DELIVERABLE

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D6.1 STRATEGIC EVALUATION METHODOLOGY

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Executive Summary

This document is designed to set out ECIM's strategic evaluation strategy. As described in Work package 6 (WP6), this document aims to create an evaluation methodology that will examine systematically the acceptance and value of the platform in general, as well as the main determinants (i.e. factors affecting levels of acceptance) of the project. To this end, the unique characteristics of this project are combined with clear-cut evaluation methodologies guided by a Living Lab approach, which has been customized to mirror the specific needs of the European Cloud Marketplace for Intelligent Mobility (ECIM) project.

The ECIM project will develop a state-of-the-art solution that combines the strong cloud capabilities of a cloud-based platform with new functionalities that facilitate the easy migration of existing city services and innovative creation of new ones. In doing so, ECIM 1) provides a pathway for cities and businesses to easily migrate services to the cloud, 2) opens these services to innovators for use as the basis for new applications & services and 3) leverages the existing architecture of CIP marketplaces for Intelligent City services (EPIC & EnoLL) to promote these services across Europe.

In this process three pilots and a proof concept are organized under WP5 Pilot Deployment. These pilots, organized in Brussels, Issy-les-Moulineaux (Grand Paris Seine Ouest urban community), Barcelona and the proof of concept in the Birmingham region, will validate the ECIM solution by 1) submitting existing services to the platform 2) engaging citizens and SMEs to co-create new services and 3) demonstrating cross border interoperability by implementing these new services in their own areas.

The evaluation of the pilots is aligned with the operationalization of each of the pilots (as described in D5.1 Pilot Operations Plan) and the feedback gathered from various end users of ECIM (citizens, developers, private and public service providers) and feeds into the evaluation work within the Results and Validation work package (WP6) and the sustainability work of the Dissemination and Network Enlargement work package (WP7). Furthermore, the analysis of the evaluation and the feedback is passed on to the technical work packages (WP3 and WP4) for refinements and improvements of services, platform and pilot applications.

In the context of the pilots, the ECIM solution will be validated with the deployment and test of services in the three pilot cities in a three staged process: (1) a pre-pilot stage, (2) a closed stage and (3) an open group stage. Each of these three pilot stages will be accompanied by user tests, which have a particular objective for each stage in order to on the one hand allow that gathered insights will flow from one test stage to the other and on the other hand that the range of inquiries can be broadened in order to capture as rich feedback as possible.

For the evaluation we use both quantitative and qualitative methods in order to provide an overview of the users' stances towards the usage of the solution and to capture suggestions for its further development and applicability. Participants will evaluate, among the rest, the ease of use, usefulness, accessibility, quality of information and attitude towards the solution. Some of the produced indicators will be implemented in the platform, while others will be used to elaborate a semi-qualitative questionnaire (users' survey), interviews and also Participant Observation and the focus group exercise. The process for the elaboration of the metrics initiates with a definition of operational, intermediate and strategic objectives of the project followed by a definition of evaluation criteria related to the case at hand, both to the pilots and the platform and to the technology acceptance model. The results of the evaluation processes will be included in the upcoming WP6 deliverables, liaising with other work packages to collect and analyze relevant outputs, such as in WP5 and WP2, and will be exploited both internally and externally towards the scientific and business communities so as to validate the European Cloud Marketplace for Intelligent Mobility.

1 Introduction

The aim of the Deliverable 6.1 is to elaborate on a detailed evaluation methodology, describing both qualitative and quantitative methods that will be applied to the production of the Evaluation Report. Some of the produced indicators will be implemented in the platform, while others are used to elaborate a semi-qualitative questionnaire (users' survey), interview questions and participant Observations. The process for the elaboration of the metrics initiates with a definition of the operational, intermediate and strategic objectives of the project followed by a definition of the evaluation criteria related to the case at hand both to the pilots and the platform and to the technology acceptance model. Then, building on objectives and criteria, we develop a series of evaluation questions. Finally, in order to give an answer to the specific evaluation questions, a set of indicators is elaborated and matched to the appropriate sources for data collection.

In the following paragraphs the relation between the evaluation activity and other work packages is presented.

1.1 Purpose of the strategic evaluation methodology

This document sets out to formulate the strategic evaluation methodology of the project European Cloud Marketplace for Intelligent Mobility (ECIM). Consequently it provides an overview of the methodology and methodological considerations that underpin the execution and assessment of the pilots in particular, and the project at large. The overall aim is to ensure that the project outputs are consistent with the planned objectives and in conjunction with real stakeholder' needs as those reported in other work packages.

More specifically, whereas the dimension of evaluation mainly concentrates on the pilots and the platform, these depend on elements developed in other work packages. Namely WP2 "User Requirement Analysis and Scenario Creation", WP3 "Platform Adaptation", WP4 "Service Application Integration" and WP5 "Pilot Deployment" constitute the basis of the pilots and of the mobility applications and platform development and thus have both direct and indirect influences on the Strategic Evaluation Methodology.

The main stakeholders' requirements, which will drive the definition of the project technical and implementation requirements, were captured during a series of stakeholder workshops organized under WP2. Based on these, the user scenarios were drafted and are used to pilot the city mobility platform.

Under WP3 and WP4, the services of the ECIM partners are integrated to the ECIM platform. The platform is built on the concept of open web-services connecting with external services and information sources. The ECIM project platform will provide web-services for city mobility (on-street and off-street parking) and combine them with other open services and datasets. These technical work packages adopt an iterative approach to the incorporation of all the technical developments from the other WPs into an integrated prototype.

The ECIM solution is validated under WP5 in three pilot cities: Brussels, Belgium; Issy-les-Moulineaux ('Grand Paris Seine Ouest' urban community), France and Barcelona, Spain. To demonstrate cross border interoperability, each pilot will test similar functionalities related to the city mobility. Furthermore, a proof of concept will be performed in the wider Birmingham Region in the UK. The results of the pilots will be evaluated within WP6, providing further technical refinement suggestions; recommendations for more efficient platform implementation, and suggestions for cities to enhance their service delivery based on user behavior patterns.

Predominantly, the work package (WP6) entitled "Results and Validation" works closely in conjunction with WP5 "Pilot Deployment" to build the evaluation methodology into the pilot operations plan and to learn from the experiences of the first Brussels pre-pilot that was undertaken in September 2014. Nonetheless, in

the framework of WP6 and more specifically in the frame of this deliverable, a detailed evaluation methodology, describing both qualitative and quantitative methods that will be applied to the production of the Evaluation Reports will be set-up.

Specifically, the evaluation plan will be broken down into two main pilot stages (pre-piloting Brussels and two integration pilots in Issy-les-Moulineaux and Barcelona, followed by the proof of concept in Birmingham region, each divided in several iterations along the integration path for the different mobility services.

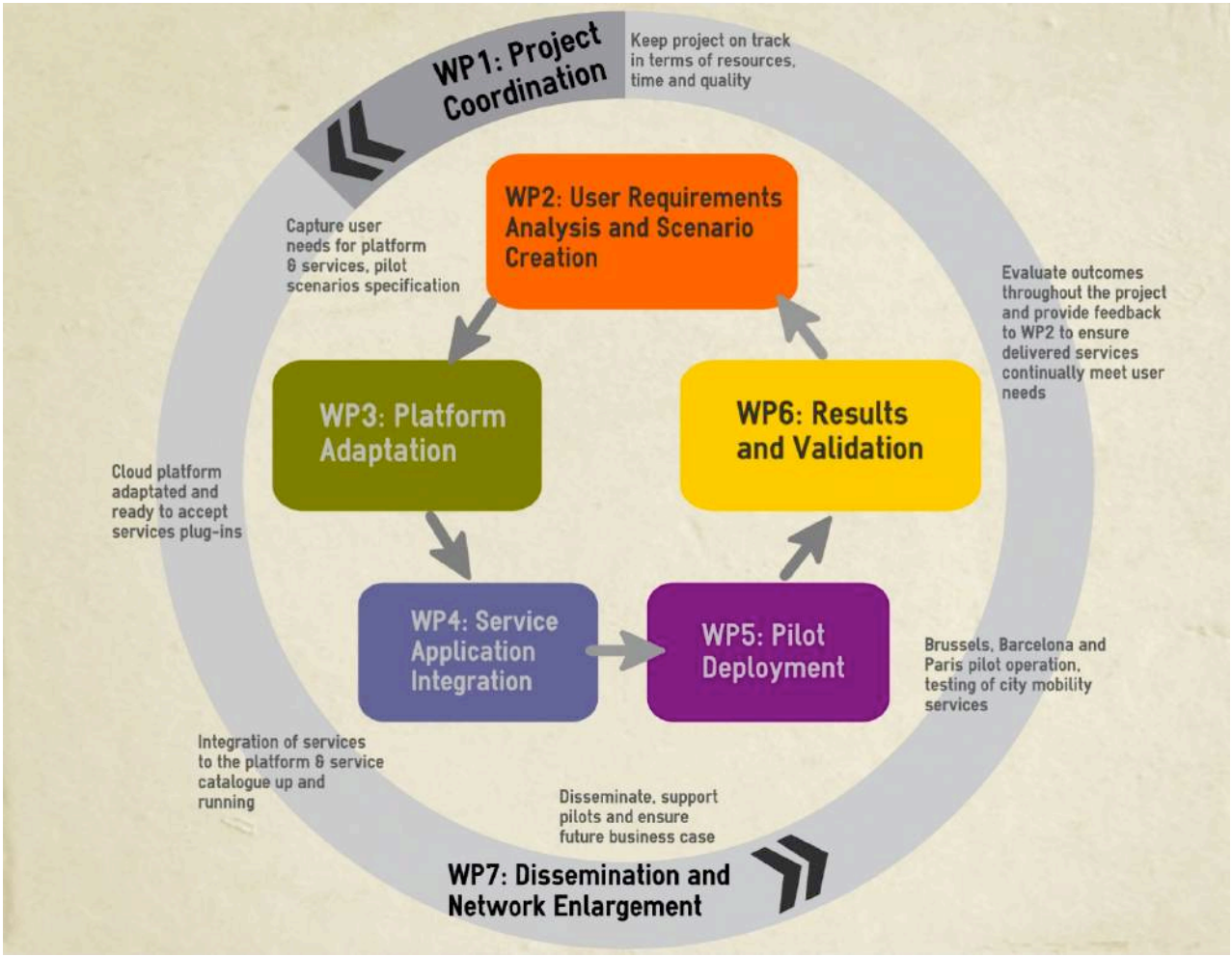

Figure 1: Work Packages Structure (PERT Chart)

1.2 Structure of the document

This section presents the structure of this deliverable. Chapter 2, describes the ECIM General Evaluation Framework and a selection of the various evaluation theories. Furthermore, it presents the concept of Living Labs, the ECIM service analysis and use Cases and the measures for evaluating User Experience/Acceptance. Chapter 3, will present ECIM's Evaluation Methodology the criteria and Evaluation Questions, the overview of Evaluation Instruments, and the indicators and sources whereas chapter 4 presents the Pilot Scenarios and timeline and Chapter 5 the technical evaluation.

2 ECIM's General Evaluation Framework

The scope of the evaluation framework is to evaluate the platform, the three pilots (Brussels, Issy-les-Moulineaux and Barcelona) and the proof of concept (Birmingham), in concurrence with the overall project scope. More precisely, this evaluation focuses on whether the platform and services developed are designed and implemented satisfying the requirements and needs of the citizens, developers, service providers, city managers and Mobility app users involved. This implies that our evaluation methodology needs to go further than mere usability studies in order to draw conclusions on which are the main determinants of the experience and acceptance of the European Cloud Marketplace for Intelligent Mobility (ECIM), what are the weaknesses of the applications used in the pilots and of the platform, where is a need for improvement and what are the best conditions for deployment.

The selection of the appropriate evaluation framework therefore depends on these goals in conjunction with the selection of appropriate evaluation criteria that in turn serve the aims: a qualitative and quantitative assessment of the development and usage of the solution designed within the ECIM project, providing refinement suggestions for the solutions in an iterative fashion; additionally, it aims at identifying key practices on how to successfully move it across borders.

ECIM will concentrate on achieving three goals to meet the overall objective for Cloud of Public Services:

1) Allow cities and businesses to easily migrate services to the cloud

2) Open cloud-based services to innovators for use as the basis for new services

3) Facilitate easy access and cross border adoption of cloud-based services across Europe

Chapter 2 and Chapter 3 outline the chosen evaluation framework and methodology derived therefore. Furthermore, in addition to the evaluation theories presented in the next section the Living Lab approach was selected as key to this purpose, as it has proven to be a valid framework for the operational interaction among key pillars of society including citizens and community, industries/business, public administrations, universities and research institutes, addressed to human-centered open innovation, particularly in the early stages of ideation and concept design of the product/service development process.

2.1 Theories of Evaluation

A number of theories have been developed in order to assess the reasons according to which users make decisions about adopting new services and technologies. These theories constitute the framework upon which evaluations of technology applications are based and in fact, the constructs of these theories are used as indicators/metrics of the evaluation.

This section presents some of these most important evaluation theories and their constructs developed over the years. The purpose is to provide an overview of the landscape of theories in order to examine which theory seems more appropriate to be used for the ECIM evaluation.

The Innovation Diffusion Theory (IDT) (Rogers 1995) explains the process that an intervention follows in order to move from the state of invention to widespread adoption. The theory classifies individuals according to their speed of uptake: innovators, early adopters, early majority, late majority and laggards.

IDT includes five significant innovation characteristics: relative advantage, compatibility, complexity, and trialability and observability. Relative advantage in this theory is defined as the degree to which an innovation is considered as being better than the idea it replaced. This construct is found to be one of the best predictors of the adoption of an innovation. Compatibility refers to the degree to which innovation is regarded as being consistent with the potential end-users' existing values, prior experiences, and needs. Complexity is the end-users' perceived level of difficulty in understanding innovations and their ease of

use. Trialability refers to the degree to which innovations can be tested on a limited basis. Observability is the degree to which the results of innovations can be visible by other people. These characteristics are used to explain end-user adoption of innovations and the decision-making process.

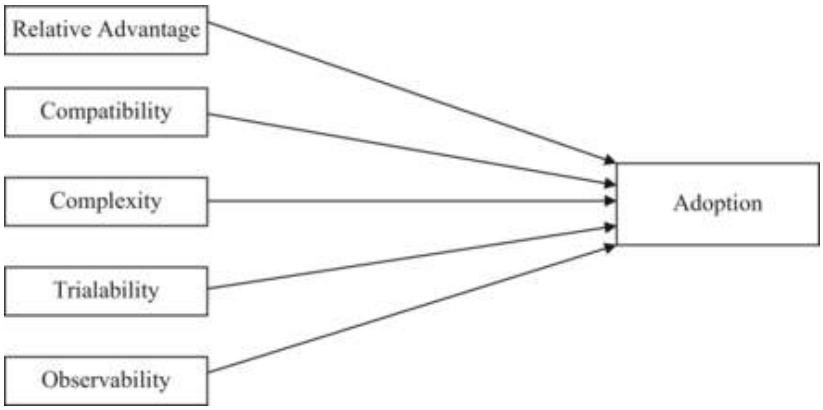

Figure 2: Innovation Diffusion Theory

Ajzen and Fishbein formulated in 1980 the Theory of Reasoned Action (TRA). This resulted from attitude research from the Expectancy Value Models. Ajzen and Fishbein formulated the TRA after trying to estimate the discrepancy between attitude and behavior. This TRA was related to voluntary behavior. Later on behavior appeared not to be 100% voluntary and under control, this resulted in the addition of perceived behavioral control. With this addition the theory was called the theory of planned behavior (TpB). The theory states that the determinants of individual behavior are subjective norms (individual's consideration about the opinion of people who are important to him/her towards the implementation of the behavior in question), attitudes toward behavior (feelings about implementing the behavior), and perceived behavioral control (ease or difficulty in implementing the behavior).

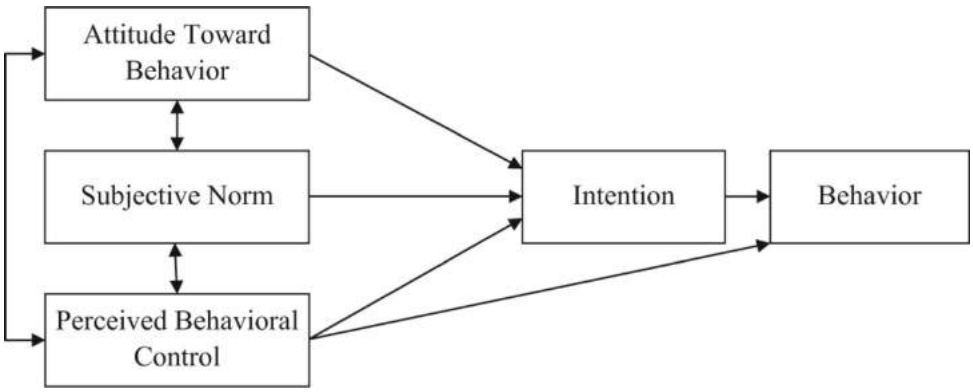

Figure 3: theory of planned behaviour (TpB)

The FITT framework (Ammenwerth et al. 2006.) is based on the idea that fit between individuals, task and technology is essential issue in IT implementation processes. According to FITT, adoption in a clinical environment depends on the fit between the attributes of the individual users (e.g. computer anxiety,

motivation to use computer), attributes of the technology (e.g. usability, functionality) and attributes of the clinical tasks and processes (e.g. organizational factors). These attributes interact with each other when a new IT application is implemented in clinical practice in health care. The model helps to analyze the socio-organizational-technical factors that influence IT adoption in a health care setting. The theory points out that the fit between attributes is more important than the individual attributes themselves.

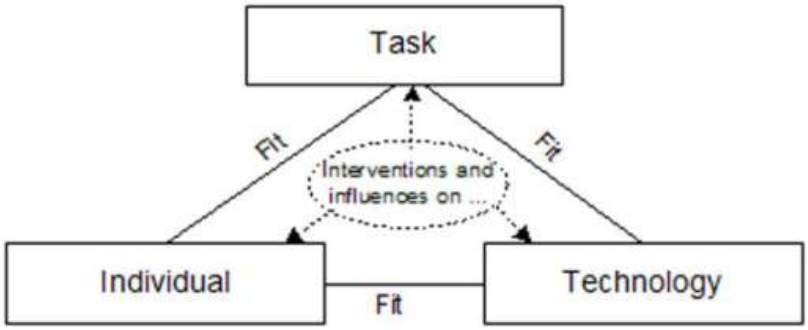

Figure 4: FITT framework

The Technology Acceptance Model (TAM) (Davis 1989, Davis et al. 1989) is the most frequently used theory. The Technology Acceptance Model builds on the attitude paradigm developed by Fishbein and Ajzen's (1975), which illustrates how to measure the components of attitudes related to behavior, distinguishes between beliefs and attitudes and explains the mechanism according to which external stimuli are connected to beliefs, attitudes and behavior. The Technology Acceptance Model builds also on the Theory of Reasoned Action (TRA). This theory states that the performance of an individual is influenced by his/her attitude and subjective norms concerning the behavior in question. Moreover, it states that the beliefs and the motivations of individuals interact with existing behavior (Ajzen and Fishbein 1980).

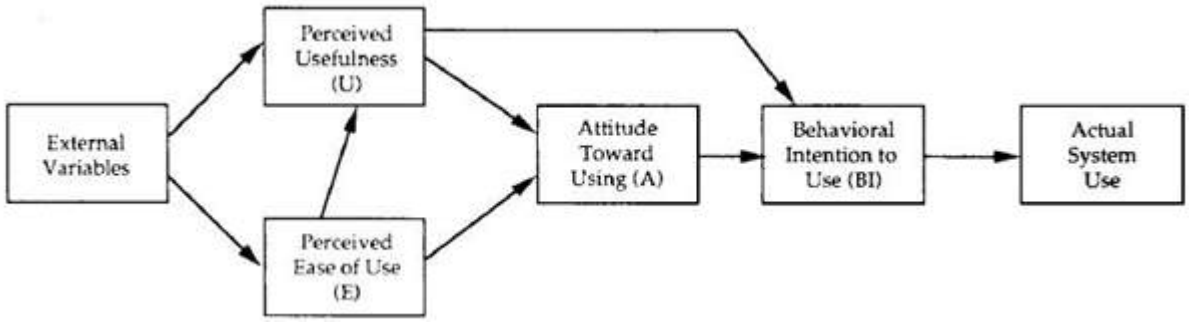

Figure 5: Technology Acceptance Model (TAM)

The Unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh and others in 2003. The UTAUT aims to explain user intentions to use an information system and subsequent usage behavior. The theory holds that four key constructs: 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) facilitating conditions; the first three being direct determinants of usage intention and behavior, and the fourth a direct determinant of use behavior. Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behavior. The theory was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information

systems usage behavior (theory of reasoned action, technology acceptance model, motivational model, theory of planned behavior, a combined theory of planned behavior/technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory).

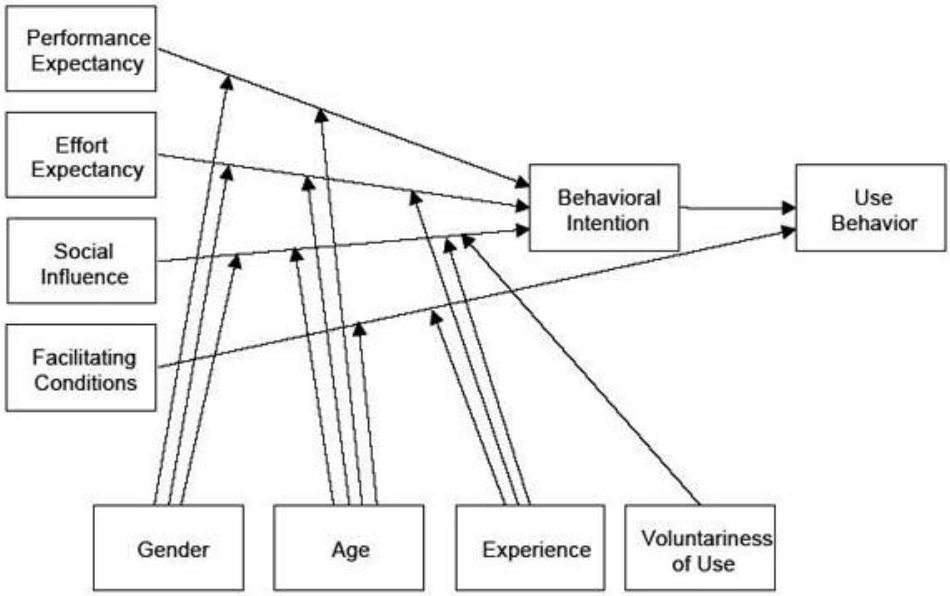

Figure 6: Unified theory of acceptance and use of technology (UTAUT)

Having presented a series of theories of evaluation, the evaluation theory that applies to be more relevant for the project and the activities undertaken is this of the Unified theory of acceptance and use of technology (UTAUT) presented above. The theory will be used as it considers

1) Performance expectancy, which we translate as the extent to which a user believes that using the system will help towards gains in performance (to be precise usefulness, relative advantage)
2) Effort expectancy or the degree of ease associated with the use of the system (i.e. ease of use, complexity)
3) Social influence or as explained in the construct definition of the theory the degree to which an individual perceives that important others believe he or she should use the new system.
4) Facilitating conditions; the degree to which the user believes that an organizational and technical infrastructure exists to support use of the system (i.e. compatibility, Openness, scalability).

In the same time we can use as control variables gender, age, experience, and voluntariness of use, which might moderate the impact of the four key constructs on usage intention and behavior.

Taking these characteristics into account means then that all aspects of a certain ICT development in the specific field can be analyzed and experimented within a Living Lab framework offering a more rounded understanding. Hence, usability and technology acceptance evaluations have been incorporated into the broader evaluation framework in addition to the Living Labs methodology used in this project and which is detailed in the next section.

2.2 Living Labs methodology

In the last three decades, much attention has been given to the identification of the conditions or factors that facilitate technology integration into a business context, thereby highlighting technology acceptance. The Technology Acceptance Model (TAM) is arguably the most popular in technology acceptance studies.[1] Over the years, researchers have used this framework to examine users' acceptance toward various technology applications such as the Graphic User Interface, and online consumer behavior. Evaluation of usability and technology acceptance is certainly needed in the evaluation of solutions like those proposed in this project, where design and interface will play an important role. The platform will have to go beyond mere ease-of-use, and yet will have to be strongly integrated with the underlying data algorithms to present the information in meaningful ways to users. Yet, usability studies often take a rather isolated approach on the matter, focusing mainly on issues of design and accessibility. When new services are implemented and assessed in terms of mere usability, evaluation then often does not go beyond issues of connection speed, image quality, etc.

This evaluation framework, therefore, seeks to extend the literature by deploying a Living Lab approach to study the factors affecting technology acceptance amongst various public and private, non-commercial and commercial stakeholders. The Living Lab approach is an integral part of the project setup and it is followed throughout the project.

Living Lab research starts where technology acceptance studies and usability studies tend to stop by taking into account the impact of the context of use in the evaluation of mediated practices. The Living Lab methodology is rooted into the social shaping of the technology paradigm (Pinch & Bijker, 1984), where technology is not seen as a force external to society impacting it, but rather as the outcome of a process of socialization where its meaning and impact is constructed through people's everyday use of it. Applying this paradigm to the evaluation of ICT means that assessing technology should take into account how different social groups, living in different social contexts, use and interpret technology differently based on their own experiences, problem and perceived solutions (Flichy, 2007; Van House, 2004).

This means that technology should be studied where, when and while it is used, as part of the social-technological set of interactions between human and machine, embedded in a given social context (Ratto, 2000). Asking users to reflect on future practices without them experiencing the context in which those practices will take place, will only lead them to express themselves in very general terms (Stahlbröst & Bergvall-Kareborn, 2008). Starting from this idea of actions being contextually situated (see Suchman's situated action, 1987) implies the necessity for technology to be evaluated on the concrete social and everyday surrounding of the users (Torben Nielsen, et al., 2008). A Living Lab offers an experimental setting that inserts innovation in daily situations in order to get an idea of the possible, societal impact of innovation (Pierson, et al., 2005).

Thus, a Living Lab is a user-centered, open-innovation ecosystem, often operating in a territorial context (e.g. city, agglomeration, region), integrating concurrent research and innovation processes within a public-private-people partnership. It is a Research and Innovation concept that promotes interdisciplinary co-creation, exploration, experimentation as well as evaluation, and it thus provides test beds for demonstration in a broad spectrum of areas. In particular, it is based on an iterative approach to innovation.

Lastly, the Living Lab approach is nowadays getting momentum in Europe, as shown by the creation and successive expansion of the 'European Network of Living Labs' (ENOLL – www.openlivinglabs.eu) -a partner in this project- and a body of publications regarding Living Lab innovation projects (for recent overviews, see, among others: McPhee et al, 2012; McPhee et al, 2013).

Concretely, ECIM will use the Living Lab approach in two ways:

[1] TAM is based on the Theory of Reasoned Action (Fishbein and Ajzen, 1975) and the Theory of Planned Behavior (Ajzen, 1991), positing that beliefs and attitudes are related to individuals' intentions to perform.

a. In the testing a range of scenario's in the pilot cities that combine multiple services with local data sets in order to deliver enhanced functionality of current existing services in a relatively straight forward and cost effective manner

b. In an open innovation and co-creation setting that strives to engage citizens and SME's in developing new public services using Open API's on the ECIM platform.

2.3 ECIM service analysis and use Cases

The objective of ECIM is to develop a state-of-the-art solution that combines the strong cloud capabilities of a cloud-based platform, with new functionalities that facilitate public sector migration to cloud-based solutions and allows public and private sector actors to develop and offer innovative web services.

In this process, ECIM will use mobility and parking as a validation scenario because these services can easily be migrated to a cloud infrastructure and are consistently cited as high priorities for citizens and public service providers. In many European cities commercial off-street and public sector on-street parking solutions are available and easy to locate online. However, these offerings function in near total isolation from each other let alone with related areas, such as public transport alternatives like city bike stations. Migrating these services to the cloud will not only save backoffice time and money, but it will also help to unleash innovation by making them available as open public services that citizens and SMEs can use as a basis for innovation. To cite just one example, merging real-time on-street and off-street parking availability with real-time information on public sector transport options would enable cities to advance 'softer' urban mobility priorities, such as encouraging more environmentally friendly modes of transport.

In the process of defining a solution to be offered by ECIM and under the activities of WP2, the project initiated a User Requirement Analysis and Scenario Creation. This included both a service analysis and also a users' requirement selection and was user-driven as it was based on a series of consultation meetings organized in the three pilot cities, Brussels, Issy-les-Moulineaux and Barcelona. In these consultation meetings relevant stakeholders – city administrations, public and private service providers and mobility interest groups or associations – were invited and asked to express their vision on how city mobility services are currently developed and delivered, what are the current and future challenges in this field, which key features will be needed in a service delivery platform and how a platform such as ECIM could be integrated into existing processes. This way, expectations towards ECIM and potential outcomes were identified as well as initial user requirements were defined. The following subsection provides shortly the conclusions of the stakeholder consultations in the three pilot cities.

2.3.1 Stakeholder consultations and User task analysis and documentation

All three stakeholder consultations provided interesting insights as each pilot city has a different focus. Nevertheless, as briefly illustrated in the table below, all three pilots share also common visions and have identified opportunities and concerns regarding the prospects and challenges of city mobility service development.

	Common vision, opportunities and concerns in pilot cities
Vision	Smart mobility is taking the whole mobility ecosystem into account in order to move in the city more efficiently and environmental friendly Smart mobility is not only about technology, but also about new ways of managing mobility, as well as policies, legislation and fiscal measures Efficient solutions in planning, guiding and payment, personalized information, real-time information, open data, multimodal guidance and involvement of all actors are key characteristics in smart mobility service creation
State of the art and evaluation	New initiatives are emerging in delivering mobility services, but they are still in initial phase. Opportunities in order to tackle city mobility challenges by means of ICT exist due to an increased social and political awareness (on local, national and European level). Furthermore, these prospects arise from economic opportunity and desire to have better city services A variety of applications for end-users exist and can be used when going around in the city. This large number of separate applications is due to a dominant tendency of service providers to work in isolation due to the lack of awareness of the benefit of collaboration. Another factor that might be influencing this tendency is the difficulty in overcoming barriers in trust and openness Service providers and city administration experience a lack of efficient service and data discovery. Lack of combination of different services in the light of multimodality principle. No easy access and fragmentation of open data; service providers, also public ones, could provide real time data, but many of them are reluctant to open and share them.

Table 1: Common vision, opportunities and concerns in pilot cities regarding mobility

Based on this common vision, opportunities and concerns in the pilot cities and with the intention of implementing the smart mobility vision, the ECIM platform was created to answer the clear needs expressed by the stakeholders.

These needs are documented within the framework of ECIM using a user task analysis method, which concerns the detailed monitoring and documentation of the typical tasks of the end-user when using similar existing city mobility services.

In particular, the user task analysis aims to understand how users, in their mobility behavior, reach a certain goal (e.g. paying for a on street parking spot, finding the way to a metro station), which routes they have to follow to achieve these goals (from installing an application to registering and executing different tasks), which are the characteristics of these users (what is their mobility profile) and how the physical environment (being on the move) influences to users in order to design and allocate tasks appropriately within the system. In particular, attention is given to detecting problems and difficulties with a purpose to prevent them and to accurately specify the user interface.

To operationalize these objectives and to have a common language of analysis between the three pilots, an analysis of similar existing mobility services in each of the three pilot cities was undertaken. Based on this analysis the following common opportunities and user requirements for the ECIM project were derived.

Requirements	Description	Priority (High, medium, low)
Platform	Users can find the application on the major platforms	Priority
Login	User logs-in via existing, known method or social media account	Medium
Registration	Users register to service in order to finalize a mobility transaction (parking payment, parking reservation…)	High
Multimodality options	Having access to information about different transport options when planning journey	High
Points of interest	Discover interesting POI in the city by address, name/title or location	High
Multiple parking services display	Displaying on a map and in list parking places from different providers	High
Parking status notifications	User receives messages about start and expiration of his parking session	Medium
Filter and sort parking options	User is able to filter and sort the list of available parking options by criteria (price, availability)	High
Guidance/navigation to the selected location	Users will be guided to the location of the parking or the POI	High
Instant Mobile payment	Users can pay via mobile app on the spot	High
Notifications in change of changing traffic conditions	Users get personalized or general updates about sudden events disturbing mobility	High
Feedback on mobility service status	Users can send information about traffic conditions to provider	High
History/favorites	User is able to add POI or journeys to a list of favorites in order to personalize his user experience	Low

Table 2: Overview of common opportunities for ECIM

2.4 Measures for evaluating user experience and acceptance

Having presented in the section above the common vision and common opportunities of ECIM, as identified during the stakeholder workshops and that the project will try to implement, it is time to present the measures that will be used to evaluate the solution, user experience and user acceptance.

As outlined in section 2.2, the Living Lab approach allows for an integrated evaluation of the solution and is used in ECIM in two ways:

a. In testing a range of scenarios in the pilot cities that combine multiple services with local data sets in order to deliver enhanced functionality of current existing services in a relatively straight-forward and cost-effective manner

b. In an open innovation and co-creation setting that strives to engage citizens and SME's in developing new public services using Open API's on the ECIM platform.

The ECIM platform and mobility apps will be tested in three pilot cities and validated in a proof of concept thereby highlighting the overall project objectives informed by key performance indicators (KPI) that were developed for this project (see Annex 2). Whereas the project performance will be quantitatively measured against its KPIs – e.g. (expected) number of decision makers engaged in years 1 to 3; Number of Platform Components successfully integrated and tested, several KPIs will be both quantitatively but more importantly qualitatively measured in the execution of the pilots.

In order to evaluate the user experience and user acceptance the starting point will be using the KPIs and user requirements as provided in the Deliverable D2.1 "Service analysis, including stakeholder workshops results" ECIM Consortium (2014), (and available here in Annex 2). Based on our literature review, the following factors could be identified as measures for evaluating and determining user experience and user acceptance, supported by several of the 18 KPIs developed for this project.

The reasoning behind this approach is that, on one hand, in the Brussels pre-pilot an evaluation approach has been already tested and applied and, in correspondence to the iterative nature of the user testing, the lessons learnt are one of the fundamentals of this methodology. A further aspect to be acknowledged is that some predefined indicators have been already developed and exist in the form of project KPIs and as such should be also integrated in our methodology. A list of indicators is presented in the table below.

Measures	Description	KPI's (as Numbered in Annex 2)
User profile **ECIM mobile app users-citizens**	Demographics such as age, gender ICT-skills and usage Mobility pattern	2, 3, 6
Ease of use	Degree to which a person believes that using a particular system would be free from effort (e.g. complexity, navigational efficiency, …)	2, 3, 5, 6

Ease of access	Degree to which a person can access the system anytime, anywhere	2, 3, 5, 6
Content quality	Degree to which a person believes that his/her subjective judgment of quality and usefulness of information in certain information use settings aligns with his/her own expectation of information or in regard to other available information (context/process-orientation towards e.g. trust, reliability, performance, relevance, or actuality, …)	2, 3, 5, 6
Usefulness	Degree to which a person believes that using a particular system would enhance his or her performance	2, 3, 5, 6
Usage feelings/attitude	Degree to which the offered system causes a positive or negative attitude to its use	2, 3, 5, 6
Intention to further use	Degree to which the system does not undermine the intention of its use	2, 3, 5, 6
Performance, security, Openness, scalability	These indicators refer to the technical aspects of the system and are described in Chapter 5 of the deliverable	7, 11
Total satisfaction	Degree to which the users are satisfied by the system. Combined score	14

Table 3: Indicators for evaluating user experience and acceptance

The user profile should be understood not as an indicator itself, but as the main categories upon which the different indicators could be broken down in the evaluation reports. The reasoning behind this is that not all users have the same needs and as such, the questions will not be the same for all user profiles and the results should be analyzed taking into account the specific user profile. An example for this could be that specific questions on openness and scalability will not be asked to citizens but for most to the ones that identify themselves as service providers/developers. The following chapter describes how these theoretical methods are operationalized in the evaluation methodology, and how these measures are tested by the pilot cities.

3 ECIM's Evaluation Methodology

This Chapter outlines the evaluation methodology. ECIM's evaluation is geared towards performing a qualitative and quantitative assessment of the development and usage of the services and of the platform designed for this project, providing refinement suggestions for the solutions in an iterative fashion.

A further aim is to create an assessment tool for measuring the success of the pilots and to provide further technical refinement suggestions for using the service. The methodology and the evaluation instruments suggested in this deliverable will be used/are already used in extent in the pilots and the proof of concept and also will be applied to the production of the Final Evaluation Report and Proof of Concept and the Final white paper. Thus, the key results of this process will be presented in D5.2-5.4 (Periodical Validation Report Brussels, Periodical Validation Report Brussels, Issy-les-Moulineaux, Barcelona and Final Pilot Review Report) and D6.2 and D6.3 (Final Evaluation Report and Proof of Concept and Final white paper respectively).

This section contains the core output of the deliverable, as it illustrates the criteria and evaluation questions, the overview of evaluation instruments, and the Indicators and Sources. Due to the nature of the evaluation and the perquisite of measuring the success of the pilots, a functional benchmarking will be conducted, that is, we will not compare the pilots to direct competitors, but we will rather compare common elements of a particular set of practices between the pilots (Ziaie, Wollersheim & Kremar, 2011). More precisely, the focus will be on how the different pilots evaluate relevance, efficiency and effectiveness of ECIM as also on how they evaluate the characteristics described by the Unified theory of acceptance and use of technology model (Ease of use, Ease of access, Content quality, Usefulness, Usage feelings and attitude), as also the Intention to further use the mobility app and platform. Additionally, in a more technical context, performance, security, openness, and scalability of the platform will be evaluated. Thus, although the scenarios are different, we will be able to understand the use behavior and the outcomes will be used to provide feedback to the user requirements analysis and scenario creation in order to ensure that the delivered services continuously meet user needs.

3.1 Criteria and Evaluation Questions

In this section we first illustrate the criteria and the derived general evaluation questions relative to the impact of the project and we proceed with an illustration of the technology acceptance model.

In the context of project impact, relevance deals with the extent to which the project is designed to address genuine needs and problems. Efficiency refers to the capacity to attract the right quantity and profile of participants and to stimulate uptake of the platform in a cost-efficient manner. Finally, effectiveness refers to the capacity to reach the objectives of the project, delivering high value and benefits to users

In the following table (Table 4), the criteria and the general evaluation questions related to the project impact are presented. These criteria and the questions are on high-level impact and the project will need to answer them with the collected and analyzed outcomes and results of both the pilot and proof of concept evaluation as also of the technical evaluation.

Criteria	General Evaluation Questions
Relevance	Does ECIM satisfy the needs of users and potential users?
Efficiency	Is the participation obtained adequate in terms of quantity and profile of users? Did users contribute actively by co-creating a number of new services and uploading them to the cloud
Effectiveness	Which kinds of benefits have users gained? Did the project achieve the objectives it has set?

Table 4: Criteria and General Evaluation Questions: the project Impact Approach

On the other hand, the general evaluation questions stemming from the criteria related to the technology acceptance model are self-explanatory and are provided in the Table below.

Criteria	General Evaluation Questions
Attitude/Usage feelings	What is the attitude of users towards the ECIM platform and the mobility app?
Perceived usefulness	What it the perceived usefulness of the ECIM platform?
Perceived ease of use/ease of access	What is the perceived ease of use of the platform? Is it easy to access the system anytime, anywhere?
Behavioral intention	Do the users foresee to use the platform in the future?

Table 5: Criteria and General Evaluation Questions: Unified Theory of Acceptance and Use of Technology Research Model

Having presented the criteria and some general evaluation questions based on the selected evaluation theory presented in Chapter 2, it is time to present the instruments that will be used in order to evaluate the outcomes.

3.2 Overview of Evaluation Instruments

The next Sections present an overview of the evaluation instruments and analysis methods, and the planning of these instruments and analysis methods within the broader strategy and time framework.

3.2.1 Questionnaires/Survey

In order to be able to have a reliable sample upon which the analysis will be based a crucial element will be our sampling exercise which should guarantee that all user categories targeted by the project as future users are covered. Thus, one of the demographic questions should be the profile of the user (developer, service provider, consumer of services, city manager, etc).

The questionnaires will be drafted upon the identified determinant features using a 5-point Likert-scale and will be used so as to understand participants' usability experience and technology acceptance. These elements can be defined as total satisfaction, real usage and the intention to use again.

The questionnaires will be distributed to targeted user groups and published on the ECIM website and the Mobility application. The use of questionnaires/surveys, compared to other evaluation instruments, has the advantage of scale, price, cross-sectional and quick turn-around, and the data can be directly captured and stored using specific software. There are, however, some important drawbacks in employing questionnaires, such as low response rates and anonymity, which may become troubling sources of measurement errors. Another issue is non-response error that may be caused by factors such as the interface language (we will use English or also local languages), or other technical problems of the survey software. In case of question localization a problem that might appear is that the semantics interpreted to the same question may be different in the translation[2].

The questionnaire will allow the collection of data and their descriptive analysis so as to prepare descriptive statistics (averages, standard deviations). These will be calculated from all determinant and acceptance factors in order evaluate the quality and user acceptance of the project as a whole. The sampling of users explained earlier will allow the analysis of descriptive statistics according to the respondents' category.

3.2.2 Focus group

The focus group methodology is a form of group interview supported by a trained facilitator that capitalizes on communication between participants, allowing them to share their impressions of the integrated service offered. It should start with a clear presentation of what ECIM is about so that participants really understand the ECIM project and what the main aims are. In addition to the facilitator, another researcher participates in the focus group with the specific aim of recording not only the content of the discussion, but also attitudes and interaction modalities of the group's members. The method is used for a qualitative evaluation approach to reveal opinions, needs and interests of the different stakeholders, though it may suffer from group bias. In the course of the project, focus groups are performed with all target groups of the ECIM solutions: mobility app users, consumers of services on the ECIM platform, developers, service providers and city managers.

[2] Nonetheless, this potential translation risk has been identified and the risk of potential translation errors will be minimized

3.2.3 Participant observation

A limited number of ECIM-service and platform testers will be accompanied by a member of the test user team in each pilot city in order to record (by means of field notes, photography and other techniques) interactions with the application. Particularly participant observation will allow us to investigate the context of use of the application and the user experience on the location as it provides a context for understanding data collected through interviews. The benefit of this method is that it allows testing in actual locations that are believed to have some relevance to the research questions.

3.2.4 Interviews

There are many different types of interview approaches and techniques, however, generally speaking, all interviews fall into one of the three categories: structured, semi-structured, and depth/unstructured interviews.

- Structured interviews are most typically used in quantitative investigations, including survey research. In structured interviews, the interviewer presents the interviewee with a standardized set of questions, often in questionnaire form. These questions usually have pre-set answers from which the interviewee selects, rather than 'open-ended' questions. Each individual interview features the same set of questions, asked in a fixed order. All questions included in the research design are asked in each interview session. Structured interview questions are the most common type used in surveying interviewing.
- Semi-structured interviews centre on a mixed framework of general themes and pre-established questions, which can be adapted in the context of individual sessions. The interviewers are thus free to leave certain questions out, mix the order of questions, or ask certain standard questions in different ways depending on context. Semi-structured interviews also rely on a combination of both open and closed questions. Nonetheless since for ECIM we want to be able to compare results among pilots wherever possible this type of interview is not preferable.
- Unstructured interviews – also known as 'informal' or 'conversational' interviews – are wholly qualitative, and include only topic areas and themes rather than standard questions. Unstructured interviews take the form of natural conversation between two or more people, and allow the interviewer to pursue follow-up questions or new lines of discussion as they see fit. Closed questions are avoided, and the interviewee is often asked to identify the information they feel is most important for the discussion. This type of interview might be useful to identify potential aspects not covered by the other methods and also might be useful in order to identify the narratives of the usage and the lessons learnt.

Interviews will allow to learn about possible impacts, efficiency, barriers and issues not captured in the survey. Just like the focus groups, the interview method allows us to gain a deeper understanding of meaningful themes, practices, and relationships from the interviewees' own perspectives through a collection of qualitative user-related information (e.g. citizen developer, city admin, SME). What is important in this occasion is that the interviews can be also used as a tool that will guarantee that the various profiles (citizen, developer, city admin, SME) are sufficiently covered.

3.2.5 Logs in the system/web analytics

Logging users' interactions with the application will allow us to identify in more detail the concrete interaction of end users with the service (hits, time spent on application), as well as identifying main routes they follow to gather information and execute a task. Furthermore, a feedback form should be implemented in the Mobility app used in pilot tests and it is important that the logging is gathered and presented in a unifying matter. The second notice is that one must pay attention not to burden the system

with too many logging events, which would increase the processing time and reduce the overall system performance. More details on the aspects of technical evaluation will be provided in Chapter 5.

Each of the methods presented above encompasses a unique technique, geared to elicit a particular kind of data to address a certain aspect of the pilots and of the platform usage. All these methods combined will provide a holistic picture for the acceptance and usage of the ECIM solution and each different technique will be used to enhance validity of the findings. The process will be both deductive and inductive, starting with a more micro qualitative analysis and moving to a more macro quantitative analysis and vice versa. Quantitative data will be mainly used to reveal relevant relationships and strength of user experiences. Qualitative data will be collected to understand the rationale and evaluation underlying those experiences associated with acceptance.

The results will not only help to test the quality of the services integrated on the platform from the viewpoint of easy navigation and handling, but will also come up with the most important affective impressions of various stakeholders and their perceived benefits (and impacts, from a more qualitative stance during the evaluation phase). The results will allow us to draw conclusions regarding the extent of acceptance, as it investigates Effort Expectancy (degree of ease associated with the use of the system) and Performance Expectancy (the degree to which an individual believes that using the system will help him or her to attain gains in performance), as main determinants together with social influence, for behavioral intention to use new technology (Venkatesh et all, 2003).

3.3 Indicators and Sources

In this section we present the questions/indicators and the source of data that are going to be used. Fundamentally, in the evaluation of the European Cloud Marketplace for Intelligent Mobility project a set of various instruments will be adopted. Broadly speaking, different sources are typically associated to different criteria, as illustrated in the table below. The survey, interviews, participant observation and focus groups of users involved in the pilots are expected to be the main source, while platform data are mostly to be used to measure the technical requirements of both functional and non-functional nature.

This section starts by presenting the questions/indicators related to the project impact measurement approach, and then it presents the questions/indicators stemming from the technology acceptance model.

Criteria	Primary Source Used
Relevance	Survey of users, Interviews, Participant observation, Focus group
Efficiency	Technical evaluation, Survey of users
Effectiveness	Survey of users, Interviews, Participant observation, Focus group

Table 6: Schematic overview of primary sources per criteria

Continuing, the table below presents the Key performance indicators and links them to the primary source that will be used for the evaluation project impact measurement approach, and then it presents the specific questions/indicators stemming from the technology acceptance model. The technical evaluation aspects will be described in more detail in Chapter 5 of this deliverable.

Indic. No./ WP	Corresponding Project Objective	Indicator	Method of Measurement	Primary Source Used
In1 WP2	1.1 Use existing research, previous project outcomes and end user feedback to understand the main challenges Cities face in migrating their services to the cloud	End User Needs Capture	Number of end users participating in the process of ECIM solution design (survey, workshops etc.)	Survey of users, Interviews, Focus group
In2 WP2	1.1 Use existing research, previous project outcomes and end user feedback to understand the main challenges Cities face in migrating their services to the cloud	Current Situation Analysis Report	1) Analysis of key research in the Cloud Computing & Open Innovation/ Service Co-Creation 2) Level of liaison with previous CIP projects 3) Survey of key actors 4) Identification of key challenges 5) Identification of key barriers 6) Identification of best practice	Survey of users, Interviews
In3 WP2	1.2 Generate political backing for cloud-based public services	Decision makers	Number of decision makers actively providing feedback to ECIM through interviews or expressing interest in adopting the solution	Interviews, Focus group
In4 WP7	1.2 Generate political backing for cloud-based public services	New Cities	Number of new cities interested in implementing the ECIM solution	Survey of users, Interviews, Participant observation, Focus group
In5 WP2 WP5	1.3 Create a simple approach to guide cities and businesses through the process of migrating services to the cloud	Public sector feedback	Number of city administrators and CIOs involved in the process of ECIM solution design and adaptation	Survey of users, Interviews, Participant observation, Focus group
In6 WP4	1.4 Successfully combine new and existing components into an innovative cloud architecture for a pan-European cloud of public services	ECIM Platform	Number of Platform Components successfully integrated and tested	Technical evaluation
In7 WP4	1.5 Outline compliance standards for basic interoperability which	ECIM roadmap	Number of pilot services in compliance with ECIM interoperability	Technical evaluation

Indic. No./ WP	Corresponding Project Objective	Indicator	Method of Measurement	Primary Source Used
	all services can follow		standards (updated from EPIC Roadmap)	
In8 **WP2, 3, 4**	2.1 Understand the needs of SMEs and citizens in terms of stimulating innovation to enable them to co-create new services	Related projects	Number of other projects regularly exchanging insights with ECIM during solution design, adaptation and deployment	Survey of users, Interviews, Participant observation, Focus group, Technical evaluation
In9 **WP5**	2.2 Utilize Living Lab innovation methodologies to create new cloud-based Open Public Services and in so doing help involve the widest possible range of citizens/SME's in the service co-creation process	New services	Number of new services co-created by Citizens & SMEs and uploaded to the cloud	Survey of users, Interviews, Participant observation, Focus group, Technical evaluation
In10 **WP5**	2.2 Utilize Living Lab innovation methodologies to create new cloud-based Open Public Services and in so doing help involve the widest possible range of citizens/SME's in the service co-creation process	Living Labs	Number of users testing the applications	Survey of users, Interviews, Participant observation, Focus group
In11 **WP5**	2.3 Use existing ECIM solution mobility services to promote co-creation of new Open Public Services to cities across Europe	Cross-border validation of services	Number of services interoperable across borders (tested in multiple cities)	Technical evaluation
In12 **WP5**	2.3 Use existing ECIM solution mobility services to promote co-creation of new Open Public Services to cities across Europe	ECIM platform use by pilots	Number of pilot cities using the ECIM platform	Survey of users, Interviews, Participant observation, Focus group
In13 **WP3**	3.1 Ensure Cities can easily adopt cloud-based services from the ECIM service catalogue	Platform functionality	Positive response rate of usability tests of platform functionality	Technical evaluation

Indic. No./ WP	Corresponding Project Objective	Indicator	Method of Measurement	Primary Source Used
In14 **WP5**	3.2 Evaluate the pilots success and identify any future changes that are needed	Pilot cities User Satisfaction	User Satisfaction of the pilot cities with ECIM solution	Survey of users, Interviews, Participant observation, Focus group
In15 **WP7**	3.3 Create new Public/private partnership business models for cloud service provision between cities, businesses and living labs	Public Private Partnership (PPP) Business model	Production of new PPP business model for cloud-based services and its implementation in at least one pilot city	
In16 **WP7**	3.3 Create new Public/private partnership business models for cloud service provision between cities, businesses and living labs	SMEs engagement	Number of SMEs engaged in developing services through PPPs	
In17 **WP7**	3.4 Create a viable exploitation offering that will provide balance the value - creating potential of Open Public Services with the economic strength of a private commercial strategy	Business Case	Validation of a business case in all pilots	
In18 **WP7**	3.4 Create a viable exploitation offering that will provide balance the value - creating potential of Open Public Services with the economic strength of a private commercial strategy	ECIM take-up by new cities	Number of cities other than pilots adopting ECIM exploitation offering	

Table 7: Schematic overview of primary sources used to evaluate the KPIs

Evaluation questions to be asked to the pilot cities according to the Unified theory of acceptance and use of technology are provided in summary in tables 8 to 12. The questions presented below have been implemented in the user survey undertaken during the Brussels pre-pilot phase and have been developed in collaboration with WP5. In fact, WP6 and WP5 partners worked together to set-up a first evaluation plan for the Brussels pre-pilot. This was designed in line with the general framework that is underpinning the pilot evaluation methodology in D6.1. More details on the concrete pilot activities are provided in the Chapter 4, which focuses on the Pilot Scenarios. A more extended sample of questions from which the ones presented in the tables 8-12 have been selected, is provided in Annex 4.

Demographic Questions	Scale
What is your gender?	Male/Female/Prefer not to say
In which year were you born?	List of Years
What is your nationality? If you prefer not to say, please leave the field open.	Open field
What is your current profession? If you prefer not to say, please leave the field open	Open field

Table 8: Demographic questions used during the Brussels pre-pilot

ICT and mobility profile Questions	Scale
How old is the smartphone/tablet that you use most regularly. If you prefer not to say, please leave the field open.	Open Field
How would you consider your ICT-skills, in particular your skills in handling mobile applications?	• I find it easy to work with mobile applications • I am able with most of the mobile applications, but some applications I don't use • I find it difficult to work with mobile applications • Prefer not to say
How do you consider your ICT-knowledge, in particular your knowledge about mobile applications?	• I can work easily with mobile and internet applications, but I have no knowledge about their technical background and working. • I can work easily with mobile and internet applications and I have basic knowledge about their technical background and working. • I develop simple mobile and internet applications with free online building software (Wordpress, Wix, ...). • I develop ICT-tools myself with the aid of specialized software. • I prefer not to say.

What is the operating system of your mobile phone?	• iOS • Android • Windows • I prefer not to say.

Table 9: ICT and mobility profile questions used during the Brussels pre-pilot

Questions about knowledge of mobile applications currently present in Brussels concerning mobility (public transport, parking, bike and car sharing, traffic information and planning).	Scale
Which applications regarding mobility and parking do you use already?	Public Transport (Open Field) Parking finding (Open Field) Parking Payment (Open Field) Bike or car sharing (Open Field) Navigation (Open Field)

Table 10: Knowledge of mobile applications currently present in Brussels concerning mobility (public transport, parking, bike and car sharing, traffic information and planning)

Questions about current parking behavior	Scale
I drive and park in a city mainly for:	• Professional reasons. • Personal reasons. • Both professional as personal reasons. • Prefer not to say.
Generally speaking, when I drive to the city centre, I need parking places that are:	• More or less situated in the same neighborhood. • In different but neighboring neighborhoods (such as for example: the southern region of a city). • In different neighborhoods distributed over the city (both southern, western, eastern and northern part of the city).
Do you live in the city?	• Yes • No • I prefer not to say.
If you live in a city, do you mostly use for your journeys within the city borders:	• the car • public transport • I prefer not to say.
If you do not live in the city, but you go there with your car, what is your first thought:	• I drive with my car to the location where I need to be and search for a parking spot there. • I try to park my car at places at the periphery of the city and try to find out the best public transport options to continue the journey to my destination.

	• I prefer not to say.
Did you use the application actively during the test phase?	• Yes • No • Not answer • Other
Why didn't you use the application?	• I had no time • The test instructions were not clear to me • I didn't feel motivated to test • The application was not attractive and too complex
Did you find the application easy to use? Please indicate your opinion on a scale from 1 to 5	Slider (1=very uneasy to use, 5=extremely easy to use)
What are your reasons for giving the score you provided for ease of use?	Open Field
Did you think that the application was accessible? Please indicate your opinion on a scale from 1 to 5	Slider (1= not accessible at all; 5= very accessible)
Can you give us the reasons why you gave this score?	Open Field
Do you think the application is useful for your parking purposes? Please indicate your opinion on a scale from 1 to 5	Slider (1=not useful at all; 5 = very useful)
Can you tell us why you gave this score?	Open Field
The quality of the provided information	Slider (1; 5)
Can you tell us why you gave this score?	Open Field

Table 11: Questions about current parking behavior. Ease of use, accessibility, usefulness of application, quality of the provided information

Statements related to possible user attitudes and intentions with respect to the ECIM application.	Scale
The use of this application will make parking for me much easier	• Strongly Agree • Agree • Neutral • Disagree • Strongly Disagree • No Opinion • I prefer not to say.
I liked using this application	• Strongly Agree • Agree • Neutral • Disagree • Strongly Disagree • No Opinion • I prefer not to say.

If possible, I would certainly consider re-using this application	• Strongly Agree • Agree • Neutral • Disagree • Strongly Disagree • No Opinion • I prefer not to say.
I will recommend this application to friends and other persons I know	• Strongly Agree • Agree • Neutral • Disagree • Strongly Disagree • No Opinion • I prefer not to say.
It is good that different providers are present on one platform	• Strongly Agree • Agree • Neutral • Disagree • Strongly Disagree • No Opinion • I prefer not to say.
It is necessary that other services are provided on the application	• Strongly Agree • Agree • Neutral • Disagree • Strongly Disagree • No Opinion • I prefer not to say.
Can you tell us what you think are the weakest points of the application?	• weak point 1 • weak point 2 • weak point 3 • weak point 4 • weak point 5
What are, according to you, the strongest points of the current application?	• strong point 1 • strong point 2 • strong point 3 • strong point 4 • strong point 5
Can you tell us which functionalities or information you miss in the application and which you consider as essential to include?	• suggestion 1 • suggestion 2 • suggestion 3 • suggestion 4 • suggestion 5

Table 12: Statements related to possible user attitudes and intentions with respect to the ECIM application.

The next Chapter explains in detail the Pilot Scenarios and timeline focusing on the already undertaken pre-pilot of Brussels and presenting the lessons learnt and also presents the pilot scenarios of Issy-les-Moulineaux and of Barcelona and the Pilot Phases.

4 Pilot Scenarios and timeline

4.1.1 Brussels: Park, Pay & Go

The Brussels pilot will use a wide range of datasets about parking (on-street and off-street locations, price and availability), public transport (location of stops, schedule), bike and car sharing and points of interests and will combine these, if possible, with traffic congestion level data (real traffic data, sensor data), traffic data and arrangements (real traffic data, raw sensor data, road works…) and maps about controlled city centre circulating ring information, stations data, route data and route diagrams, and available public urban transport services.

The main goal of the application is (1) to allow users to find an off-street or an on-street parking place in Brussels Region, near to a point of interest such as a shopping mall, a hospital or cultural venue, (2) to start, manage, end and pay the parking session via the mobile application, and (3) to check public transport options to continue the journey in Brussels from, or towards the parking spot.

1. Find and drive to the parking place

The user will first use the application to search for a Point of Interest and discover available parking places nearby, view them on a map or a list, and then will drive to the location of the selected parking spot.

2. Start, end and pay the parking session

2.1 Start the session

If the user selects an on-street parking place, he or she will have to provide information such as license plate and the zone code displayed on the parking meter. After confirmation, the parking session starts. In the case of off-street parking spot, the user will have to approach the parking gate and ask the application to open the parking gate. The application will display a parking code and the user has to check if it matches with a code displayed on the gate. If the code matches, the user will confirm, the gate will open and the parking session will start.

2.2. Manage the parking session

During the time of the parking session the user has the ability to check through the application the status of an active parking session.

2.3. End the parking session

In order to leave the parking, the user will use the application to select his active parking session and confirm that he wants to stop the session. After receiving a message announcing a successful termination of the parking session and showing information about the total cost, the user can drive away from the on-street parking or, in the case of an off-street parking, the application will perform the necessary actions to open the gate in order to allow the user to leave the place.

3. Use public transport to go from parking spot to point of interest or vice versa

In order to go from the parking place to the point of interest or to return to the parking place after the visit of the Point of Interest, the user can use the application to check public transport options.

4.1.2 Issy-les-Moulineaux/Paris region: Buy Parking Time

The Issy-les-Moulineaux pilot will use various datasets about parking (on-street and off-street locations, prices and availability if possible, car services (repair garages, car wash, gas stations), bike sharing including real time information, public transport (location of stops, planned times for RER, subway, bus, tram) and points of interests of the city. Combining these datasets with others such as traffic congestion level data, traffic data and maps about route data and available public urban transport services, the

objective of the Issy-les-Moulineaux pilot is to offer an application to the citizens and visitors that facilitates mobility and allows for multi-modal travels.

The main goal of the application is (1) to allow users to find an off-street or on-street parking place in the city of Issy-les-Moulineaux near to a point of interest such as a building, a stop of public transport or a cultural facility, (2) to start, manage, end and pay through the mobile application a parking session, and (3) to check public transport options to continue their journey in Issy-les-Moulineaux or Paris Region and to search car services.

1. Find a parking place

Before departure the user will start the application on his mobile to search a Point of Interest and discover available nearby on-street and off-street parking spots on the map or by browsing a list and then will drive to the location of the selected parking spot.

2. Buy parking time

In the case of an on-street parking, the user will have to check on the application the Zone Code of the nearest park meter and to enter the duration of his parking. During the time of the parking session, the user has the ability to check the elapsed and remaining time of the parking session and extend it through the application.

In the case of off-street parking, the user will have to approach the parking gate and launch the application if this hasn't been done yet. Then, he asks the application to open the parking gate. The application will display the parking code and the user has to check if this matches with the code on the gate. If the code matches, the user can confirm the start. The gate afterwards opens and the session starts. During the time of the parking session, the user has the ability to check the elapsed time and the cost through the application.

At an on-street parking place, the parking session being prepaid, it automatically ends when the bought time is over. At an off-street parking place, the user must stop the parking session and the application will display a message of successful Parking session ending and the total cost. The application will also perform the necessary actions to open the exit parking gate.

3. Continue the journey

Coming from the suburbs to go to Paris, it can be useful to park in Issy-les-Moulineaux and pursue the travel with public transport means. That is why the user will be able to search for public transport options (RER, subway, bus, tram) using the application.

In order to go from the parking spot to a selected Point of Interest or to return to the parking place after the visit of the Point of Interest, the user can use the application to check public transport options and bike-sharing service in real time.

To complete the service package offered by the application, the users can access useful information for drivers like locations of repair garages, car wash and gas stations.

4.1.3 Barcelona: Conference Mobility

The Barcelona application aims to assist conference visitors in their various mobility needs in the conference city and as such improve their conference and city experience: going to the hotel when arriving in the city, finding the way to the conference registration venue, going from one venue in one part of the city to another venue in another part and when exploring the city and its points of interests during free time.

The application will therefore use a wide range of datasets about mobility in and around Barcelona (location of stops and schedules of public transport, bike sharing stations, bike lanes, location of parking

spots, traffic information) and will combine these with points of interests in the city and all the practical information about a congress (congress schedule, location of venues, activities), which, for pilot purposes (see chapter 6), will be the Mobile World Congress.

The main differentiation and advantage of this application versus any other mobility apps (like Google Maps, Tom Tom navigators, Moovit, …) is that it is based on the curation of the specific content. Congress organisers and City administrators will do this curation. The application will be designed for and with the Congress organizers, and the user will have access in a single point to most information related to such special event (like special transports, specialized routes, updated congress events and activities positions and schedules…), always together with their related mobility options.

As such, the application will allow users to:

(1) Locate and schedule all surrounding activities related to the Congress (including distributed parallel sessions and points of interest around the city related to the congress thematic). (2) Select their mobility preferences for public and private transportation (tram, train, taxi, metro, bus, shared bicycles…). (3) Compare all mobility options from their hotel to the main congress venue, from their hotel to the surrounding activities and from the main venue to the surrounding activities. (4) Receive a notification for the already selected activities indicating that they need to start their journey.

Also remark the role/benefit of the content providers into the application that will be able to:

(5) Create data files with all specific content related to the event; it will be done by using common standard formats like JSON, CSV etc. providing data schemas. The content, always related to the Congress and/or with potential interest for the visitor, will include POIs, congress related activities, special interest events associated with the city and the congress and special interest routes. (6) Include additional services to the "Data Sets", such a special transports, additional activities…

A wide range of data sets will be used, between others, the most important are public transport information (stops location and schedules), bike sharing stations and bike lanes, traffic information and of course, in coordination with the Congress organizers, the complete congress schedule and activities combined with a list of points of interest proposed by the City administrators and Congress organizers.

Functionalities:

1. Locate and schedule Congress activities

The user will first select the conference he is attending. A list of congress activities, together with their location and schedule time, as well as Points of Interests will be displayed on a map and the user has the opportunity to select the activities that he wants to attend or the Points of Interests he wants to go to.

2. Select your mobility preferences for public-private transportation

Secondly the User can select the transports means they want to use by indicating his preference and those that are not a valid option for him. Available transports in the city of Barcelona are: bus, tram, metro, train taxi, shared bicycles shared motorbikes and walking.

3. Analyze your best mobility options

Once the user has selected his mobility preferences, he will be able to see all the different mobility options shown on a map by selecting the associated POI or the congress activities with four different options:

1. Calculate best route from my current position.
2. Calculate best route from the main congress venue.
3. Calculate best route from my hotel
    a. In this option a new screen will appear in order to let user to enter the hotel, this information will be only asked once.

4. Calculate best route from one POI to another POI

All routes will include estimated time, number of transfers, and the kinds of transport... according to user's preferences.

Note 1: If the Congress visitor selects shared bicycle services, the app will also recommend the better route on the map (not related to the fastest/shortest route but taking into account the bike lanes availability).

Note 2: the application is based on information and is not designed to be used as a navigation tool.

5. Receive your alarms

As a useful tool for the user and as a part of the strategy of user retention, once the user exits the application, it will keep the information about the POI the user plans to go to, and will alert the user via push messages, indicating that he needs to start the journey in order to reach the final destination on time.

6. Upload specific content

To ensure future exploitation of the app in different events, also, if available, additional open data sets that relates to specific mobility offers around the Congress, will be included.

4.1.4 Birmingham

As stated in Deliverable D2.2 "Initial Technical Requirements and Use Cases" ECIM Consortium (2014), the scenario for the proof of concept in Birmingham will be based on the ECIM mobility application and services that will be implemented in the Brussels, Issy-les-Moulineaux and Barcelona scenarios, combining services with Bus Transportation in Birmingham Region. This pilot will be running between month 25 and month 28 of the project and a detailed description for this scenario will be presented in D2.3 "Technical requirements and Use Cases", once the ECIM mobility application will be more mature and the provided services stable and consolidated. The bus company Cen Group is researching user requirements and developing user journeys for this POC to ensure alignment with on-going development work.

4.2 Pilot Phases

The pilot phases depict the generic test strategies of the ECIM user testing. The Pilot Operations Plan (D5.1) outlines the deployment and testing, in line with a common strategy over different cycles, given the iterative nature of the project. The ECIM solution is validated by the deployment and test of services in three phases or cycles, which take place in the three different pilot cities: a pre-pilot phase, a pilot phase and a proof-of-concept phase.

4.2.1 Pre-Pilot: Closed Group Testing

ECIM's evaluation is geared towards performing a qualitative and quantitative assessment from a technical, functional and usability point of view, allowing to investigate the service compliance with the scenario and test the initial user requirements. At this cycle users provide feedback on their experiences and the development team will make necessary improvements in order to launch the pilots in the two other cities with a lager, open community. Restricted groups tested the mobility application in Brussels, in order to ensure the solution is as intuitive and as easy to use as possible. A "demonstration group" tested the application in a lab setting, and a "car drivers group" used the application while being on the road.

Due to the experimental nature of this application, safety concerns concerning the use of the application while driving were anticipated by performing a demonstration test. To achieve these aims, the "demonstration group", consisting of skilled application users, participated in several focus groups, where participants followed a test scenario, and provided feedback through a survey. Secondly, to make sure that

the planned operations are working accurately, a controllable test setting with a limited number of real car drivers provided the necessary insights.

This group was divided in two segments, the first of which was involved during two weeks in a daily life context and was expected to use the application in multiple interactions and provide regular feedback through surveys. The second group executed a test scenario on the street using their own cars, accompanied by a member of the user test team. The member of the user test team provided support and recorded concrete interactions of the tester with the application through participant observation. Together with the interview after the test provided a close view on potential usability problems.

Although both groups provided us information about user experience and acceptance, this way of working allowed us also to target evaluation questions. We could compare insights and feedback coming from both groups and chart similarities and also divergent opinions relevant for development purposes. The group of drivers provided us with the opportunity to focus on the evaluation of the technical performance of the pre-pilot, the usability and the aspect content accurateness. The demonstration group provided an opportunity to get more feedback about end user's future expectations towards the pilot regarding the level of data/services to be added for the second pilot phase, the design-options and the place of ECIM within a broader context of ICT mobility planning.

The other lessons from this test-phase regarding methodology (see 5.2 'Periodical Report Brussels' for more detail) was related to users testing the application in real traffic conditions and in their daily life context. We learned that when testing a first prototype version of an application that, given its aim to provide on-the-spot solutions, the slightest things that might go wrong (be it not understanding the function of a button, be it a misunderstanding in instructions), might cause user drop-out and hence loss of feedback. Therefore, we learned that in the first test cycles of the other pilots, qualitative methods, requiring also a closer monitoring of participants, should have an important part in gathering feedback.

4.2.2 Pilot: Open Group Testing

After the improvements undertaken based on the feedback of the testers of the pre-pilot, the pilot is deployed and tested in the larger community, involving increasingly local and diverse actors than merely technically skilled testers. The pilot open group testing will include two stages: a piloting stage and a co-creation and innovation stage. Interviews, surveys and other analytical tools are used during these stages to help identify the main determinants of acceptance and use ECIM's solution, the weaknesses, what needs improvement and what are the best conditions for deployment. All types of end users of ECIM are involved (citizens, mobility stakeholder, developers, service providers).

Stage 1 – Piloting Stage

Building upon the insights and improvements of the pre-pilot in Brussels, the pilots are in the first stage deployed in Issy-les-Moulineaux (Paris Seine Ouest) and Barcelona in a small open group. User research is undertaken here, and the experiences of the testers with the ECIM Mobility application are captured and analyzed. For the second cycle of Brussels, Issy-les-Moulineaux and Barcelona pilots the ECIM Mobility application will be improved based on the feedback from the first cycle for Issy-les-Moulineaux and Barcelona and pre-pilot cycle for Brussels, and tested with a wider audience of users. In both cycles constant interaction between the pilot user test team and the development team is a crucial aspect of the operations.

Issy-les-Moulineaux/Paris region – Cycle 1

In Stage 1- cycle 1 of the restricted user group tests, one group tests the application in a lab setting by means of a focus group and another small group uses the application while being on the road by means of a test scenario.

The selected drivers are mainly those who already use the service of PayByPhone in Grand Paris Seine Ouest and the citizens who are already involved in testing other solutions on smart mobility through the Living Lab. For development purposes we collect, compare insights and analyse relevant feedback coming from the interactions they had with the application in the month period.

Issy-les-Moulineaux/Paris region – Cycle 2

The second cycle of tests in Issy-les-Moulineaux (Paris Seine Ouest) targets a wider audience, not only those who have IT skills and/or interest in innovation, but also those that are less familiar with mobility applications.

The "demonstration group" participates in a workshop that Issy Media organizes for this purpose. The workshop starts with an introduction to ECIM and the application, followed by the performance - under the guidance of the user test team – of a test scenario on their own device (tablets or smartphones). The session ends with gathering of their feedback for development purposes of the ECIM application.

Barcelona - Cycle 1

The aim of the 1st cycle of the Barcelona pilot is to test the prototype of the ECIM application with a limited group of testers in order to analyse its functionalities, usability, and its compliance with the scenario and the initial user requirements. The prototype is tested through bigger focus groups, and a small sub-group of IT experts who are also conference visitors. The latter group tests the prototype of the application with some preliminary congress content by means of a test scenario in the city context itself, together with the ESADE ECIM team. Feedback gathered will enable us to make the necessary improvements before the application will be presented and made available in the next cycle.

Two groups of users will test the application: the 'conference visitors group' and the 'conference content providers group'. Former will validate the functionalities of the application from the perspective of the conference visitor as well as the overall usability of the application. Latter will focus on validating the congress related content aspects of the applications.

Barcelona- Cycle 2

The piloting cycle 2 takes place during the Mobile World Congress, where visitors can volunteer to test the application. Each of these visitors has to login to the application (using a Social login such as LinkedIn, Google or Facebook), providing his email address. Via this e-mail, a link to an online survey is sent in order to provide their feedback. Some of these visitors will be asked to be involved in a 'participant observation' study in order to record user actions on location (recorded in field notes).

The Barcelona pilot also creates a subgroup of close collaborators recruited from the network of ESADE, the ECIM-project partners, and people from institutions, organizations and IT experts that collaborated in the cycle 1 test. This subgroup is controlled by the pilot lead more, and it also visits the conference using the application to organize their mobility during the event. Members of this subgroup will complete a survey and a selected representative group will be invited for a focus group session to provide further insights about their experience, expectations and acceptance and interest regarding the application.

Finally, members in cycle 1 of the 'conference content providers group' will evaluate the application - based upon their own usage during the Mobile World Congress and initial test results – from the viewpoint of conference organizers and city administrations and their objectives regarding mobility and conference organizations. They will be invited for a special focus group session.

Stage 2 – co-creation and innovation

In a second innovation and co-creation stage, citizens, developers, SMEs and city administration will on the one hand be encouraged to develop new services themselves using open APIs published on the ECIM platform by means of hackathons, app competitions or focus group sessions. On the other hand, in Brussels, Barcelona and Issy-les-Moulineaux new services are developed by ECIM (Services such as an Intelligent Parking Locator, MyNeighbourhood Community Parking, Park with Us, eID Parking Permit might be included)

and deployed in the larger community. Park with Us and MyNeighbourhood Community Parking will be deployed in the three pilot cities, while e-ID permit will be restricted to Brussels. Just as in the pilot stage, in this co-creation and innovation phase, user research by means of surveys and interviews will chart the experience of end users (developers, cities, citizens) and the feedback will flow back to the technical team in order to improve the solution 'on the fly'.

4.2.3 Proof of Concept Validation

To validate the re-use of ECIM services across local and national borders, ECIM will leverage the public transportation service of partner CEN Group to run a proof of concept in the Birmingham Region in the United Kingdom.

4.2.4 Iterative Evaluation Process

This 3-stage approach results in an iterative process of evaluation. Most significantly,

(a) It offers a built-in feedback loop so improvements can be made during the lifetime of the project,

(b) It tests the process of users adding and using their own data on the platform, and

(c) It tests the process of users taking data and creating services and commercializing them.

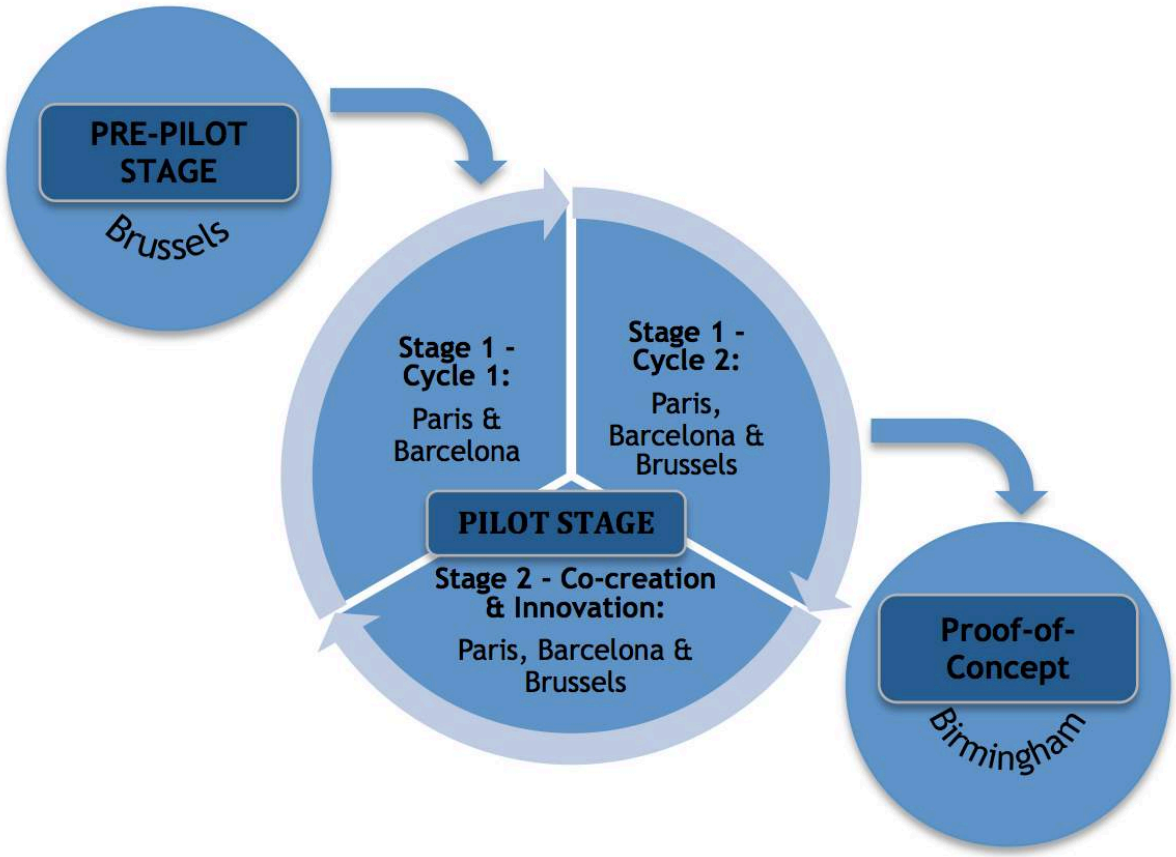

Figure 7: Deployment of Evaluation Process

The table below summarizes the above-presented deployment of the evaluation methods in the different cycle of the ECIM-piloting phase.

		Pre-Pilot		Pilot, Stage 1							Pilot, Stage 2 Co-Creation/ Innovation	Proof of Concept
				Cycle 1				Cycle 2				
		Brussels		Issy-les-Moulineaux		Barcelona		Brussels	Issy-les-Moulineaux	Barcelona	Brussels, Barcelona, Issy-les-Moulineaux	Birmingham
		Inside	Outside	Inside	Outside	Inside	Outside	Outside	Outside	Outside		
Methods/ Instruments	Focus Group					X				x		
	Survey	x	x	x	x	X		x	x	x	x	x
	Interview		x		X		x	x	x	x	x	x
	Participant Observation		x		x		x	x	x	x		
	Logs		x		x		x	x		x		

Table 13: Deployment of methodology in piloting test cycles

5 Technical Evaluation

5.1 Technical Evaluation Theories

In this chapter of the deliverable, the methodology regarding the technical evaluation is presented. The evaluation of the ECIM platform covers the aspects of Usability, Performance, Security, Maintainability and scalability. Although here we use the term technical, the reader should not be confused that technical evaluation is done only with logs, web-analytics or other simulation tools. The evaluation concerning the technical part can take also the forms of focus groups or interviews with developers or service providers. This is especially relevant for ECIM in view of the fact that the idea behind this evaluation is to measure also the scalability and future use of the platform.

The ECIM Platform is tested in the context of WP4 to assess the maturity of the technical implementation and the alignment to the user requirements from a technical perspective. The technical assessment of the ECIM platform is supported by monitoring the technical parameters of the platform performance and aims to determine how far the integrated prototype meets the technical requirements and the functional specifications.

Technical evaluation is ongoing and is realized through quality models. In the past, different quality models have been proposed, each of which addresses different quality attributes that allow evaluating the developed software. Some of the most well known are:

- McCall's model of software quality (GE Model, 1977), which incorporates 11 criteria encompassing
  1. Product operations. The product operations perspective identifies quality factors that influence the extent to which the software fulfils its specification
     - Correctness, the functionality matches the specification,
     - Reliability, the extent to which the system fails,
     - Efficiency, system resource usage
     - Integrity, protection from unauthorized access,
     - Usability, ease of use
  2. Product revision. The product revision perspective identifies quality factors that influence the ability to make changes to the software product. These factors are:
     - Maintainability, the ability to find and fix a defect
     - Flexibility, the ability to make changes required as dictated by the business,
     - Testability, the ability to Validate the software requirements;
  3. Product transition. The product transition perspective identifies quality factors that influence the ability to adapt the software to new environments:
     - Portability, the ability to transfer the software from one environment to another
     - Reusability, the ease of using existing software components in a different context
     - Interoperability, the extent, or ease, to which software components work together.
- Boehm's spiral model (1978) is another quality model based on a wider range of characteristics, which incorporates 19 criteria. Nonetheless the criteria in both, this and McCall's model, are not independent as they interact with each other and often cause conflicts.

- ISO 9126-1:2001 is a further model and incorporates six quality goals, each goal having a large number of attributes. These six goals (Functionality, Reliability, Usability, Efficiency and Scalability, Maintainability and Portability) are then further split into sub-characteristics, which represent measurable attributes (custom defined for each software product).

Recently the BS ISO/IEC 25010:2011 standard about system and software quality models has replaced ISO 9126-1:2001 and this makes it the most recent model. It is worth mentioning here that applying any of the above models is not a straightforward process. There are no automated means for testing software against each of the characteristics defined by each model. For each model, the final attributes must be matched against measurable metrics and thresholds for evaluating the results must be set. It is then possible to measure the results of the tests performed (either quantitative or qualitative/observed).

For ECIM, as already described in Deliverable D2.2 "Initial Technical Requirements and Use Cases" ECIM Consortium (2014), we have adopted the ISO/IEC 25010:2011 standard, which is the most widespread reference model and it includes the common software quality characteristics that are supported by the other models. This standard defines two quality models providing a consistent terminology for specifying, measuring and evaluating system and software product quality:

- Quality in use model, which is composed of five characteristics that are related to the outcome of the interaction with the system and characterizes the impact that the product can have on the stakeholders.
- Product quality model, which is composed of eight characteristics that are related to static properties of software and dynamic properties of the computer system.

For our case, the product quality model is adopted. The eight characteristics are further divided into sub-characteristics, as shown in the following figure:

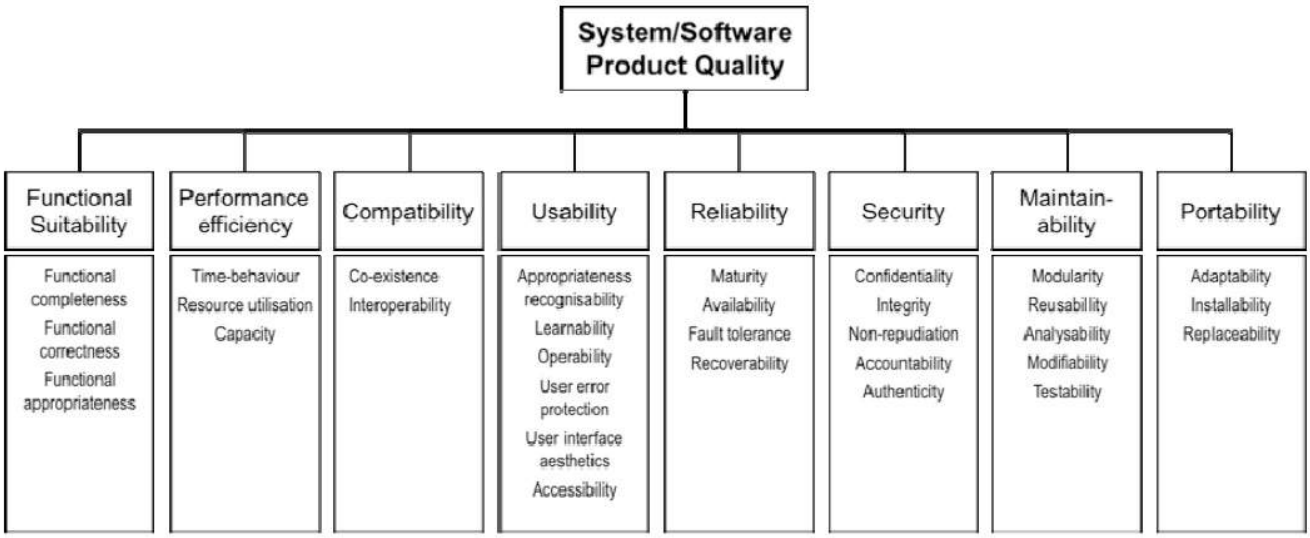

Figure 8: The ISO/IEC 25010:2011 system/software quality model characteristics

For each of the sub-characteristics, a metric/measurable attribute is defined, along with thresholds. These metrics and thresholds are customized for each software product, which in our case is the ECIM platform (consisting of individual components). By evaluating the complete set of metrics, we will be able to assess the overall quality of our platform and the percentage to which we were able to meet the user requirements (reflected to system specifications and functionalities) defined during the design phase of the

project. In the following section the ECIM quality model is presented which will be used in order to evaluate the functional and non-functional requirements presented later in this Chapter.

5.2 ECIM Quality Model

The software quality model of the BS ISO/IEC 25010:2011 standard is adapted to the needs of the ECIM platform, in order to define appropriate metrics and to be able to evaluate the platform capabilities. These metrics need on the one hand to reflect the characteristics that they represent and in addition to allow appropriate measurements to be obtained, either through quantitative methods (e.g. by software tests/simulations, usability tests) or qualitative methods (e.g. through user observations). Three types of metrics classes are defined in this standard:

- Internal metrics associated with static internal properties of a system such as number of function calls, number of rules.
- External metrics associated with dynamic external properties. These are metrics that are observable when the user interacts with the system (i.e. the user performs a task/function/operation and observes the response in the sense of time required, results obtained etc.).
- Quality-in-use metrics, which refer to metrics that evaluate the extent to which a system meets the needs of the user.

In view of the fact that the aim of the ECIM platform by the end of the project, is a proof of concept and not a commercial product there will be less focus on the internal metrics, which are essentially used in the development phase. As such, the different components and the platform itself will be mainly optimized for their functional suitability and usability. ECIM will therefore concentrate on external metrics and quality in use metrics, which are respectively used in the testing phase and the piloting phase. Various target users will make use of these metrics, as following:

- Developers, IT experts and Service Providers will make use of external metrics prior to the release of the ECIM platform prototype to the evaluation phase
- Platform end users (i.e. developers, Data Providers and Service Providers) will make use of quality-in-use metrics, during the evaluation stage in order to assess the suitability of the prototype to address the needs in helping the public sector embrace the cloud.

Due to the nature of the ECIM platform, we concentrate on the following BS ISO/IEC 25010:2011 characteristics for the ECIM platform, as shown in the following table:

ISO/IEC 25010:2011 characteristics	Description	Method for measuring quality metric	Threshold
Functional Suitability			
Functional Completeness	Assess the implemented functionalities with respect to requirements and project objectives	Observation Tests	# of implemented functionalities > 95%
Functional Correctness	Assess whether the ECIM platform provides the correct results with the needed degree of precision	Log Analysis, Observation Tests	Precision of results > 75%
Functional Appropriateness	Assess whether the implemented	Log Analysis, Observation Tests	# of correct actions > 95%

ISO/IEC 25010:2011 characteristics	Description	Method for measuring quality metric	Threshold
	functionalities facilitate the accomplishment of specified tasks and objectives		
Performance Efficiency			
Time Behavior	Assess the response and processing times and throughput rate per user	Log Analysis, Observation Tests, Simulation Tests	Mean Response Time < 1 min Mean Throughput < 2Mbps
Resource Utilization	Assess the resource usage	Log Analysis, Simulation Tests	Memory and CPU usage < 50%
Capacity	Assess the number of concurrent users	Simulation Tests	# of con_users > 10
Compatibility			
Interoperability, Co-existence	Assess the interoperability capabilities of the ECIM platform	Observation Tests	Interoperability with at least two other separate systems
Reliability			
Availability	Assess whether the ECIM platform functionalities are operational and accessible when required for use	Log Analysis, Observation Tests	Availability > 90%
Fault tolerance	Assess whether the ECIM platform operates as intended despite the presence of hardware or software faults	Log Analysis, Observation Tests	Fault tolerance > 90 %[3]
Security			
Confidentiality	Assess whether the ECIM platform ensures that data are accessible only to those authorized to have access	Observation Tests	Confidentiality > 99,9%
Maintainability			
Modularity, Analyzability, Changeability, Stability,	Assess whether the ECIM platform operation is affected by changes to one or more components	Observation Tests, Use JavaDocs comments on all code, Prepare documentation	Operation breaks < 0,1%

[3] Thus up to 10% of errors

ISO/IEC 25010:2011 characteristics	Description	Method for measuring quality metric	Threshold
Testability, Compliance		of APIs definitions/descriptions, Use error logging (such as Log4J tool).	

Table 14: Technical evaluation metrics

Having presented the technical evaluation metrics it is time to present the Functional and Non-functional requirements that will be evaluated based on these metrics.

5.2.1 ECIM's Functional Requirements

In this subsection of the deliverable the functionalities upon which the functional characteristics of the platform will be evaluated, such as its usability are presented. Metrics to be used as presented above in Table 14 can include Log Analysis, Observation Tests, Simulation Tests and web-analytics, but also a usability questionnaire and Focus groups. The ECIM platform use cases described in detail in Deliverable D2.2 "Initial Technical Requirements and Use Cases" provide a description of the functionalities that have to be offered by the ECIM platform. The following table summarizes these requirements for all the use cases of the ECIM Platform.

Req. ID	Description
P_F1	Login/Registration functionality is required
P_F2	There must be a web form to register a new web service. The endpoint, HTTP method type (GET, POST) and the required parameters must be provided
P_F3	Registered services must accept ECIM authentication
P_F4	Providers can see a list of their registered services and manage them (edit/delete)
P_F5	Searching functionality in the Marketplace must exist
P_F6	Details' page for every service is required. Usage options, limitations, user ratings and other available information will be displayed here
P_F7	Authorisation of developers to use ECIM services must be supported. The ECIM Platform will perform the access control.
P_F8	Used/Purchased services must be visible in user profile
P_F9	ECIM services must provide an ECIM Restful endpoint
P_F10	ECIM must provide services to developers, which in turn invokes the service providers service

P_F11	ECIM platform must accept online data resources in various formats, e.g. CSV, XLS, JSON, XML
P_F12	ECIM services wrapping online data resources should respond in JSON format
P_F13	User authentication and user management must be handled by the ECIM platform
P_F14	The platform must support role and user management
P_F15	Usage statistics for every service must be stored, e.g. number of calls, date & time of calls, number of different consumers, consumers per service, etc.
P_F16	The platform should offer forum functionality
P_F17	Users should be able to rate and comment a service

Table 15: Functional requirements

In addition to the functional requirements that will be evaluated based on the metrics identified in table 14 there is also a series of Non-Functional Requirements that will be evaluated using the same metrics.

5.2.2 ECIM's Non-Functional Requirements

In order to develop a robust and fully flexible system, which will cover all the needs of the ECIM project, a set of non-functional requirements had to be considered and upon which the technical evaluation will also take place. The following table summarizes these requirements and provides a short description for each one of them.

Req. ID	Description
NF1	Scalability. The platform should be built in such a way that allows an easy up scaling in terms of users and data exchange volume. The service oriented nature of the backend and the elasticity provided by the cloud platform itself, provides a solid basis for a scalable system.
NF2	Security – Roles should be defined to control the access and actions that users can perform within the ECIM Platform. Security checks should by applied system-wide to ensure proper authorization and authentication of users that access the platform services.
NF4	Usability. User Interfaces must be developed according to W3C standards and Human Interface Guidelines. The front-end functionalities should be provided with a clean and fully functional interface. The layered architecture that will be followed is separating the presentation layer from the business and data layers, therefore giving the capability to create an appealing user interface using any of the most modern interface elements that can foster the usability of the platform.

NF5	Performance. The success of the ECIM platform is tight to the overall performance of the various components. The architecture of the platform should be designed in a way, which ensures that there are no severe bottlenecks between the system processes and that the user perceived response time is the minimum possible.
NF6	Maintainability - The ECIM platform should follow a standards oriented and technology independent architecture. Proprietary solutions should be avoided and the implementation of modules should follow an approach that doesn't restrict developers to specific tools and technologies.

Table 16: Non-functional requirements

Especially the concept of scalability needs to be defined further as it has not been defined until now and although it is relevant for the future exploitation of the system the term might not be clear. In fact one of the benefits of the ECIM open innovation approach for cities is that it offers a scalable system where all citizens can potentially create public services through Living Labs without the need for highly skilled programmers. In the following subsection we first define the concept of scalability and then provide the metrics on how to evaluate it.

5.2.2.1 Defining Scalability

This section makes an introduction to the scalability concept for Service-Oriented Architecture systems, and elaborates on the different dimensions that scalability can be defined and measured upon. It then instantiates this concept on the ECIM needs and describes how it can be measured in the context of the work done in the project. Table 17: summarizes the different dimensions to define and measure scalability and describes where they refer to.

Scalability Metric	Explanation	To be measured
Load scalability	Number of transactions per hour	YES
Service scalability	Number of simultaneous users	YES
Data scalability	Size of the dataset	YES
Functional scalability	Enhance the system by adding new functionality at minimal effort	YES

Table 17: Scalability in terms of the ECIM developments

For each of the components, the above-mentioned metrics have been tested and/or considered in order to offer insight on the degree of the scalability potentials. Based on the metrics of the above table, the following have been taken into consideration:

For the load scalability, the analysis focuses on whether the components can support multiple con-current sessions and the effort and the cost (mainly by means of more memory usage and computational power) to upgrade the components in order to support more con-current sessions than the current implementation.

For the service scalability, the analysis focuses on whether the components can support multiple con-current users and the effort and the cost (mainly by means of more memory usage and computational

power) to upgrade the components in order to support more con-current users than the current implementation.

For the data scalability, the analysis focuses on whether the components can support more content or bigger/more complex ontology structures and the effort and the cost (mainly by means of more memory usage and computational power) to upgrade the components in order to support more content or bigger/more complex ontology structures.

For the functional scalability, the analysis focuses on whether the components can be expanded to new functionalities and the effort and the cost (probably by developing a new interface, which is compatible with other technologies) to upgrade the components in order to support more functionalities than the current implementation.

6 Conclusions

This document describes the strategic evaluation methodology that will be followed by the ECIM project in order to evaluate by means of both qualitative and quantitative methods the pilot operations and the platform as such. The evaluation methodology, instantiated in three phases, i.e. closed, open and proof of concept, presented here will be applied to the production of the Evaluation Report, and also for the pilot operations, as the methodology has been created in a close collaboration between WP6 and WP5 in order to test metrics and survey questions in the Brussels pre-pilot and in order to incorporate the learning's of this first pre-pilot in the evaluation methodology.

The deliverable at hand started out with a description of the primary objectives of the ECIM evaluation strategy and the fundamental theories and principles on which it is based. This also yielded insight into the relation to the work that has been undertaken by the other work packages, and more specifically, WP2 "User Requirement Analysis and Scenario Creation" and WP5 "Pilot Deployment". The evaluation methodology benefited from the close collaboration, as the Brussels pre-pilot pre-tested the concepts of the methodology, which are presented in this deliverable. This allowed verifying how criteria and instruments can be best deployed and if the questions raised in the survey are understandable. Furthermore the demonstration group provided an opportunity to get more feedback about end user's future expectations towards the pilot regarding the level of data/services to be added for the second pilot phase, the design-options and the place of ECIM within a broader context of ICT mobility planning. An additional learning, that the pre-pilot provided was that in the first test cycles of the other pilots, qualitative methods, requiring also a closer monitoring of participants, should have an important part in gathering feedback. As a result based on the feedback provided, the evaluation methodology now includes participant's observation.

Having incorporated these first learning's in the methodology at hand, it is expected that this document will provide useful input for the whole project, as it will be used as the basis for the evaluation of the entire project, and will validate the work that has been previously done by the former work packages.

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Annex 1: User requirements' results summary

No	Requirement Name	Description	Priority (High, Medium, Low, Not needed)	Pilot
MOBILITY APP USERS				
UR01	Training	Special info-sessions, training programmes,	Low	All pilot cities
UR02	Simple mobility app login	Mobility app shall provide a simple and common way to login, e.g. using a social media account (Facebook, Google) or OpenID	Medium	All pilot cities
UR03	Single-sign-on	User logs-in the mobile application once and than he is able to use services from different providers without being required to log-in to each service separately	High	All pilot cities
UR04	Account linking	Solution shall enable existing service users to link their existing account with ECIM login in order to provide a single profile		
UR05	Multi-language support	Mobility app shall be available in the local language and other relevant languages shall also be available	High	All pilot cities
UR06	Parking status notifications	User receives a notification (e.g. SMS) when a parking session has	Medium	Where relevant for services involved in the pilot

No	Requirement Name	Description	Priority (High, Medium, Low, Not needed)	Pilot
		started, and when it is about to end		
UR07	Multimodality support	Mobility app shall encourage multimodal approach in providing transportation services, not only cars	High	All pilot cities
UR08	Multiple parking services displayed	Mobility app shall display on the same map or list parking services, or other mobility services, from different providers	High	All pilot cities
UR09	Find POI nearby or by address	The desired POI (e.g. car parking) shall be searchable by providing an address, or by using a 'nearby' option (using current GPS location)	High	All pilot cities
UR10	Filter and sort parking options	Application shall provide a comprehensive map and list of available parking options which shall be possible to filter and sort on different criteria (distance, cost and availability)	High	All pilot cities
UR11	Guidance/navigation to the selected location	Application shall suggest an optimal route to the selected location (e.g. parking spot), providing distance and estimated travel time	Medium	All pilot cities
UR12	Travel time and cost estimation	Travel time shall be	Medium	All pilot cities

No	Requirement Name	Description	Priority (High, Medium, Low, Not needed)	Pilot
		calculated considering current traffic condition, travel cost shall be estimated considering different means of transportation (travel cost comparison)		
UR13	Notifications in case of change of traffic conditions	Mobile application shall automatically notify the user in case the traffic conditions change and a new route, optimized to the new condition is calculated	Medium	All pilot cities
UR14	Feedback on mobility service status	Mobility app shall provide a way to report and share exceptional traffic conditions, parking issues or similar mobility related situations	Medium	All pilot cities
UR15	Simple app discovery and use	Mobility app shall be available on most common app stores and easy to setup and start from the smartphone desktop	Medium	All pilot cities
UR16	Supported smartphone platforms	Mobility app shall be available for the most common smartphone platforms	High	All pilot cities
UR17	Instant payment	Mobility app shall provide a seamless and instant payment method and	High	All pilot cities

No	Requirement Name	Description	Priority (High, Medium, Low, Not needed)	Pilot
		supporting different payment services (e.g. credit card, mobile phone invoice)		
CITY MANAGERS				
UR18	Monitoring of different mobility flows within the city	City mobility dashboard shall display parking availability of different parking services, real-time traffic information and other mobility-related information in one place	High	All pilot cities
UR19	Qualitative information on mobility status	A city dashboard shall provide also a qualitative status of the different aspects of city mobility	Medium	All pilot cities
DEVELOPERS and SERVICE PROVIDERS				
UR20	Efficient and easy service and data discovery and promotion	Mobility data and services shall be listed on a common portal	High	All pilot cities
UR21	Easy service and data integration	The platform shall enable quick and simple integration of external services and shall support well known and common standards (e.g. JSON, CSV)	High	All pilot cities
UR22	Payment service	A unified payment service shall be available, without the need for integrating to different payment systems when an	Medium	All pilot cities

No	Requirement Name	Description	Priority (High, Medium, Low, Not needed)	Pilot
		application is being deployed in a new country.		
UR23	Common standards	Data and services shall be provided in a more standardized formats	High	All pilot cities
UR24	Revenue sharing	Paid services available on through the platform shall enable different revenue sharing models	High	All pilot cities
UR25	Service level agreements	The platform shall provide different SLA	Medium	Brussels
UR26	Standard API formats	Services and data available through the platform should be provided in a standard, state-of-the-art format and protocol like JSON/REST, Datex	High	All pilot cities
UR27	Platform and mobility app provided as open-source	Platform and Mobility app source code shall be published on common code sharing portals (e.g. GitHub)	Low	All pilot cities

Annex 2: Project Performance Indicators

Indic. No./ WP	Corresponding Project Objective	Indicator	Method of Measurement	Expected Progress		
				Year 1	Year 2	Year 3
In1 WP2	1.1 Use existing research, previous project outcomes and end user feedback to understand the main challenges Cities face in migrating their services to the cloud	End User Needs Capture	Number of end users participating in the process of ECIM solution design (survey, workshops etc.)	3x20 in the workshops 3x50 survey respondents	N/A	N/A
In2 WP2	1.1 Use existing research, previous project outcomes and end user feedback to understand the main challenges Cities face in migrating their services to the cloud	Current Situation Analysis Report	1) Analysis of key research in the Cloud Computing & Open Innovation/ Service Co-Creation 2) Level of liaison with previous CIP projects 3) Survey of key actors 4) Identification of key challenges 5) Identification of key barriers 6) Identification of best practice	Report finished, peer reviewed, used to design ECIM solution and published	N/A	N/A
In3 WP2	1.2 Generate political backing for cloud-based public services	Decision makers	Number of decision makers actively providing feedback to ECIM through interviews or expressing interest in adopting the solution	10	20	30
In4 WP7	1.2 Generate political backing for cloud-based public services	New Cities	Number of new cities interested in implementing the ECIM solution	0	1	3
In5 WP2 WP5	1.3 Create a simple approach to guide cities and businesses through the process of migrating services to the cloud	Public sector feedback	Number of city administrators and CIOs involved in the process of ECIM solution design and adaptation	15	30	40
In6 WP4	1.4 Successfully combine new and existing components into an innovative cloud architecture for a pan-European cloud of public services	ECIM Platform	Number of Platform Components successfully integrated and tested	100%	N/A	N/A
In7 WP4	1.5 Outline compliance standards for basic interoperability which all services can follow	ECIM roadmap	Number of pilot services in compliance with ECIM interoperability standards (updated from EPIC Roadmap)	All original public sector services	All original private sector services	All new services uploaded

Indic. No./ WP	Corresponding Project Objective	Indicator	Method of Measurement	Expected Progress		
				Year 1	Year 2	Year 3
In8 WP2, 3, 4	2.1 Understand the needs of SMEs and citizens in terms of stimulating innovation to enable them to co-create new services	Related projects	Number of other projects regularly exchanging insights with ECIM during solution design, adaptation and deployment	5	8	12
In9 WP5	2.2 Utilise Living Lab innovation methodologies to create new cloud-based Open Public Services and in so doing help involve the widest possible range of citizens/SME's in the service co-creation process	New services	Number of new services co-created by Citizens & SMEs and uploaded to the cloud	3	5	8
In10 WP5	2.2 Utilise Living Lab innovation methodologies to create new cloud-based Open Public Services and in so doing help involve the widest possible range of citizens/SME's in the service co-creation process	Living Labs	Number of users testing the applications	100	250	350
In11 WP5	2.3 Use existing ECIM solution mobility services to promote co-creation of new Open Public Services to cities across Europe	Cross-border validation of services	Number of services interoperable across borders (tested in multiple cities)	3	5	90% Total Uploade d
In12 WP5	2.3 Use existing ECIM solution mobility services to promote co-creation of new Open Public Services to cities across Europe	ECIM platform use by pilots	Number of pilot cities using the ECIM platform	1	3	3
In13 WP3	3.1 Ensure Cities can easily adopt cloud-based services from the ECIM service catalogue	Platform functionalit y	Positive response rate of usability tests of platform functionality	60%	80%	95%
In14 WP5	3.2 Evaluate the pilots success and identify any future changes that are needed	Pilot cities User Satisfaction	User Satisfaction of the pilot cities with ECIM solution	60%	80%	95%
In15 WP7	3.3 Create new Public/private partnership business models for cloud service provision between cities, businesses and living labs	PPP Business model	Production of new PPP business model for cloud-based services and its implementation in at least one pilot city	N/A	PPP Business Model developed	1 Pilot City in PPP
In16 WP7	3.3 Create new Public/private partnership business models for cloud service provision between cities, businesses	SMEs engagement	Number of SMEs engaged in developing services through PPPs	N/A	1	3

Indic. No./ WP	Corresponding Project Objective	Indicator	Method of Measurement	Expected Progress		
				Year 1	Year 2	Year 3
	and living labs					
In17 WP7	3.4 Create a viable exploitation offering that will provide balance the value - creating potential of Open Public Services with the economic strength of a private commercial strategy	Business Case	Validation of a business case in all pilots	N/A	Business case validated	Business Case operational in plot sites
In18 WP7	3.4 Create a viable exploitation offering that will provide balance the value - creating potential of Open Public Services with the economic strength of a private commercial strategy	ECIM take-up by new cities	Number of cities other than pilots adopting ECIM exploitation offering	N/A	1	3

Annex 3: Field note and evaluation interview template ECIM

The annex at hand presents the template that ECIM pilot cities will use during the participant observation session they organise. It contains a template for introducing testers to the test procedure, a template for writing down and organizing field notes and the questions of the evaluation interview to be organised after having used the application in real traffic conditions.

Template: introduction to testers

Thank you for your participation in our test drive. We first will let you execute a test scenario, meaning that we will ask you to use our ECIM- application to find a suitable parking place in Schaarbeek near a certain destination that we will tell you.

One of the members of our research team will drive with you in order to register your experiences and reactions 'on the spot' (and to provide you also with assistance in case of parking problems). This means he will, in case you do, note some exclamations or sayings of you, log if the action happened as expected and afterwards, based on his field notes, describe shortly what happened. These field notes will help us to gather the necessary insights regarding usability, experience and usefulness of the application in a real-life context

After having found the parking spot, we will ask you to drive back to our offices and have a short evaluation interview of around 20 mins. Here we can gather your opinions and you can explain in more detail your feelings towards the applications. This will allow us to gather practical design wishes (going from usability to content provision) as well as the main factors of acceptance and use.

Before we start the test, we will now explain you the main functionalities of our application.

Field Notes ECIM pilot test

Test information:

Date:
Time:
Place:

Observer:

Name:
First Name:
Research Institution:

Participant information:

Test ID:
Name:
First Name:
Age:

Profession:
Residence:
ICT-knowledge:
Current mobile app use:
Main reasons to come to your city by car:
Main current parking need in city:

Notes for phases in the test-scenario
Every step in the scenario has to be elaborated here. As an example, we provide here the steps from the pre-pilot in Brussels. Every pilot city will have to adapt this according to their pilot objectives and scenario.

1. Installing the application on the mobile phone
Expressions:
Log:
Description:

2. Finding the potential interesting parking options and route planner
Expressions:
Log:
Description:

3. Driving to the parking neighbourhood
Expressions:
Log:
Description:

4. Find the parking location
Expressions:
Log:
Description:

5. Only on-street: park car and start parking session
Expressions:
Log:
Description:

6. Only on-street: ending parking session and leaving parking
Expressions:
Log:
Description:

7. Off-street: open gate and find parking spot location in building
Expressions:
Log:
Description:

8. Off-street: leave parking spot by foot
Expressions:
Log:
Description:

9. Off-street: end session and leave parking

Expressions:
Log:
Description:

Template: ECIM post driving evaluation interview

Thanks for having executed our test-scenario. We will now ask you some questions about your experience with our application. Your feedback and suggestions will help us towards further improving our application. Thank you for your answers

1) Did you think the application was easy to use? Can you tell us in a few lines why you consider it to be easy to use or not?
2) Did you think the application was accessible? Can you tell us in a few lines why consider the application to be accessible or not?
3) Was the application useful for executing the test scenario? Can you tell us why you consider it useful or not?
4) Do you think that the information provided on the application was of good quality and reliable in order to find parking?
5) Do you think that the application would be useful for your other parking needs? Would you, if you could, use it again and/or recommend it to others? If yes, why, if no, why?
6) Did you like using the application? Would you use it again if possible and recommend it to friends/relatives?
7) What do you see as the main advantage of the current pilot regarding creating smarter parking solutions?
8) What are for you the strongest points of the application?
9) What are for you the weakest points of the application?
10) What would be your suggestions for improvement and why?
11) Are you interested in testing the second iteration of our application?

Annex 4: Survey

The survey below will be used in the test cycles for Brussels, Issy-les-Moulineaux and Barcelona. Given the different nature of the Barcelona application compared to the two other pilot cities, some of the questions, while respecting the general spirit that underpins the question for Brussels and Issy-les-Moulineaux, needed a specific adaptation. These Barcelona specific questions are provided in italic.

Demographic Profile

Demographic profile	Question	Potential answers
1.	What is your gender?	Male/ Female
2.	What is your age?	Either scales or open field (birth year)
3.	What is the highest level of education you have completed	High school or equivalent, Vocational/technical school, Bachelor's degree, Master's degree, Doctoral degree, Other
4.	Which of the following categories best describes your area of employment?	Either open field or field with specific selections
5.	How would you describe yourself in terms of the following categorization (Multiple selections possible) Note: The groups are targeted differently in the closed stage of the pilots as we are aware of the users role, yet this question is applicable for the open cycle	Citizen Developer Service provider SME (owner) SME (employee) civil servant
6.	Nationality	List of nationalities or open field
7.	Email address	Field for email address so as to include as return user afterwards

ICT profile

Internet / ICT profile	Question	Potential answers (In closed questions also N/A as an answer)
1.	How old is the Smartphone that you use the most?	Open field
2.	What is the operating system of your most used Smartphone?	Android, IOS, Windows
3.	Do you use location based applications on your smartphone?	YES/No If yes go to 3b, 3c
3b	Do you use a GPS on your smartphone?	YES/No

Internet / ICT profile	Question	Potential answers (In closed questions also N/A as an answer)
3c	Which kind of transport related applications do you use at least weekly on your Smartphone?	Navigation software, Parking applications (can be further refined if apps are known) Applications of the local Bus/Train/Tram provider
4.	How often do you use the internet to search the location or information about points of interest (on your city) such as shopping mall, train stations, …?	Daily Twice a week Weekly Twice a Month Monthly
5.	Via which tool do you find location of points of interest?	Google Maps Apple Maps Map on website of Point of interest
6.	What are your ICT-skills? Please select the options that are characteristic for you out of the list.	I know how to use digital applications in the market I develop my own simple applications via free web building software (wordpress, wix) I develop ICT-tools via specialized software

Smart - Mobility Concern Profile

Smart - Mobility Concern	Question	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	I think in my city there are not enough smart solutions/applications dedicated to mobility	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
2.	I think that having all relevant mobility services in my city available via one access point is necessary	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
3.	I think that current providers of mobility services don't work enough together to enable citizens to plan their journeys in more ecological and multimodal ways	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree

Usability questions

Perceived ease of use	Question	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	I had to search a long time before I could insert/find my personal information	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
2.	I like a simple and common way to login, e.g. using a social media account (Facebook, Google) or OpenID (OID) is an open standard and decentralized protocol that allows users to be authenticated by certain co-operating sites using a third party service.	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
3.	I find the application easy to use	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
4.	I need some instructions before I can use the mobile application	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
5.	It is easy to navigate through the menus	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
6.	I could not find easily the information I was looking for.	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
7.	The application is in line with users needs	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree

Ease of access

Perceived ease of access	Question	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	The web-application is compatible with my browser (I could open the web-application in my browser) If NO => 1.b: which browser do you use? Open question	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
2.	I could log in the application without any restriction If No: Which restrictions did you encounter? Open question	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
3.	I find it an advantage to have applications relevant to my city available via one access point.	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
4.	Learning how to work with the application is	1 Very difficult 2 difficult 3 neither difficult nor easy 4 easy 5 Very easy

Usefulness

Usefulness	Question	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	The application helped me in finding the right information	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
2.	I think this application is very useful to access real-time information. Note: To be further specified based on the different types of real-time information	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
3.	The application enabled me to fulfil the objective set (we have concrete test scenarios in the early pilot phase)	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
4.	The application enabled me to plan a personalized route	1 strongly disagree 2 disagree

Usefulness	Question	Scale 1-5, No answer (captured as specific answer and not as missing)
		3 neither disagree nor agree 4 agree 5 fully agree
5.	I have been able to find an appropriate parking slot *Barcelona: I have able to find appropriate transport modes*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
6.	Using this application I was able to save time	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
7.	I like that I am notified on my status (parking app) *Barcelona: I like that I am notified on my mobility needs*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
8.	I feel this application allows me to be ecological friendly	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
9.	I like that I can check my parking status *Barcelona: I like that I can check my mobility status*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
10.	I like that I can pay for services via my application	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
11.	I have a feeling the application improved my parking and mobility experience *Barcelona: I have a feeling the application improved my mobility experience during conferences*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree

Information quality

Information quality	Question	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	The quality of this application is	1 Not satisfying at all 2 Not satisfying 3 moderately satisfying 4 very satisfying 5 extremely satisfying
2.	The trustworthiness of this application is	1 Not satisfying at all 2 Not satisfying 3 moderately satisfying 4 very satisfying 5 extremely satisfying
3.	The accuracy of information in the application is	1 Not satisfying at all 2 Not satisfying 3 moderately satisfying 4 very satisfying 5 extremely satisfying
4.	The language/terminology used in this application is clear and understandable	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
5.	The overall look and feel of this application is …	1 Not interesting at all 2 slightly interesting 3 moderately interesting 4 very interesting 5 extremely interesting
6.	I have to reveal personal information for using this application	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
7.	Using this application concerns me about my privacy rights Note: Question to be asked also in the frame of an Interview/Focus group	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree

Attitude/Intention

Attitude	Question	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	Using this application makes life a lot easier	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
2.	I find the various functions in this application well integrated	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
3.	I like using this application	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
4.	I would recommend this application to others	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
5.	Would collaboration with other mobility solutions/ Including other open data sources help improve the application?	YES/No If yes go to 6b
5b	Which further datasets would you suggest to be added…	Open field
6.	When I use this application: I have new ideas in mind for creating other applications / I have some ideas on how to use this application to create my own applications Important especially for people categorizing themselves as developers	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
7.	I am interested in participating in events where new applications will be developed Important especially for people categorizing themselves as developers	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree

SMART MOBILITY Potential

	Did your use of the application led to change in behaviour in mobility or mobility experience	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	I discovered more potential interesting parking places than before *Barcelona: I discovered more interesting conference mobility options than before*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
2.	I discovered parking spots faster than before *Barcelona: I discovered conference mobility options faster than before*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
3.	I discovered alternative parking spots than I usually took in a more efficient way than before *Barcelona: I discovered alternative mobility options that I otherwise normally won't think of*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
4.	I can now consider and plan multimodality journeys better than before *Barcelona: I can now consider and plan multimodal journeys better for my congress mobility needs than before*	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree
5.	I can now plan my travel journeys in a more ecological way Note: To be used in a more advance pilot stage	1 strongly disagree 2 disagree 3 neither disagree nor agree 4 agree 5 fully agree

Platform User Survey

Platform User survey	Evaluation Questions	Scale 1-5, No answer (captured as specific answer and not as missing)
1.	Is the platform desirable to use? • Using the platform has been a pleasant experience (Likert scale) • It is desirable for me to learn how to use the platform (Likert scale)	
2.	Is it desirable to have this platform	

Platform User survey	Evaluation Questions	Scale 1-5, No answer (captured as specific answer and not as missing)
	• The platform is a positive tool for Intelligent Mobility	
3.	Does it enhance the effectiveness in performing your activities? • Use of the platform increases the effectiveness of performing tasks (Likert scale) • Using the platform enables me to have more accurate/complete information (Likert scale)	
4.	Are your tasks accomplished more quickly? • Using the platform allows me to carry out my tasks more quickly (Likert scale)	
5.	Does interacting with the platform require a strong effort? • My interaction with the platform is effortless (Likert scale) • The platform uses a clear and understandable terminology (Likert scale) • It is easy to use the platform without help (Likert scale)	
6.	Is the platform easy to use? • The platform easy-to-use (Likert scale) • The platform is easy to navigate (Likert scale) • Learning to use the platform is easy (Likert scale)	
7.	Is it easy to get the services to do what you want to do? • I can use the platform in a manner that allows me to obtain the information I want (Likert scale) • It is easy to find information on the platform (Likert scale)	
8.	Do you expect to use the platform on a regular basis in the future? • The platform is worth using (Likert scale) • I plan on using the platform on a regular basis in the future (Likert scale)	
9.	Are you going to advise your colleagues to use the platform in the future? • I plan on advising other colleagues on using the platform on a regular basis in the future (Likert scale)	