trip	ROV-PR	ROV-PR/1
ROV-RI-44	MUST	The STREETLIFE system MUST record the choice taken by the user about the trip with destination in the city center	ROV-PR	ROV-PR/1
ROV-RI-45	MUST	The STREETLIFE system MUST be able to send notifications about events that are relevant to the car driver’s trip	ROV-PR	ROV-PR/2
ROV-RI-46	MUST	The STREETLIFE system MUST be able to choose among the various P+R facilities the one that is more favorable for the trip at hand, based on a set of criteria (parking availability, distance to original destination, current schedule and availability of “Ride” transport options, etc.)	ROV-PR	ROV-PR/2

ROV-RI-47	MUST	The STREETLIFE app MUST be able to send this kinds of notifications to the STREETLIFE system	ROV-PR	ROV-PR/3
ROV-RI-48	MUST	The on-the-ground notifications MUST include information identifying the individual parking and traffic aide that has issued it, and the P+R facility of interest	ROV-PR	ROV-PR/3
ROV-RI-49	MUST	The STREETLIFE system MUST be able to present the notifications to the mobility management office for further analysis and possible action	ROV-PR	ROV-PR/3
ROV-RI-50	MUST	the STREETLIFE system SHOULD allow the mobility manager to decide how compelling the alert notification is on a numeric scale	ROV-PR	ROV-PR/4
ROV-RI-51	SHOULD	Mobility Mgmt Office SHOULD be able to simulate the policy alternatives	ROV-PR	ROV-PR/5

4.3. Requirement ideas originated from TRE scenarios

Table 10: Requirements ideas originating from TRE scenarios.

Req. Idea	Category	Description	Scenario	Use case
TRE-RI-1	MUST	Utilize existing IT architecture as a basis for StreetLife development.	TRE-01	TRE-1/1
TRE-RI-2	MUST	Take real-time data into account in journey planning	TRE-02	TRE-2/1
TRE-RI-3	MUST	Remember user preferences in journey planning	TRE-02 TRE-04	TRE-2/1 TRE-4/1
TRE-RI-4	SHOULD	User location awareness in journey planning (suggest current location as the route start point)	TRE-02 TRE-04	TRE-2/1 TRE-4/1
TRE-RI-5	SHOULD	Allow easy definition of bus stop parameters for journey planning, so that transportation flow can be controlled	TRE-03	TRE-3/1
TRE-RI-6	MUST	Park & ride journey planning: citizens can plan a journey which combines private and public transportation.	TRE-04	TRE-4/1
TRE-RI-7	MUST	Let Journey Planner users know the CO2 emissions of the trip.	TRE-05	TRE-5/1

TRE-RI-8	SHOULD	Device/resolution independent and scalable user interface for journey planner	TRE-02	TRE-2/1
TRE-RI-9	MUST	Publish an Open API for journey planner, to boost development of new third party applications.	TRE-02	TRE-2/1

5. PLANNING OF FIRST PILOT ITERATION

5.1. Methodology

The scenarios and use cases described in Section 4 have provided the STREETLIFE team with a good basis for understanding and analysing the work that needs to be done next. In fact, the scenarios do not only outline what needs to be developed, executed and evaluated in each of the pilot sites, but also what kind of innovations need to be pursued in the various STREETLIFE Work Packages to enable those scenarios and the underlying technological support.

In order to come up with a work plan that focuses on the first project iteration and in particular on the first project year, we have adopted a *Work Item-based approach*. We define a Work Item, for the purpose of work planning and this Section of the deliverable, as a unit of work that addresses a single problem or unit of functionality, and supports a recognizable element of one scenario or use case, or multiple occurrences of that same element that can recognized across various scenarios. Although the amount of work involved in different Work Items may vary (and we have not at this stage made yet an effort to estimate effort associated to our Work Items) a Work Item is a "small", atomic task that can be assigned to individual responsibility, therefore it needs to be internally coherent and significantly fine-grained.

To elicit Work Items, and conceive a work plan that predicates on them we organized an "all-hands-on-deck" workshop during the plenary technical meeting that took place in Berlin on December 2-3, 2013. In the workshop, we familiarized with the scenario descriptions and examined them, to extract units of work that would represent our Work Items. We carried out an iterative process of consolidation of similar Work Items from separate scenarios, and considered whether merging or splitting some of the proposed work units, to improve their internal coherence.

We grouped the 58 Work Items we had thus elicited into a number of *Work Item categories*, and we used categories to not only discuss individual Work Items in isolation, but also look together at those that are akin thematically and support the development of related functionality or use cases. The Work Item categories that we have identified are as follows:

- Route planning and travel assistance (comprised of 5 WIs)
- Car/bike sharing (comprised of 2 WIs)
- Car pooling (comprised of 2 WIs)
- Car-to-X C2X (comprised of 1 WI)
- Real-time traffic console (comprised of 2 WIs)
- Data integration (comprised of 3 WIs)
- Data modelling and storage (comprised of 2 WIs)

- Crowdsourcing and tracking (comprised of 6 WIs)
- Analysis and simulation (comprised of 5 WIs)
- Impact analysis (comprised of 2 WIs)
- Gamification and incentives (comprised of 4 WIs)
- System aspects (comprised of 4 WIs)
- Community involvement strategies (comprised of 5 WIs)
- User profiling (comprised of 3 WIs)
- KPIs support (comprised of 3 WIs)
- Security (comprised of 3 WIs)
- Human-computer Interaction – for WP5 (comprised of 3 WIs)
- Architectural analysis and design – for WP2 (comprised of 2 WIs)

Category by category, we examined Work Items during the workshop in accord with a WI description schema; we show in Figure 4 a portion of the schema, which is most relevant to the early planning phase we are carrying out at this point in the project.

	Tracking			Origin								Plan				
				Berlin pilot		Rovereto pilot		Tampere pilot		Project-wide				Milestones		
Title	Descr	WP	Responsible	Use case	Impact	Use case	Impact	Use case	Impact	Use case	Impact	Impact	Difficulty	M12	M24	M36

Figure 4: fragment of Work Item description schema.

We filled in the various fields in the schema as follows:

- responsibility was appointe to an individual member of the team
- relevance to Work Packages was assessed (mostly a single WP for each single WI)
- traceability to pilot and specific use case was recorded
- impact was estimated, on a scale of {Blocker, High, Medium, Low}
- difficulty of WI resolution was estimated, on a scale of {High, Moderate, Low}
- each WI was assigned to one of three milestones (M12, M24 or M36), in terms of completion goal; completion status at any milestone can be {No, Partial, Yes}

The outcome of the workshop was a set of records for the 58 elicited WIs, which have been uploaded to the project Trac repository, for Work Item tracking. Trac[1] is a tool that allows the interactive discussion and update of all Work Items, and the tracking of their completion state, as their development progresses in the rest of the project.

The Work Item set has therefore become a living specification of the work plan of the project. That set itself is likely to grow organically as a consequence of the development work necessary to fulfil the initial set of Work Items we have specified so far.

[1] http://trac.edgewall.org/

5.2. Interface with other STREETLIFE Work Packages

Table 11 shows the relationship between the different groups of work items that we have identified and the different Work Packages of the STREETLIFE project. It shows how the development that derives from the chosen pilot scenarios impacts a Work Package, or if necessary spans over multiple Work Packages, in particular technical Work Packages WP2 to WP5, thus driving the innovation that is supposed to be delivered in those Work Packages. For example the work of security relating tasks is impacting data modelling (WP3) and architectural design (WP2), since privacy concerns needs to be considered in the data model and securing interfaces and services needs to be done in the security architecture.

Some categories of work items do not have a specific impact on the technical Work Packages, but nevertheless impact the project in other ways. The work item group “Community involvement strategies” targets the wide range of recruiting users, partners of the city, mobility managers, developers and enterprises. Since WP7 is responsible for the pilot execution it is necessary to devise and execute strategies to involve a representative community group to achieve significant results. The work item group “KPIs”, instead, covers the definition, measurement, analysing and extrapolation from city to project-wide KPIs, and has an important impact on WP8, because this leads to a better understanding of the impact of green mobility methods, on the user behaviour, on the traffic system and on the carbon emission.

Table 11: Impact of Work Items (first iteration) on STREETLIFE Work Packages.

Work Item	WP2	WP3	WP4	WP5	WP7	WP8
Route planning and travel assistance				X		
Car/bike sharing		X				
Car pooling		X				
Real time traffic console			X			
Data integration		X	X			
Crowd-sourcing & tracking		X		X		
C2X				X		
Analysis and simulation			X			
Impact analysis			X	X		
Gamification and Incentives	X			X		
System aspects	X					

User profiling	X	X		X		
UI				X		
Security	X	X				
Community involvement strategies					X	
KPIs						X

5.3. Impact on mobility in pilot sites

Table 12 illustrates the traceability between the various work item groups and the scenarios at each pilot site. It shows how the work directed towards the development capabilities and features for the STREETLIFE system is common to – and percolates onto - a number of aspects that enable the three city pilots; as such, it is going to be heavily re-used across pilots and their scenarios.

Table 12: Traceability of Work Items (first iteration) onto STREETLIFE pilots.

Work Item	BER	ROV	TAM
Route planning and travel assistance	PTP BUI	BS CP P&R	TRE-02 TRE-03 TRE-04
Car/bike sharing	CPI BUI	BS	
Car pooling	CPI	CP	
Real time traffic console	MGMT BES	BS	TRE-03
Data integration	MGMT BES PTP	BS CP P&R	
Crowd-sourcing & tracking	PTP BUI MGMT CPI	BS CP P&R	TRE-02
C2X	BUI		
Analysis and simulation	MGMT BES	BS P&R	TRE-04
Impact analysis	MGMT PTP	BS CP P&R	TRE-03 TRE-05
Gamification and Incentives	CPI BUI	CP P&R	TRE-05

System aspects	PTP CPI BUI MGMT BES	BS CP P&R	TRE-01 TRE-02
User profiling	PTP CPI BUI	BS CP P&R	TRE-02 TRE-04
UI	PTP CPI BUI	BS CP P&R	TRE-02 TRE-04 TRE-05
Security	PTP CPI BUI BES MGMT	BS CP P&R	TRE-01 TRE-02 TRE-03 TRE-04 TRE-05
Community involvement strategies	PTP CPI BUI BES MGMT	BS CP P&R	TRE-02
KPIs	MGMT CPI PTP BUI	BS CP P&R	

6. Engagement Strategies

The execution of the pilots in the field, that is, in each city, is a fundamental element of STREETLIFE.

The project is organized according to an iterative R&D approach, and all the pilots will undergo two rounds of deployment, execution and evaluation within the timeline of the STREETLIFE project. Therefore the outcome of the pilot execution in the first phase enables the evaluation of the value of the STREETLIFE mobility innovations *per se*, as well as their impact in the pilot site where they are deployed. The outcome of the first iteration shall also be used to guide what will need to be developed and experimented with in the second iteration.

Furthermore, pilot execution and its results (in both phases) constitute a basis for post-project exploitation plans of the advanced mobility-related ICT solutions developed by STREETLIFE within each of the pilot site. Finally, they will also provide the evidence and data that we need to assess the value and generality of those proposed solutions beyond the pilot sites, and in other European urban contexts.

To execute the pilots successfully, a critical component is the engagement of groups of early adopters of the STREETLIFE technologies, who will exercise and enable the evaluation of the functionality offered in each iteration. In this Section, we outline the strategies that each pilot intends to use to recruit and engage early adopters, based on the various stakeholders' profiles identified as actors in the scenarios they have devised (see Section 3). These include end users / citizens who will use the STREETLIFE mobility services and apps, and which represent a very significant part of the user base of STREETLIFE technology, as well as mobility operators and administration and city management officials, who will use the services incorporated in the Control Panel functional area of the STREETLIFE mobility information system. The strategies that are described in Section 6.1 are intended to enable such engagement principally in the first project iteration, and may be augmented and expanded for the second iteration.

Another important element of engagement, at the local pilot level, as well as across pilots, is the creation of the STREETLIFE Advisory Board (AB), as per the project DOW. The work done to establish and launch the AB is reported in Section 6.2.

6.1. Engagement of user groups and other stakeholders

6.1.1. Engagement in BER (FOKUS)

The STREETLIFE Berlin pilot group partners will identify and address appropriate groups of test users and stakeholders within their local networks. Here, a very strong role can be played by Berlin Partner (STREETLIFE partner) as a Berlin technology and innovation marketing expert. Respective networks and project co-operations have been established in recent and on-going activities and projects. Besides that, existing memberships in interest groups and appropriate associations (e.g. ADFC, TSB, etc.) will be used to inform, and entice, broader audiences to an active participation. The public will be constantly informed about the project progress and new implementations via well-established dissemination channels that are being set up in the context of WP9 (newsletters, press releases, conference papers, etc.)

During a pre-test of the pilot implementations in Berlin, (friendly) test users (**early adopters**) will mainly come from partners and associated companies. They will thoroughly test and provide feedback on early implementations, workflows and desired evaluation methods (e.g. surveys, questionnaires, data collections) before setting into operation.

As for evaluation aspects, the main focus of user/stakeholder recruitment will be laid on service providers (PT operators, car & bike sharing operators, service operators, etc.), Berlin system operators and municipality representatives and decision makers (Berlin Traffic Management Center, City of Berlin, etc.) and end-user who use the STREETLIFE system very intensively. Especially for the recruitment of end-users to be actively addressed for local service assessment interviews and workshops appropriate incentive schemes need to be designed and made available. As associated partner, The Berlin traffic management center operator VMZ is reliably connected to local STREETLIFE pilot set up and, thus, constantly consulted in terms of service design and deployment.

Also the Berlin pilot advisory board, which is already set up and contains of local key role players, stakeholder and transport system experts, will be applied for approaching broader audiences and identifying users as first and early adopters and STREETLIFE service promoters.

Table 13: Stakeholder roles in Berlin pilot engagement

Stakeholder	Recruitment	Profiles	Scenarios/Use cases
End users and citizens	Through local partner networks, associations and dissemination channels (website)	All kinds of travelers in urban BER context	BER-PTP-* BER-CPI-* BER-BUI-*
System Operator	Through local partner networks, advisory board and dissemination channels	VMZ and further transport operators, City of Berlin	BER-MGMT-* BER-BES-*
Service Operator	Through local partner networks, advisory board and dissemination channels	Mobility service operators (e.g. PT, car/bike sharing)	BER-MGMT-*

6.1.2. Engagement in ROV

End Users: In terms of innovation delivery, the ROV pilot will target as its end user base for all the innovations delivered by STREETLIFE the users of the mobile app “Viaggia Rovereto”, in a future release. “Viaggia Rovereto” is an Android mobile app, released in the Google Play marketplace initially on October 15, 2013. Since that date, its user base has grown steadily, with 522 downloads from the market place and 359 distinct installations at the time of writing.

Early adopters: in terms of evaluation of the ROV pilot results, specific profiles of early STREETLIFE adopters will be targeted based on the content of the scenarios we have devised in the ROV pilot and the actors (stakeholders) who take place in them.

We plan to involve the following early adopters in the first iteration of the pilot:

Table 14: Engagement of stakeholders in Rovereto pilot by role.

Stakeholder	Recruitment	Profiles	Scenarios/Use cases
Citizens	meetings dedicated to the presentation of STREETLIFE, publication on Web sites	cyclists, commuters	ROV-BS ROV-CP ROV-PR
City visitors	publication on the main Web sites sites of tourist promotion (APT, visit Rovereto, etc.)	casual travellers, tourists	ROV-BS ROV-PR
Mobility manager officers	definition of a selected group of public managers and mobility operators who have a stake in sustainable mobility in the city	mobility managers and operators; policy makers	ROV-BS ROV-CP ROV-PR

Public transport company	Use existing contact through the STREETLIFE Advisory Board.	Managers of the local public transport company	ROV-PR
Data source and service provider companies	Use existing contact through the STREETLIFE Advisory Board. Involve the city parking company	Companies which either manage some services in the mobility sector, or are in charge of related infrastructure	ROV-BS ROV-CP ROV-PR
Other business enterprises	mobility manager of the enterprises, or people who are in charge of the sustainable mobility subject within each local company	Medium- or large-size g enterprises, with a number of commuting workers sufficient to be significant in the total number of work-related trips	ROV-CP

6.1.3. Engagement in TRE

End Users: The actual target group of end users and citizens of Tampere, who will get access to the services developed in STREETLIFE, will be reached through the city of Tampere Public Transport Internet site, on which the new mobility services will be marketed. This is a proven outreach strategy, which has been previously used and has constituted an effective way to engage Tampere end users directly. According to a recent study, public transport passengers in the city of Tampere are very satisfied with the current offering of public transport information services from that site, but at the same time they are eager to be provided and experiment with new, more real-time solutions.

Early adopters: Tampere region has an active Intelligent Transport Systems community called ITS Factory. ITS Factory is an innovation, experimentation and development environment of public and private sector co-operation including University, the city administration, and companies like Logica. ITS Factory significantly enhances the co-operation between intelligent transport players. The TRE pilot has engaged ITS Factory in its engagement strategy, as they can facilitate recruiting and retaining an excellent base of early adopters, which will provide test users and test companies for the STREETLIFE scenarios planned for execution in Tampere.

The full list of stakeholders is defined in the table below:

Table 15: Engagement of stakeholders in Tampere pilot by role.

Stakeholder	Recruitment	Profiles	Scenarios/Use cases

End users and citizens	Offer the new services and applications via the appropriate sections of the existing web sites of Tampere city (www.tampere.fi), and ITS Factory Tampere (www.itsfactory.fi), which is a dedicated site for intelligent traffic solutions. People visiting these sites are motivated to explore the new innovations and improved services.	Preferably all kind of public transport users	TRE-02 TRE-04 TRE-05
City council	Use the existing business relationship with Tampere and already established good contacts with city authorities. The project is based on a co-operation with Tampere city, so the city representatives will become involved in a natural way.		TRE-01 TRE-02
Public transport authority	Utilize the existing business relationship between Logica and Tampere city, and the already established good contacts.		TRE-03
Data source and service provider companies	Use existing contacts. Refer to our public transport authority partners at Tampere. Specify direct business benefits (park & ride -> Finnpark Oy).	Companies which: - Directly benefit from the project -Provide services for Tampere	TRE-04
Third party developers	Publish the new API via ITS Factory, which is an optimal channel for finding mobility application developers.	ITS / mobile application developers	TRE-02 TRE-04
Other business enterprises	No direct recruitment needed. Local business benefits from the project indirectly, as the traffic becomes more fluent, parking gets easier and better routing services help to plan work related travelling.		TRE-02

6.2. Advisory board

As per the STREETLIFE DOW, an Advisory Board (AB) was set up, consisting of experts and organisations outside of the project consortium. The main goals of the AB are to provide external consultancy on specific topics, to provide additional local dissemination channels in the pilot sites and to ensure a long-lasting support for STREETLIFE in the pilot sites. Because of this, the AB focuses on members who have a strong standing in the pilot sites with respect to mobility and transport areas.

Candidate AB members have been identified by the STREETLIFE partners, selecting from the following fields of expertise:

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- Public authorities of transport, city planning and environmental areas
- Carriers of relevant transport posts (e.g. operators of bus lines)
- Key players in field of the urban mobility system of the pilot
- Scientific technology experts with involvement in EU integration issues

Recruitment of members: during the project's kick-off meeting, it was decided that the AB should consist of up to 21 members, with seven members from each pilot site.

Any consortium partners could propose candidate AB members; the proposals were discussed by the consortium, and it was appointed who should approach which potential member, in order to use already established connections whenever possible. The potential members were given an invitation letter (outlining the project's goals as well as the duties and benefits of AB members) and the project factsheet; they were asked to sign a Non-Disclosure Agreement (NDA), which was written by the Consortium, according to the Fraunhofer Society's standard for such documents. Membership in the AB becomes effective with the signing of the NDA. The NDA is included in this deliverable in Appendix C: Advisory Board Non-Disclosure Agreement.

Notice that a few AB members also originate from organizations that are part of the STRETLIFE consortium, (specifically, SIEMENS and Fraunhofer FOKUS), but these AB members are not working themselves within the consortium. They were included in the AB because of their recognized specific expertise in the topic of urban mobility and its ICT support.

At the time of writing, the following memberships have been confirmed (18 out of the 21 seats in the AB):

- From the BER pilot:
  - Hermann Blümel, SenStadtUm - Senatsverwaltung für Stadtentwicklung und Umwelt
  - A. Pilz, VBB - Verkehrsverbund Berlin-Brandenburg GmbH
  - Jan Kätker, VMZ – Traffic Management Center
  - Peter Deussen, Fraunhofer FOKUS
  - Dr. Inessa Seifert, VDI/VDE Innovation + Technik GmbH
  - Axel Schultz, Siemens AG
- Rovereto Pilot:
  - Silvio Sada, Trentino Trasporti
  - Marco Cattani, Trentino Mobilità

- Giuliano Stelzar, City of Trento, city planning and mobility planning office
- Sergio Pellegrini, City of Riva del Garda
- Marcello Pallaoro, Autonomous Province of Trento, Biking and Pedestrian tracks office
- Andrea Piccioni, Municipality association of Vallagarina, technical-urbanistic office

- Tampere Pilot:
  - Risto Laaksonen, Department of city development, City of Tampere
  - Ari Vandell, Department of city planning, City of Tampere
  - Mika Periviita, Public Transport department, City of Tampere
  - Tero Myyryläinen, Public Transport planning department, City of Tampere
  - Pekka Pirhonen, Tampere City Transport
- International scientific experts:
  - Gilles Betis, EIT ICT Labs

Organisation: for the project-wide discussion and dissemination of topics that pertain to the STREETLIFE AB, a general English language e-mail list was created, involving all AB members. However, because the AB consists of mostly local players with a big involvement in the pilot sites, it was decided that its work should mostly be done locally, and it is left up to each pilot how to engage in STREETLIFE discussions its local members, and transfer knowledge and discussion to the local AB subset.

Similarly, in order to kick off the work of the AB, three separate meetings have been set up in Tampere (February 17th, 2014), Berlin (February 18th) and Rovereto (February 19th). During these meetings, the AB members will be given a presentation of the project goals and organization and will have the opportunity to give their initial input according to their specific expertise.

Perspective: the next steps will be to inform the AB on all relevant issues during the project's progress and to ask for their consultancy. This will be done through the project-wide mailing list, through additional pilot-centred mailing lists (preferably in the respective language of the pilot sites) and through regular project-wide (once per year) and local meetings (on a per need basis).

7. Conclusion

This deliverable can be considered a snapshot of all the pilots-related work that has been carried out during the period M1-M4. The principal goal and the underlying theme of all of this work has been to understand of how each pilot can most effectively address – and reap the benefits of –sustainable urban mobility through the support of ICT innovation, so that we can design the pilots in the three cities of Berlin, Rovereto and Tampere accordingly.

At the same time, by getting a detailed picture of what the pilots are going to look like, we have had the chance to provide valuable input to the rest of the activities of the STREETLIFE project, ranging from architectural design, to data modelling, to applications and services for end users and citizens, as well as mobility operators and city managers.

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APPENDIX A: DATA SOURCE COLLECTION TEMPLATE

Data Source Survey

PILOT:

1) Data Source Record:

(to be repeated for each data source)

Data Source **Name**:

Data Source **Description**:

Data Source **Type**:

(e.g. static, dynamic, real-time, crowdsourcing, historical, …)

Data source **Format**:

Data source **Ownership**:

(e.g. open data, open service, proprietary, etc. If proprietary and a STREETLIFE partner has access to it, name that partner)

Data source **License**:

Data source **Location**:

(typically URL to data or to API)

Notes:

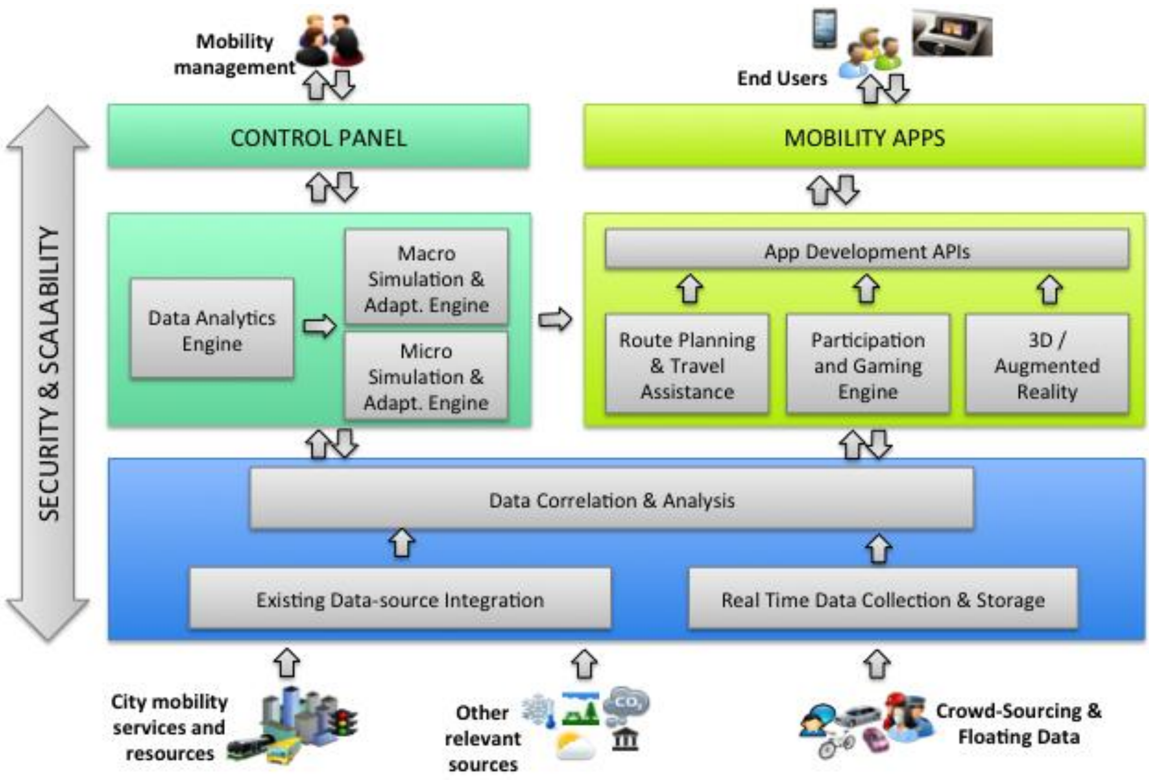
(you can put here any other useful information that is not covered by the fields above)

APPENDIX B: SOFTWARE ASSET COLLECTION TEMPLATE

Component Survey

PILOT:

Important note: please refer to the functional blocks in the diagram below when describing your components. We assume each component can either fit one block in the diagram, or perhaps multiple blocks at once.



1) Software Component Record:

(to be repeated for each software component currently available to the pilot)

Part I – snapshot of Software Component

Software Component **Name**:

Software Component **Description**:

Functional block:

(indicate which functional block(s) in the diagram above is covered by this Software Component)

Software Component **Technology**:

(specify technological constraints and requirements for the Component, such as platform, middleware, programming language, etc. Examples include: java, .NET, Web Service, REST Service, etc.)

Software component **Ownership**:

(specify if the software is open source, otherwise free for use, or proprietary. If proprietary, and a pilot partner owns it, mention which partner)

Software component **License**:

Software Component **Accessibility** to Project Partners:

(specify here what is available for use in STREETLIFE, e.g., binary, API, source code, etc. Also add any other qualification on the conditions for access that apply to this Software Component)

Other **Technical Considerations**:

(add here a bullet list of any other useful technical detail, such as, protocol implemented, standards complied with, (in)compatibility and interoperability characteristics, etc.)

-

Part II – Usage of Software Component in STREETLIFE

Software Component **Status**:

(specify if this Software Component - as it currently stands - must be considered background or foreground with respect to STREETLIFE)

Expected Enhancements:

(provide here a numbered list of features –if any - that you plan should become part of the same Software Component, as a by-product of work carried out in the WPs and Tasks of STREETLIFE)

Feature #	*Description*	*WP*	*Task*

Opportunities for sharing and reuse across STREETLIFE:

(provide here a numbered list of features, capabilities or other items that are part of this Software Components and could be contributed, shared or re-used within the project)

1.

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APPENDIX C: ADVISORY BOARD NON-DISCLOSURE AGREEMENT

Non-Disclosure Agreement

between

FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V., Hansastrasse 27C, 80686 München, Germany

- hereinafter referred to as »Fraunhofer«-

as legal entity for its

Fraunhofer Institute for Open Communication Systems FOKUS, Kaiserin-Augusta-Allee 31, 10589 Berlin, Germany

- hereinafter referred to as »Fraunhofer FOKUS« -

Fondazione Bruno Kessler, Via Santa Croce 77 - 38122 Trento, Italy

- hereinafter referred to as »FBK« -

Siemens AG, Wittelsbacherplatz 2, 80333 München, Germany

- hereinafter referred to as »SIEMENS« -

Deutsches Forschungszentrum für Künstliche Intelligenz GmbH, Trippstadter Straße 122, 67663 Kaiserslautern, Germany

- hereinafter referred to as »DFKI« -

AALTO-KORKEAKOULUSAATIO, represented by Helsinki Institute for Information Technology, Otakaari 1, 00076 Aalto, Finland

- hereinafter referred to as »AALTO« -

Deutsches Zentrum für Luft- und Raumfahrt e.V., represented by its Executive Board;
Linder Höhe, 51147 Köln, Germany,
performing DLR Institute: Institute of Transport Research

– hereinafter referred to as »DLR« –

Cooperativa Architetti ed Ingegneri - Urbanistica SC, Via Reverberi, 2, 42121 Reggio Emilia, Italy

– hereinafter referred to as »CAIRE URBANISTICA S. « –

Comune di Rovereto, Palazzo Pretorio, piazza del Podestà 11, 38068 Rovereto, Italy

– hereinafter referred to as »ROVERETO« –

Berlin Partner für Wirtschaft und Technologie GmbH, Fasanenstrasse 85, 10623 Berlin, Germany

– hereinafter referred to as »Berlin Partner« –

TAMPEREEN KAUPUNKI, Aleksis Kiven Katu 14-16, 33100 Tampere, Finland

– hereinafter referred to as »TAMPERE« –

CGI Suomi OY, Garverigranden 2, 00380 Helsinki, Finland

– hereinafter referred to as »CGI« –

– hereinafter together referred to as »Project Partners« –

and

[member of the Advisory Board]

[Address]

– hereinafter referred to as »Member of the Advisory Board« –

Preamble

The Project Partners co-operate in the project STREETLIFE which is partly funded by the EU's 7th Research Framework Programme under Grant No. 608991 and which is coordinated by Fraunhofer. In accordance with the »Annex I – Description of Work« of the Grant Agreement, the EU and the Project Partners have agreed that the project's progress shall be assessed by experts of an Advisory Board so to benefit from the Advisory Board members' expertise. To protect the results and information exchanged between the Project Partners and the members of the Advisory Board Board on national as well as on international level, and to provide a reference frame for the task of the Advisory Board, the following agreement is concluded:

§ 1 Purpose of the Advisory Board

The Project Partners will establish an Advisory Board which will include relevant external, independent expertise on user-requirements and project progress and which will be a dissemination channel to bring the project results to the widest possible audience.

The members of the Advisory Board will be invited to technical and scientific workshops, one of which will be organised in each of the three pilot sites Berlin, Rovereto and Tampere each year during the project's duration in order to inform interested local parties (companies, public authorities and other relevant stakeholders in the mobility sector) about the scientific project achievements but also to get valuable feedback to adapt the systems to the real needs in the pilot sites.

The members of the Advisory Board will get preferred access to deliverables and publications of STREETLIFE and will be asked to comment on the project and its progress.

§ 2 Confidentiality

For the purposes of this Agreement »Confidential Information« shall mean

- any technical and/or commercial Information, including – but not limited to – any documents, drawings, sketches or designs, materials or samples disclosed either by the Project Co-ordinator or any of the Project Partners, international partners to the project or subcontractors to the Member of the Advisory Board.
- information obtained from another member of the Advisory Board
- deliverables of the STREETLIFE Project Partners, international partners to the project or Subcontractors

The Member of the Advisory Board agrees to treat as confidential all and any Confidential Information – whether obtained directly or indirectly – and to use the same only for the purpose of the execution of its duties as an Advisory Board member and not to exploit such information, disclose it to any third party or allow any third party access to such information, except with the prior written consent of the disclosing party. Project partners are not deemed to be third parties in this context.

The Member of the Advisory Board will take all necessary precautions to ensure the confidentiality of disclosed Confidential Information.

The restrictions on the use and disclosure of Confidential Information shall not apply to any information which is:

(a) proven to have been known to the Member of the Advisory Board prior to the time of its disclosure pursuant to this Agreement; or

(b) in the public domain at the time of disclosure to the Member of the Advisory Board or thereafter enters the public domain without breach of the terms of this Agreement; or

(c) lawfully acquired by the Member of the Advisory Board from an independent source having a bona fide right to disclose the same; or

(d) independently developed by the Member of the Advisory Board provided that it has not had access to any of the Confidential Information of the disclosing party.

§ 3 Liability

The Member of the Advisory Board shall be held liable for any damage caused to the Project Co-ordinator, the Project Partners or the international partners to the project by breach of its duties under this agreement.

The Parties agree that any Confidential Information is made available »as is« and that no warranties are given or liabilities of any kind are assumed with respect to the quality of such Confidential Information, including, but not limited, to its fitness for the purpose, non-infringement of third party rights, accuracy, completeness or its correctness.

§ 4 Succession

This Agreement shall inure to the benefit of and be binding upon successors of the parties.

§ 5 Intellectual Property

The Member of the Advisory Board agrees not to exploit Confidential Information, in particular not to apply for the registration of intellectual property rights.

All Confidential Information supplied pursuant to this Agreement shall remain the property of the party disclosing or supplying the same and nothing contained in this agreement shall be construed as granting to or conferring upon the Member of the Advisory Board any rights by license or otherwise, express or implied, to the Confidential Information, know how under any intellectual property right of the Project Partners or international partners to the project.

Should any results generated by the Member of Advisory Board – in particular from evaluating the STREETLIFE project results or Deliverables – be eligible for protection under intellectual or industrial property laws or be protected under copyright law, the rights to use shall exclusively belong and be assigned by the Member of Advisory Board to the STREETLIFE Project Partners. This shall especially apply to the documents and reports mentioned under § 2. Additionally, the Project Partners shall be entitled to use the contributions and recommendations generated by the Member of Advisory Board unrestrictedly in time, place and content. For the avoidance of doubt, this right of use contains also the right to implement and develop such contributions and recommendations.

§ 6 Entry into Force and Term

This Agreement shall come into force on the date of the last signature and shall thereafter be valid until September 30th, 2016, the current planned end date of STREETLIFE. The obligation of confidentiality hereunder shall continue to be valid for a period of 10 years after the end of the term of this Agreement.

Upon request of the Project Co-ordinator or the disclosing party at any time any document, sample or material shall be returned by the Member of the Advisory Board to the disclosing or supplying party without undue delay at the latest at the end of this agreement.

§ 7 Miscellaneous

Amendments and additions to this Agreement must be made in writing to have legal effect.

This Agreement is subject to and governed by the laws of the Federal Republic of Germany.

If any provision of this Agreement is determined to be illegal or in conflict with the applicable law, the validity of the remaining provisions shall not be affected. The ineffective provision shall be replaced by an effective provision which is economically equivalent. The same shall apply in case of a gap.

Signed on behalf of the Project Partners, acting through Fraunhofer
Place, date

Signature of the Member of Advisory Board Place, date

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