ICT cloud-based platform and mobility services available, universal and safe for all users

D8.5.1 1st report on cooperation with other Projects

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Abstract: The deliverable describes the actions and outcomes of Project Task 8.5 aiming at promoting networking, knowledge exchange and coordination activities among MoveUs and other relevant projects running under FP7 in the same timeframe.

HISTORY

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List of Abreviations

B2B	Business to business
B2C	Business to consumer
CAI	Commonly Agreed Interface
CIP	Competitiveness and Innovation framework Programme
GML	Geographic Markup Language
MDA	Model-Driven Architecture
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
RDSS	Regional Data and Service Server
SOA	Service-Oriented Architecture
TISP	Traffic Information Service Provider
UML	Unified Modelling Language
WFS	Web Feature Services
WMS	Web Map Services
WP	Work Package
WSDL	Web Services Description Language
XML	eXtensible Markup Language

1 Introduction

The task T8.5, whose outcomes are described in the present Deliverable, deals with networking, knowledge exchange and coordination activities among MoveUs and other relevant projects running under FP7 in the same timeframe, including projects selected under the FP7-SMARTCITIES-2013 call (Mainly MyWay but also MOVE SMART, STREET-LIFE, MinE) as well as other projects under CIP ICT-PSP (e.g. Co-Cities, OPEN CITIES) and Transport program (e.g. OPTI-TRANS). The aim is to identify relevant common issues and understand possible commonalities in terms of approaches, lines of investigation and solutions adopted in the different projects, which: (a) may facilitate synergies among MoveUs activities (WP2-WP7) and other projects' developments, (b) may further support MoveUs exploitation, sustainability and business model development (WP10) and (c) can be eventually generalised into cross-project or program level inputs for the Commission.

The activities in the task aim at ensuring the organisational and networking conditions for an effective cooperation to be achieved especially during key phases of project development. The objectives are addressed by identifying the topics as well as the external projects and partners of relevance for the coordination. The activities also include setting up appropriate communication services and tools but also the organization of joint meetings or events for common discussions.

The aspects of cooperation are derived from a background scenario which will be described more in details in the document and that includes the main elements under investigation and development in MoveUs like: technologies and standards for the integration of data sources and services in the domain of transport and traffic, innovative cloud-based ICT elements applicable to the design and development of spatial infrastructures, interoperability between services and applications, methodologies and criteria for the implementation and operation of Living Labs, crowd sourcing concepts applied to future mobility services, etc.

The main expected outcomes of the cooperation activities are:

- Discussion on common aspects of interest on technical, organizational, validation, legal, privacy and security themes.
- Identification of elements that can further support the exploitation, sustainability and business model development.
- Establishment and facilitation of synergies among MoveUs activities (WP2-WP7) and other projects' developments
- Possible generation of future cross-project programs as inputs for the Commission.

2 Background, methodology and tools

2.1 Background scenario

The reference background context for the cooperation activities is a scenario where different transport and traffic management systems and future internet technologies and providers operate together at different stages through a *service chain* to capture, store and process a relevant and heterogeneous amount of data on mobility to provide Multimodal smart travel services.

Within this service chain, including technical and non-technical aspects, at least these basic key stages can be identified:

Content provision: data owned by local (origin) transport and mobility organizations and authorities are made available through locally-available interfaces. **Content integration**: the local contents are retrieved, integrated and processed to generate enhanced information suitable for the purposes of the target system. The integrated data can be distributed through an ICT middleware/infrastructure able to offer additional innovative, enhanced facilities and services.

Value added Service Generation: thanks to the ICT infrastructure, the integrated data is retrieved and managed efficiently by the traffic information service providers to develop value added services on top of it.

Service delivery: the value added services are made available to the end users (travellers but also organizations, operators etc.) through a number of distribution channels over the existing network and communication infrastructures.

The **cooperative or crowd-sourced information provision** has also to be considered. This operation can be achieved by using the same end user services provided in the previous steps or with external tools.

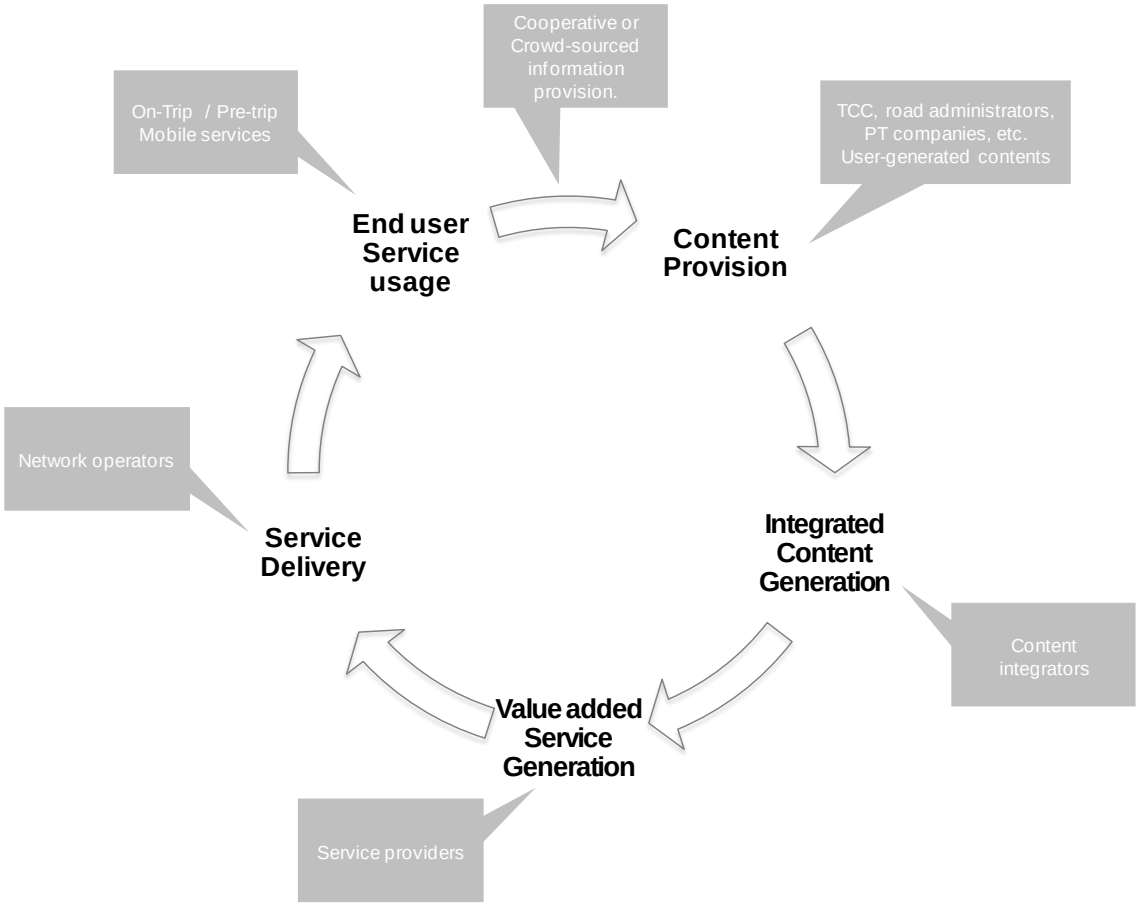

Figure 1 – service chain of the background scenario

MoveUs operates by designing and developing innovative concepts, models, components and solutions within this process. Specifically, the MoveUs *cloud-based platform* acts as content integrator while the *city-services* realize the service provision on top of the platform. The introduction of innovative elements like incentives or cooperative functions involves, for instance: (a) the service provision level, (b) the end user services and (c) the technical and organizational aspects of the service provision in the City.

All these background elements are considered as drivers for the identification of aspects and projects of relevance for the cooperation activities. In that respect, a methodological approach is introduced in the following section to refine this identification.

2.2 Methodology

The cooperation foreseen for the activities in Task 8.3 is based on a discussion and exchange of information between the representatives of the MoveUs consortium and the representatives of other projects that operates in the background scenario previously described. The synergies among the projects should not be only found on the basis of strict *commonalities* identifiable at various levels within the group of

the MoveUs activities, but also by looking at the *differences* in terms of targets, goals, emphasis, efforts and approach that external projects may put or have on *specific* or *horizontal* aspects of the common background.

In order to establish a basic method for the identification of specific elements of cooperation, the combination of three factors is considered:

(a) **Aspects of interest**, that could be seen in the context of the (b) **common background** (or part of it) and in relation to specific (c) **scope of activities.**

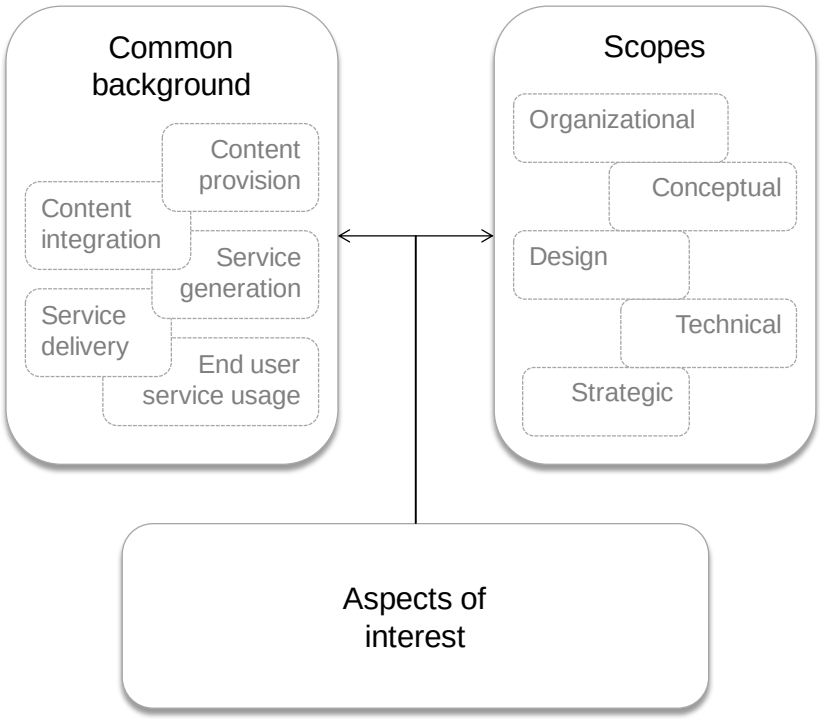

Figure 2 – Methodology for the identification of cooperation themes

General ***aspects of interest*** can be identified, for instance, in relation to:

- General Objectives
- Technical solutions and specifications
- Methodological approach
- Innovative elements and concepts applied to reach the objectives
- Etc.

The ***common background***, described in section 2.1, may be considered as a whole or with its single parts (e.g. the focus can be on content provision or on

service provision etc.). It should be noted that additional or more detailed stages of the service chain may be present in addition to those previously described[1].

The ***scopes*** that are identified for the cooperation can be:

- **Organizational:** aspects of the organization that may be relevant for the activities in the project. This may include:
  - Organization of the technical and analysis activities
  - Living Lab implementation and operation
  - Etc.
- **Conceptual:** high-level analysis, description and approach on concepts, methods, elements applied in the project. For example:
  - Application of incentives-related concepts.
  - Concepts and options for system and service architectures
  - Crowd-sourcing concepts
  - Etc.
- **Design**: approach and methodology followed for the specification of technical and non-technical elements.
- **Technical:** innovative technical aspects, related for example to the following enabling technologies and emerging drivers:
  - Standards and interoperability technologies
  - Integration of data sources and services in the multimodal personal mobility context
  - Services and applications interoperability
  - Use of cloud and ICT transformative technologies
  - Open data
  - Mobile apps
  - Etc.
- **Strategic:** aspects like exploitation and dissemination

After the identification of the main topics of discussion operated starting from the above methodology, the projects for cooperation are selected considering also the ***timeline*** and the status of activities expected in relation to the external projects themselves.

2.3 Tools

There are a number of potential supporting tools and instruments that can be identified for the cooperation. The following are considered although just a part of them is expected to be used.

- Email exchange
- Web Meetings
- Physical meetings
- Reporting with minutes of the meeting
- Internal web-based tools integrated into the collaborative web platform
- External web-based tools (e.g. wikis)
- Reporting with the present official deliverables

[1] This will be evident about the cooperation with the Co-Cities project.

2.4 Organization of the report

The outcomes of the coordination activities are described in the present deliverable by first introducing (Chapter 3) the projects interested by the cooperation done in year 1 and then by reporting on the outcomes (Chapter 4) with a presentation of the aspects of discussion and the concrete results. The networking and supporting tools and instruments set up for the cooperation are also described. The conclusion (Chapter 5) also includes a few notes on the cooperation planned for the next period.

3 Aspects and projects for cooperation

The selection of aspects of interest and projects for the cooperation activities has been primarily influenced by the type of activities carried out in the first year of the MoveUs project. This factor has been then crossed with the same information of the project candidate for the cooperation. The following candidate ***aspects of interests*** have been especially selected in relation to the activities done in MoveUs and as starting point for a more refined selection of cooperation themes and projects:

- **Concepts and options for system and service architectures:**
  - Use of cloud and ICT transformative technologies
  - Architecture Design
  - Standards and interoperability technologies
  - Data modelling, ontology
  - Mobile services
- **Innovative concepts:**
  - Incentives
  - Crowd sourcing
- **Energy Consumption awareness**
  - **Methods for measuring energy consumption and efficiency gains with the application of the ICT solutions.**
  - **Methods for translating energy consumption and savings into different parameters and values**
- **Users involvement:**
  - Living labs organization

A number of projects have been indicated in the Description of Work as candidates for the cooperation including FP7-SMARTCITIES-2013 projects (MyWay, MOVE SMART, STREET-LIFE, MinE) as well as CIP ICT-PSP ones (e.g. Co-Cities, OPEN CITIES).

The selection of the projects where the cooperation could be focused in year 1 has been operated on the basis of the following considerations:

1. Since the cooperation had just to start, a number of preparatory and organizational activities have been carried out first.
2. Most of the analysis, specification, designs and organization was achieved and improved only progressively during the first year thus influencing the quality and completeness of a potential knowledge sharing on concrete outcomes. Nevertheless, it was important to establish a first cooperation with one or more projects running in the same timeline and having common aspects of interest to cooperate on progress, concepts and solutions over a comparable time plan. For these aspects, the first project selected for the cooperation was the **MyWay project**.
3. In order to cooperate on specific aspects of interest for MoveUs with a reference on outcomes already proven and consolidated, **Co-Cities** has been selected as the second key cooperation project. In this case the envisaged

cooperation is more focused on aspects like the content provision and service integration, the cooperative services and the possibility of combining them with the incentives which could be interesting for Co-Cities.

The detail on the aspects of interests identified for the collaboration with the single projects, according to the methodology introduced before, is given in section 4 together with the report on the outcomes of the cooperation. Here, a short presentation of the main facts of the Co-Cities and MyWay projects is given.

3.1 Introduction to the Co-Cities project

3.1.1 Main project facts

Co-Cities[1] is a FP7 project started in January 2011 and ended in April 2014 that addressed the objectives of efficient traffic information demand, management and distribution towards a better integration, adaptation, enhancement and provision of the information over the entire value chain that spans from the content generation to the end user service provision and introduces, additionally, the cooperative services for improving the process of content generation and quality enhancement.

Co-Cities relies on the outcomes of the previous European projects In-Time[2] and e-MOTION[3] where a *Common Standardized Interface* has been defined for the integration of heterogeneous services and data. Co-Cities aimed at extending the number of Cities using this interface as well as enhancing it with an additional "Feedback loop" following the same design principles of the two previous projects.

Co-Cities also introduced a detailed validation process for cooperative traffic information services with the specification, setup and usage of a "reference platform" able to support the estimation of the data quality over the Co-Cities chain. The validation is the basis for setting up a roadmap for Cities and urban areas giving indications how to extend the current traffic information provision with additional services and opportunities by looking especially at the opportunities offered by the **cooperative traffic information services**.

On the technical level, Central element of Co-Cities is the specification of the extended Common Interface, able to integrate data and services from different local systems remotely available and referred by Co-Cities as Regional Data and Service Server (RDSS). A number of adaptation components (adapters) are set up on top of the local systems to translate the available offering according to the Co-Cities technical specifications. These components form the Commonly Agreed Interface (CAI), accessible from the Traffic Information Service Providers (TISPs) that builds value added services on top of it.

Thanks to the CAI the only differences in terms of data and service offerings from a city to another can be reduced to the number of services and the details of the available datasets (number of features). Instead, the commonalities in terms of data/service format allow the TISP to simply use any available CAI-compatible service and to simply manage the above differences (e.g. to show a property or not depending on its presence).

The concepts of interoperability and "common point of access" for information and service provision in Co-Cities can be summarized with the following figure:

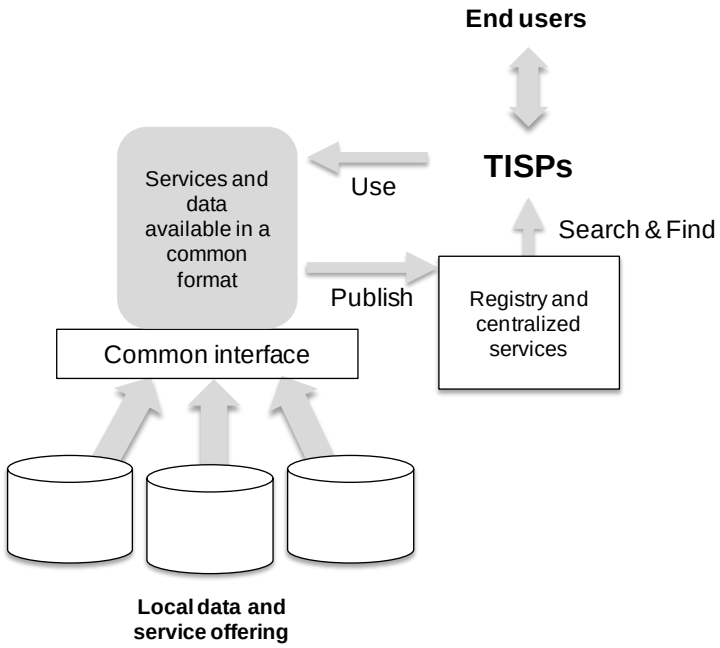

Figure 3 – Concepts of interoperability in Co-Cities

The interesting aspect on the definition of the Common Interface is the *methodology* adopted for its definition, already established starting from the eMOTION project and further adopted and consolidated in In-Time and Co-Cities. Key aspect of this methodology is the selection and use of European and international standards in the domains of traffic and transport as starting point for the definition of the common data and service structures and models.

The methodology can be summarized as follows:

1. Identification of the domains of relevance and interest for the infrastructure
2. Identification of use cases
3. Definition of information exchange chains for each use case
4. Identification of international standards of relevance for the analysis done in the previous steps.
5. Selection of standards
6. Harmonization of standards. This is a complex operation that results in the production of the whole conceptual model (data and services) of the interface. The conceptual model is specified by means of UML language.
7. Refinement and agreement of the UML model
8. Conversion from the UML model to an application schema. This is another complex operation that produces the technical specification is an exchange format like XSD and WSDL files.

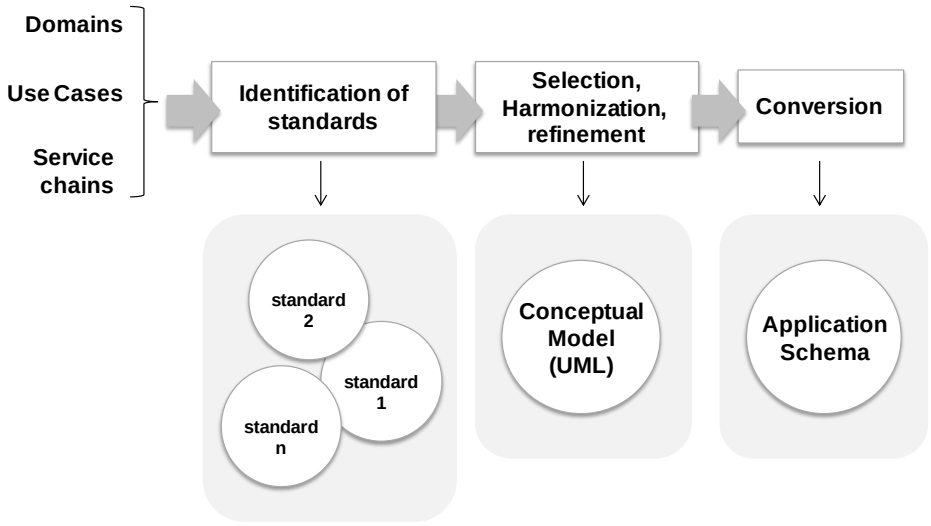

Figure 4 – Model-Driven Architecture design for Co-Cities

The specification is the basis for the implementation of information services that can be either (a) data services (providing information in various domains like traffic, parking, public transport etc.) or (b) specialized services like the Co-Cities Trip Planner. These services can be set up in the Cities: the CAI can be seen as an interface distributed over a number of different nodes along the principles of a SOA.

The value added services, realized by the TISPs on top of the components of the CAI, typically addresses the travelers for their pre-trip or on-trip transport and traffic information needs but also organizations or operators in the transport and traffic domain.

By using the services, the users have the possibility of providing their own information as a *feedback*, then becoming part of the content provision system. The feedback information in Co-Cities can be of three types:

1. Evaluation of the quality of the observed data
2. Evaluation of the overall quality of the service used
3. Provision of new data (like new road traffic events)

The feedback information is formulated through the end user visual interfaces of the clients like mobile apps, web pages etc. It is then formatted according to the specification of the CAI and sent to the "feedback services" set up and installed by the cities (and able to collect the feedback data coming from any Co-Cities-compliant TISP). This data is locally stored and processed for the purpose of information optimization and improvement. An analysis of several scenarios of cooperative information usage has been achieved with the development of a number of prototypes that demonstrates the effectiveness and potential of the feedback processing.

Overall, the workflow of information in Co-Cities involves the stakeholders depicted by the following figure:

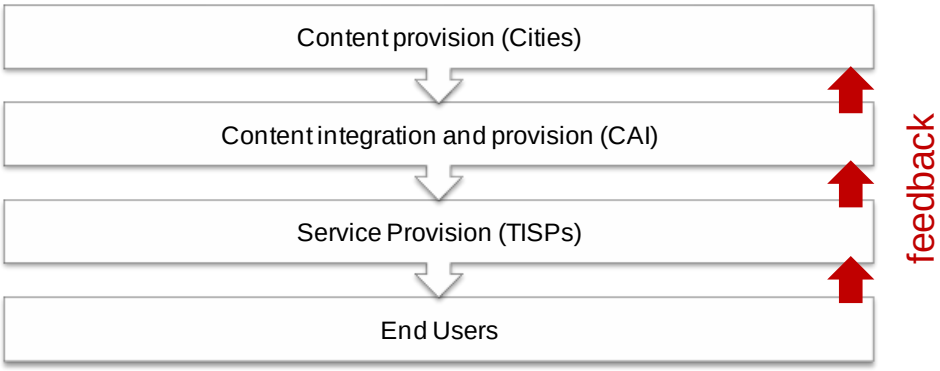

Figure 5 – Co-Cities service chain with the feedback loop

Co-Cities, as well as e-MOTION and In-Time, offer the possibility to run centralized services providing facilities or common functions to support the operations of the infrastructure itself and that are not specifically tied to the service/content provision of the single Cities. The detailed information on the service and content provision from the Cities is available through one of these centralized services, namely the centralized *registry*. Maintained by the Co-Cities community, the registry contains meta data on services offered through Co-Cities and provides a single point of access to publish, discover and retrieve this metadata**.**

Based on the technical infrastructure set up in the Cities, a technical, functional and user-centered validation of the solutions and concepts has been carried out on the basis of a detailed validation methodology and process. The outcomes of the validation have been considered as input to define the roadmap for the development of cooperative services in European Cities in the last stages of the project.

3.1.2 Main elements for the cooperation

To summarize, the main objectives, aspects, technical and methodological elements investigated and developed in Co-Cities are:

Development of a spatial infrastructure

- **Commonly Agreed B2B Interface** between local systems/services and TISPs able to realize a **standardized** access to **distributed** Data and Service sources
- Service provision focused on real-time, multi-modal traffic and travel information

Key features of the infrastructure:

- Harmonization of access to data and services
- **Interoperability** of end-user applications (TISP services)

- **Centralized services** for 3rd-party, end-user, value-added service deployment
- Enhanced **cooperative functions**

Key design principles:

- Technology and Geo referencing independence
- Model-Driven Architecture (MDA) approach and use of existing standards as the basis of conceptual modeling.
- Derivation of Geography Markup Language (GML) Application Schema and WSDL service definitions.
- Mapping standards.
- Use of a centralized registry.

Technical specification

- **Data Model** based on several international and European standards and **Service Model** developed by using wherever possible, existing service standards
- **Use of UML** for conceptual modeling. Translation into an **Application Schema** of **Geography Markup Language** (GML) and **WSDL documents** describing the interfaces

3.2 MyWay

3.2.1 Main project facts

MyWay[3] is a FP7 project started in September 2013 and ending in February 2016 with a Consortium of 14 members. The project aims at developing an integrated ICT service platform, the European Smart Mobility Resource Manager, developed as an open, modular and scalable framework able to seamlessly integrate different types of urban transport modes by enhancing existing Trip Planning and Travel Demand management services.

An impact is expected in terms of reduction of the traffic congestion thanks to improvement in mean journey times and significant shift in travel choices from private to collective (Public transport) and flexible (flexible transport, shared e-scooters, bikes) modes.

MyWay operates in several directions to reach the objectives. These include:

- Improvement of service offering, accessibility and interoperability.
- Improvement of development conditions for the providers with the reduction of market entry barriers.
- Application of ICT technologies for smart mobility.
- Development of multimodal journey planning systems based on awareness of the resources.

- Flexible and intelligent mechanisms applied to Trip Planning like personalized discovery, negotiation-based matchmaking.

Specifically, with regard to the ICT solutions, MyWay addresses the innovation aspects of the Trip Planning services with:

- A strong user-centric approach also based on user's travel experience.
- The integration of multi-modal transport solutions with a high level of context-adaptation and personalization.
- The integration of information supplied by the user (feedbacks) as well as information shared within user communities (crowd-sourcing).
- Cloud-enabled and Future Internet compatible solutions as elements to ease the resource provision and integration of the operators into the multimodal mobility market

Service platform

The above requirements and objectives are transposed into the *MyWay service platform*, an open, modular and scalable framework that allows the provision of:

- Core components for integrated multi-modal trip planning, operation and assessment
- Mobile end user services for pre- and on-trip planning and operations
- A set of standardized APIs and SDKs supporting the integration of local ITS services as well as the development of applications.

Looking at the background scenario introduced in 2.1, in MyWay the services (trip planners or infomobility) that already exist in the area are not replicated; instead, thanks to a cloud-based ICT infrastructure, the local offering is collected, harmonized and linked together to provide integrated, user-centric and flexible Trip Planning and mobility information services.

The infrastructure includes a number of modules for the following purposes:

- Management of user preferences and learning from the mobility behaviour of the single user to offer a personalized service.
- Combination of travel options provided by different mobility schemes like vehicle sharing, demand-responsive transport, etc.
- Achievement of situation-aware dynamic evaluation and re-planning capabilities determined by changes in the user or transport context.
- Provision of Real-time information as part of the trip planner to notify about possible disruption or delays which affects the journey.
- Management of user feedbacks and evaluation to build up an evolving knowledge base of user's mobility experience for future choices.

4 Cooperation Activities and results

4.1 Report on the Cooperation with the Co-Cities Project

There are a number of aspects that have been identified as significant for the cooperation between the MoveUs and Co-Cities based on the objectives, activities and timeline of the two projects. A selection has been operated based on the basic methodology introduced in section 2. The following tables synthesize the basic factors significant for the cooperation.

Timeline and overlapping	
MoveUs	Started October 2013
Co-Cities	Ended April 2014
All publicly available results of Co-Cities can be investigated. From MoveUs only the results of the first year could be used. Nevertheless most of these results and studies were in progress and then only partially available during the period of the cooperation.	

Table 1 – Timeline and overlapping – MoveUs Co-Cities

Common aspect of interest	**Scope**	**Specific Background elements**
Architectural design of the spatial infrastructure.	Conceptual, technical	Overall background context
Data and service integration	Technical	Content provision Content integration
Feedback provision	Technical, conceptual	Feedback provision Feedback collection

Table 2 – Aspects of the cooperation – MoveUs Co-Cities

4.1.1 Details on aspects of interest

Main design principles

Both MoveUs and Co-Cities rely on spatial infrastructures where the content provision and integration are core operations. In this common scenario there are differences in terms of architectural design and technological approach because MoveUs focuses on cloud computing while Co-Cities follows the Service Oriented Architecture paradigm.

In terms of architectural design a comparison seems to be interesting to find the pros and cons of the two approaches. Nevertheless, this comparison will be completely feasible from the second year onwards or even during the validation phase as the MoveUs system was not completely defined and developed during the cooperation.

The operations, mechanisms and methodologies specifically related to the content provision and integration, instead, are investigated in detail.

Content and feedback provision

The content integration in MoveUs is based on the definition of a reference Ontology and Data Model, the first step for setting up centralized data structures and conversion/harmonization rules for external contents. As pointed out in section 3.1.1, for the purposes of content integration, Co-Cities relies on a common interface developed from a standard-based conceptual modeling of data as starting point of a Model-Driven Architecture (MDA) approach. The concepts and design methodologies for content integration are then comparable in the two projects and can therefore be in the focus of the cooperation.

Another common aspect, significant for the cooperation was the definition of innovative cooperative services as key element of information quality enhancement, specifically targeted by Co-Cities project and element of innovation for MoveUs. Here, Co-Cities defined a detailed approach for the design and introduction of cooperative services both on the technical and organizational level by specifying, for example, a number of categories of feedback services (section 3.1), a complete reference data model (suitable for the same MDA approach introduced above) and possible scenarios and specifications for the application and evolution of cooperative services in European Cities. These aspects of details have been considered a valuable work and knowledge base that MoveUs considered with great interest.

4.1.2 Activities and results

The cooperation activities between MoveUs and Co-Cities have been carried out with a preliminary internal analysis aiming at identifying the specific elements for a more productive and efficient discussion with the Co-Cities partners. After this phase the concrete cooperation has been carried out.

Preliminary internal analysis

The MoveUs technical partners analyzed in details the Co-Cities technical specification available through the project's public Deliverables. The analysis produced the following outcomes, shared internally within the MoveUs consortium:

I. Looking at the activities of ontology and data model definition in MoveUs, it was understood that the Co-Cities data model could partially cover or be reused for the domains and applications of interest for MoveUs.
II. Further extensions to the Co-Cities data model could be defined following the same methodology established for Co-Cities, namely, the conceptual modeling of data using the ISO 19100 series of geo-information standards as starting point of the Model-Driven Architecture (MDA) approach and use of existing domain standards as the basis of conceptual modeling. Furthermore the Co-Cities model and methodological approach have been consolidated over nearly a decade in three different projects: eMOTION, In-Time and Co-Cities and therefore the approach and results can be considered as stable, solid and of very high quality.
III. The definition of a new, complete data model in MoveUs for the domains already covered by Co-Cities would be too demanding in terms of resources giving the timeline of the project task 3.1. A new, complete data model definition for MoveUs for the domains already covered by Co-Cities would anyway result in a new set of specifications with no real innovative elements for the same applicative domains. Instead, re-using the consolidated outcomes of past European Projects (and looking especially at the historical background of this case) is preferable.
IV. For the cooperation discussion, besides the above aspects of data modeling, the Cooperative aspects should be also considered based on the amount and quality of studies, analysis and results carried out and obtained by Co-Cities in this domain.
V. As proposal of cooperation MoveUs could inform Co-Cities on the application and outcomes of the cooperative services in a new architectural and experimental context as well as in combination with other innovative concepts like the application of incentives-based measures.

Actions

The following actions have been carried within the cooperation activities:

I. The Co-Cities project coordinator, AustriaTech, has been contacted to:
    a. Present the MoveUs project objectives and goals.
    b. Explain the opportunities and willingness of a cooperation between the two projects.
    c. Introduce the themes of interest for a cooperation including the data modeling and cooperative services.
II. After the positive response of AustriaTech, a number of further contacts including a joint web meeting with the technical and project coordinators have been organized in order to:
    a. Further discuss the elements of cooperation in relation to the existing part of the data model

b. Explain the plans and opportunities for extending the existing data model according to the established methodology so that an updated package including new parts for incentives and other MoveUs specific elements will be available at European level.
c. Present the innovation aspects of MoveUs that could represent interesting additional elements for the cooperative services, namely the application of incentives in combination with the feedback services.
d. Discuss the innovation aspects common to the two projects: Crowd-sourced data and feedbacks and how the Co-Cities approach could be applied and extended in combination with the application of incentives-options in MoveUs

Outcomes

The concrete results of this collaboration resulted in the outcomes of the activities of T3.1 where the complete MoveUs data model has been defined. Based on the Co-Cities methodology, the different functional blocks of the MoveUs architecture have been analyzed and the necessary data model defined. The definition started by analyzing the available outcomes from Co-Cities and by defining the appropriate extensions in the second step.

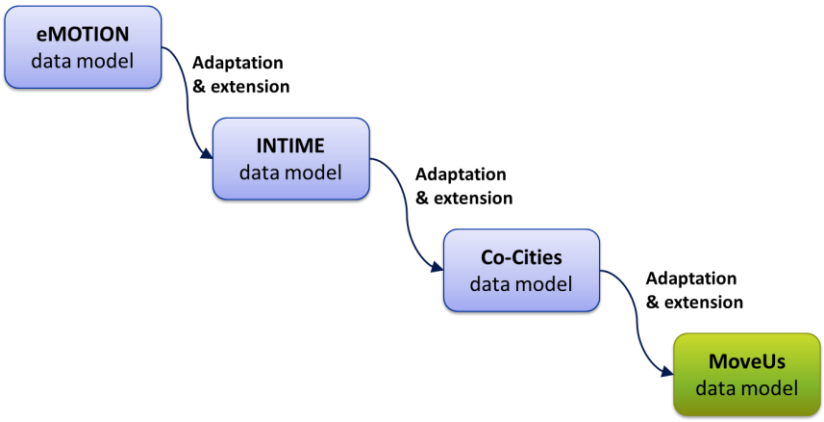

Figure 6 - MoveUs data model definition process

The following packages or sub-domains have been considered, analyzed and extended according to the MoveUs requirements when necessary:

I. User Management
II. Traffic Management
III. Public Transport Operation Management
IV. Traveler Journey Assistance
V. Incentive Management
VI. CF/EC Estimation
VII. Feedback management
VIII. Registry

In relation to the feedback services, specifically, the opportunity to consider the same feedback service taxonomy was analyzed and considered for the application into the Trip Planning and road traffic domains in MoveUs. The outcomes confirmed the validity of the opportunity offered by the adoption of the Co-Cities approach and its integration into the data model.

4.2 Report on the Cooperation with the MyWay Project

The cooperation with the MyWay project, is considered of primarily importance giving the themes and objectives of the two projects.

The MyWay and MoveUs project activities have almost the same timeline For both, the analysis, technical and organizational activities have started and been carried out progressively in the first year. Consequently, cooperation on complete and stable technical results was only partially possible over this period of time. The knowledge sharing was structured and conducted in a different way compared to Co-Cities because more general aspects have been discussed in a less-structured way with the main purpose of establishing the basis for a more strict cooperation in year 2.

The following section of the report is substantially different in terms of details and organization from the same provided for Co-Cities as a consequence of the above considerations.

Timeline and overlapping	
MoveUs	Started Oct 2013
MyWay	Started Sept. 2013
Only the results of the first year, partially available during the period of the cooperation could be jointly discussed by the two projects.	

Table 3 – Timeline and overlapping – MoveUs MyWay

Common aspect of interest	**Scope**	**Specific Background elements**
Main architectural principles	Technical, conceptual	Overall background context
Standardization and integration of data	Technical, conceptual	Content provision and integration

Availability and use of APIs and services	Technical	Content integration, Service provision
Personalization of user services	Design	Service provision
Crowd-sourcing	Conceptual	Feedback provision

Table 4 – Aspects of the cooperation – MoveUs MyWay

The preliminary cooperation activities were aimed at investigating and exchanging information on the above identified common aspects of interest. The description of the outcomes is summarized as follows.

Main architectural aspects

Both projects have a starting approach oriented to *cloud-based ICT infrastructures.* Besides the starting objectives and target view, already known, the detailed elements and features of both infrastructures have been designed, discussed and analyzed in year 1.

The design choices and solutions applied to the ICT infrastructure have a high level of complexity in a number of different aspects including technical, architectural and business-model-oriented. Consequently, the knowledge exchange will be more productive and detailed in the next period where the concrete results will be consolidated.

The identified themes of discussion include:

- Main features including:
  - Capabilities
  - Management of resources
  - Optimization of resource use
- Service Models:
  - Software as a Service (SaaS)
  - Platform as a Service (PaaS)
  - Infrastructure as a Service (IaaS)
  - Deployment Models:Private cloud, Community cloud etc.
  - Architectural design
  - Technological

Integration and standardization of data

The content/service integration using standard-based ontology and data models are foreseen in the two projects. It will be interesting to compare the different approaches adopted in the respective tasks to enrich the knowledge and

experiences done at European level in terms of standardization, data modelling and content integration methodologies.

As described in section 4.1, MoveUs, starting from the cooperation with Co-Cities adopted a methodology based on a Model-Driven Architecture (MDA) approach and use of existing standards as the basis of conceptual modeling.

It will be interesting to share the knowledge on:

- Methodology
- Reference standards
- Technical implementation of the content integrators

Availability and use of APIs and services

Several innovative technological choices and elements are introduced to design and realize the modules, interfaces, connectors and other components that the two platforms will offer to the service providers. The different solutions and innovations introduced by the two projects are a part of the developments in year 1 and will be investigated in the next period by looking especially at following aspects:

- Scope of use of the APIs within the cloud architecture
- Possibilities and extension of the application context, scenarios of applications.

Personalization of user services

The personalization of user services is the key for the definition of customized, efficient personal tools able to provide a better information offering to the travellers. The aspects of personalization are part of the specification of the City-Services in MoveUs and influence of course also the supporting infrastructure. The personalization can be specified by considering a number of aspects:

- The different levels and functions where the personalization occurs (e.g. automatic suggestions, localization, personalization of the interface etc.)
- The criteria adopted for the personalization (for example: geographic, based on user's history etc.).
- Other relevant aspects of the user-centric approach applied to the service provision.

Based on the above elements differences in terms of levels and criteria it will be possible to understand how MyWay approaches this theme with respect to MoveUs.

Crowd-sourcing

MyWay will adopt the integration of crowd-sourced information. MoveUs relies on the feedback provided by the end users -directly after or during the usage of the

services- to get and integrate data seen as part of an additional content source. The themes of cooperation with MyWay, will be especially focused on the following aspects:

- Comparison of single-user vs community-based data collection. Possibilities offered at European level y mixed solutions.
- Issues on data processing and validation, aspects of data trust, aggregation, comparison and reliability.
- Possible applications of the crowd-generated information.

5 Conclusions and future plans

In year 1 the cooperation with other projects focused on the technical and organizational aspects that interested the activities of the period in MoveUS.

Two projects have been especially addressed by the cooperation activities: MyWay and Co-Cities, both focusing on objectives partially common to MoveUs. The priority in terms of cooperation among all three projects: MoveUs, Co-Cities and MyWay can be identified in the following themes:

- Approach and methodology for setting up the spatial infrastructure for information provision in the domain of traffic and mobility
- Possibilities and options offered by the cooperative services
- Concept, application and effectiveness of the incentive-based innovative features applied to existing services

MoveUs evaluated the work done in Co-Cities and the process of data model design consolidated over nearly a decade by the Projects previous to Co-Cities. The outcomes of the cooperation largely influenced the MoveUs Task 3.1 (Ontology Design) for the aspects of ontology definition. Here, reusing a very specific outcome from Co-Cities was motivated by the approach, by now consolidated at European level and by considering the opportunity of a further extension with innovative elements (like the incentives) as interesting for future cooperation.

The cooperation with MyWay, on the other hand, is regarded as highly relevant for both the similar timeframe that make the two projects running almost "in parallel" and for various commonalities that can be found in the two projects. The preliminary investigation on the themes of collaboration has been achieved jointly as initial work for a more detailed and deep knowledge exchange to be achieved in year 2, when the concrete achievements at all levels, not completely developed for discussion during year 1, will be available.

Future plans

Many aspects found and identified for the projects considered in the first phase of the cooperation will be investigated in the second period. About Co-Cities, one of these aspects will be the roadmap for the deployment of cooperative services, applicable to the implementation and setup of the MoveUS crowded-source information services. For MyWay, giving the parallel timelines, the cooperation will be more detailed based on the preparatory work and analysis of the collaboration themes achieved in year 1.

For year 2, the plan is also to enlarge the group of projects not yet included in the collaboration network established within Task 8.5. In that respect, the initiatives Streetlife (www.streetlife-project.eu), Open Cities (http://www.opencities.net/), and Opti-trans (http://www.optitrans-fp7.eu/) are of particular interest.

Streetlife addresses advanced multimodal mobility information systems for urban areas by targeting citizens, administrations and management organizations.

Efficient information about transport alternatives through multi-provider content integration, enhancement of public transport and usage of incentives are a few of the key concepts foreseen for the achievement of the project's objectives. Although addressed by the two projects with a different level of detail and focus, many of the specific innovative actions found in Streetlife, according to the public project documentation, are certainly of interest for a cooperation. These includes: crowd-sourced data collection, content integration, mobile services, monitoring of mobility resources and carbon emissions, personalized trip planning with real-time information provision and the application of incentives-related concepts. It's interesting to note that the MoveUs partner City of Tampere is also partner of the Streetlife consortium.

The common aspects of interest for MoveUs and *Open Cities* Projects, seems to be particularly related to the openness of data, which is a key objective of Open Cities with initiatives, developed for the South Asian, for promoting the collection of data through cooperative, open initiatives in partnership with local actors like communities, government agencies, academic bodies as well with private organizations.

Opti-Trans focuses on Location Based multi-modal personal navigation mobile services developed on top of a core platform able to combine data on various transport modes to provide optimal multimodal travel information to the user by combining the available offering. The concepts of dynamic data integration, user requirement, standardisation at pan-European level and using state-of-the-art technology applied to innovative solutions and ways of exploiting them are addressed and represent key aspect of common interest. EMT, partner of MoveUs is also in the Opti-Trans consortium.

In year 1 the cooperation was partially driven by the needs emerging from the project activities, especially on the technical side. The cooperation in the next period will be carried out with an enlarged perspective based both on the next project activities (like the organizational aspects of the user involvement) and future initiatives to be identified with other projects.

6 References

[1] Co-cities Project. http://www.co-cities.eu/

[2] In-Time Project. http://www.in-time-project.eu/

[3] eMotion Project. http://www.emotion-project.eu/

[4] MyWay Project. http://myway-project.eu/