DELIVERABLE

Project Acronym: EPIC

Grant Agreement number: 270895

Project Title: European Platform for Intelligent Cities

Deliverable 8.1B: Strategic Evaluation Methodology

Revision: [2.0]

Authors:

Andreas Menychtas (NTUA)
Catalina Vasilecu (IM)
Joshua Cooper (HIL)
Julie Boulton (MCC)
Pavlos Kranas (NTUA)
Anna Triantafyllou (ATC)
Philippe Perennez (NAV)
Shenja van der Graaf (IBBT)
Wim Vanobberghen (IBBT)
Wouter Van den Bosch (IBBT)
Athanasios Dalianis (ATC)

Internal Reviewers:

Ana Garcia (ENoLL)
Hugo Kerschot (ISP)
Keith Osman (BCU)
Susie Ruston (21c)

Project co-funded by the European Commission within the ICT Policy Support Programme		
Dissemination Level		
PU	Public	P
PP	Restricted to other program participants (including the Commission Services)	

Revision History

Revision	Date	Author	Organisation	Description
0.1	12/01/12	SvdG	IBBT	Initial draft
0.2	25/02/12	SvdG	IBBT	Outline sections 3, 4, 5, annexes
0.3	08/03/12	SvdG	IBBT	Annexes, ethics
0.4	12/03/12	SvdG/WV	IBBT	Annexes, section 4
0.5	13/03/12	WV	IBBT	Section 5
0.6 - 0.18	14/03/12 - 25/03/12	SvdG/WV/AM	IBBT/NTUA	Input in all sections
0.19	27/03/12	WV	IBBT	Minor corrections on structure and content
0.20	27/03/12	AM	NTUA	Consolidation and format corrections
0.21-0.24	27/03/12 – 30/03/12	SvdG/WV/AM	IBBT/NTUA	Final contributions and formatting
0.25	30/03/12	AM	NTUA	Internal Review version
0.26	04/04/12	HK	ISP	Review corrections
0.27	10/04/12	SR	21c	Review, comments and corrections
0.28	11/04/12	KAO	BCU	Proof reading and minor corrections
0.29	11/04/12	AG	ENOLL	Review comments and corrections
0.30	13/04/12	AM/WV/SvdG	NTUA/IBBT	Post Review version, consolidation of reviewers' comments and corrections

1.0	19/04/12	AM	NTUA	Final Version
1.1	09/06/12	AM	NTUA	Initial Changes on Section 4 following reviewers' recommendations
1.2	19/06/12	AM	NTUA	Test cases input
1.3	22/06/12	AM	NTUA	Updated Test cases
1.4	25/06/12	AM, PK	NTUA	Finalising Test cases, mapping between test cases and user requirements
1.5	26/06/12	AM	NTUA	Finalization of the test cases for the platform
2.0	28/06/12	AM	NTUA	Final Version

Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Table of Contents

1 Executive Summary 9

2 Introduction 10

3 EPIC Evaluation Strategy 12
3.1 EPIC Evaluation Dependencies 13
3.2 Evaluation Approaches 14
3.2.1 Living Labs Approach for EPIC Innovation 15
3.2.2 Measuring User Experience and Acceptance of EPIC 17
3.2.3 Evaluating the "Level of Smartness" in EPIC 19

4 EPIC Platform & Technologies Evaluation Methodology 22
4.1 EPIC Platform Evaluation Scope 22
4.2 EPIC Platform Evaluation Plan 22
4.2.1 Core Cloud Infrastructure 23
4.2.2 Front-end and Mobile Services 36
4.2.3 Development Environment 43

5 EPIC Pilot Applications Evaluation Methodology 45
5.1 State of the Art in Evaluating Web and Mobile Technologies: Challenges and Good Practice 45
5.2 EPIC Pilots State of the Art 46
5.2.1 State of the Art – Energy Monitoring 46
5.2.2 State of the Art – Relocation 48
5.2.3 State of the Art – Urban Planning 49
5.3 Criteria for Pilot Testing and Evaluation 50
5.3.1 Objectives for EPIC Pilots 50
5.4 EPIC Methodology for Pilot Testing 55
5.4.1 Phase 1: Closed User Group 56
5.4.2 Phase 2: Open User Group 56
5.4.3 Phase 3: Evaluation 56
5.4.4 Timing Three Phases and Cycles and User Distribution 57
5.5 Overview of Evaluation Instruments 58
5.5.1 Framework 58
5.5.2 Description of Instruments 59

6 Set-up of Pilot Sites 64
6.1 Technical Environment/Set-up 64
6.1.1 Explicit Feedback Gathering via On-screen Surveys 64
6.1.2 Implicit Feedback Gathering via Automatic Logging 64
6.2 Framework for Recruitment, Training, Support & Further Facilitation 65
6.2.1 Protocol 65
6.2.2 Recruitment of Users and Recruitment Letters/Calls 66
6.2.3 Training 72
6.2.4 Support Levels 76
6.2.5 Work Plan and Time Schedule – Assessment/Iteration Process 77
6.2.6 Possible Risks and Corrective Actions 80
6.2.7 EPIC Partners Responsibilities in Testing 81
6.2.8 Communication Strategy for Strategic Evaluation 85

6.2.9 Ethical Considerations 85
7 Conclusions 87
8 References 88
9 Glossary of Acronyms 92
Annex A. Questionnaire Relocation Service 93
Annex B. Data Logging Per Cycle – Relocation Service 114
Annex C. Interview Guide (Generic) 119
Annex D. Interview Guide Keith's House (Generic) 122
Annex E. Questionnaire Urban Planning Service (French Version) and Data Logging PerCycle 124
Annex F. Smart Environment: Questionnaire and Data Logging Per Cycle .145
Annex G. Detailed Work Plan and Time Schedule 159
Annex H. Ethics Research Checklist 169
Annex I. EPIC Pilot and User Management 171

List of Figures

Figure 1: EPIC Evaluation Overview 13
Figure 2: EPIC Evaluation Aspects 14
Figure 3: Smart City Factors 20
Figure 4: Pilots List View 172
Figure 5: Add pilot view 172
Figure 6: Pilot Details View 172
Figure 7: Pilot Roles & Pilot Data Types for relocation Pilot example 173
Figure 8: Add view for pilot roles & data types 174
Figure 9: All available portal user groups 175
Figure 10: Add a user group 175
Figure 11: Creation of a new portal user 176
Figure 12: Search for newly created user 176
Figure 13: Adding users to groups 176
Figure 14: Users Added to group 177
Figure 15: Assign Permissions to groups 177
Figure 16: Assignment of roles 178

Figure 17: Assign permissions for portlets....178
Figure 18: User Details View....179
Figure 19: Adding a user to database....180
Figure 20: User selection for user pilot assignments....180
Figure 21: Pilot selection for user pilot assignments....181
Figure 22: Assigning user roles and user data types....181

List of Tables

Table 1: TAM Measures....17
Table 2: Measures of EPIC "Smartness" Evaluation....20
Table 3: Test Case CC-1-1....24
Table 4: Test Case CC-1-2....24
Table 5: Test Case CC-1-3....25
Table 6: Test Case CC-1-4....25
Table 7: Test Case CC-1-5....26
Table 8: Test Case CC-1-6....28
Table 9: Test Case CC-1-7....28
Table 10: Test Case CC-1-8....29
Table 11: Test Case CC-2-1....30
Table 12: Test Case CC-2-2....30
Table 13: Test Case CC-3-1....31
Table 14: Test Case CC-3-2....32
Table 15: Test Case CC-3-3....32
Table 16: Test Case CC-4-1....33
Table 17: Test Case CC-5-1....34
Table 18: Test Case CC-5-2....35
Table 19: Test Case CC-5-3....35
Table 20: Test Case FE-1-1....36
Table 21: Test Case CC-1-2....37
Table 22: Test Case FE-1-3....37
Table 23: Test Case FE-2-1....38

Table 24: Test Case FE-2-2 39
Table 25: Test Case FE-2-3 40
Table 26: Test Case FE-3-1 41
Table 27: Test Case FE-4-1 41
Table 28: Test Case FE-4-2 42
Table 29: Test Case DE-1-1 43
Table 30: Test Case DE-1-2 44
Table 31: Pilot Time Framework and User Numbers 57
Table 32: Evaluation Criteria and Instruments 58
Table 33: Closed Group 66
Table 34: Open Group 67
Table 35: Evaluation Phase 69
Table 36: Roles in Training 72
Table 37: Training Needs 73
Table 38: Training Tactics 75
Table 39: Support Levels 76
Table 40: Work Plan 78
Table 41: Testing Responsibilities 81
Table 42: Closed Group Phase - user actions to be logged (Web Component) 114
Table 43: Closed Group Phase - user actions to be logged (Mobile Component) 115
Table 44: Open Group Phase - user actions to be logged (Web Component) 116
Table 45: Open Group Phase - user actions to be logged (Mobile App) 117
Table 46: user data to be logged during cycles closed and open user group phase 143
Table 47: Pilot preparation closed group phase 159
Table 48: Pilot implementation closed group phase 160
Table 49: Pilot data analysis and feedback closed group phase 161
Table 50: Pilot preparation open group phase 161
Table 51: Pilot implementation open group phase 163
Table 52: Pilot data analysis and feedback open group phase 165
Table 53: Keith's House preparation 166
Table 54: Keith's House implementation 167

Table 55: Keith's House evaluation 167
Table 56: Activities Evaluation Phase 168

1 Executive Summary

This document sets out to formulate EPIC's evaluation strategy. The evaluation methodology capitalises upon the Living Lab approach and the Technology Acceptance Model (TAM) methodology [9] , which has been customised to mirror the specific needs of EPIC. Thus, the evaluation strategy aims to determine the main factors that affect the platform and pilot acceptance and ensure the best quality results.

The EPIC platform will be evaluated firstly by the technical experts of the consortium, in order to achieve high quality standards and will then be tested by the pilot application developers. When it comes to the end-users in the pilot trials, additional feedback is expected that will improve the EPIC platform's functionality and operation as well as the platform's performance, response time etc. Moreover, as described in D7.1 Pilot Operations Plan, the pilot evaluation is based upon five iterative cycles that reflect the two distinct periods in EPIC piloting, namely with the Closed User Group and then with the Open User Group. Both quantitative and qualitative aspects are presented, in order to provide an overview of end-users' and other stakeholders' stance towards evaluation aspects and to capture suggestions for further development and applicability of the integrated service platform. Statistical analysis of users and usage is also explored, in order to identify potential correlations that underpin relationships between the variables evaluated. Users will mainly evaluate the easiness of use, usefulness, quality of content, and attitude towards the pilots, while other stakeholders such as city administrators and SMEs will also be asked about aspects including user management tools and ownership. The results of the evaluation processes will be included in the upcoming WP8 deliverables and exploited both internally in the project and externally towards the scientific and business communities. It is believed that this approach will validate the processes supported and capture suggestions and considerations that will ensure sustainability of the EPIC platform.

Following the recommendations in the second project review, in version B of the report, section 4.2 - *EPIC Platform Evaluation Plan* was updated. The platform testing process was described in more detail and specific test cases, covering all platform aspects and requirements, have been produced.

2 Introduction

This evaluation strategy document provides an overview of the methodology and methodological considerations that underpin the assessment and the evaluation of the EPIC project.

The main aim of WP8 is to ensure that the EPIC services are consistent with the planned objectives set out by the EPIC project based on real stakeholder' needs as explored and defined in WP2, whose results are summarised in the *D2.4 Report on Technical Requirements* document.

The objectives of testing and evaluation approaches are to ensure that the integrated EPIC service platform is designed and implemented in a way as to satisfy the requirements and needs of the end-users and stakeholders. This will be accomplished through the verification and validation of the results during closed and open test cycles with the participatory involvement of the end-users and some other stakeholders such as cities and SMEs.

To validate the projects proof of concept, EPIC will deploy an evaluation strategy that focuses on the experiences of the end user. The plan will be operationalised by conducting on- and offline questionnaires, interviews and focus groups, participatory observation and event logging. In so doing, it aims to identify the strengths and the weakness of the EPIC platform for all beneficiaries according to the initial goals set up by the project and refined by evaluations of the different pilot phases. This will both strengthen EPIC's proof of concept and reinforce with real data the roadmap developed in WP6.

- The interim findings from all pilot tests (phase 1 and phase 2) will be described in the *D7.2 Report of 3 pilots* and *D7.3 Pilot Evaluation Report*.
- The summary of results will be documented in a synthesis evaluation report (*D8.2 Evaluation Report*).
- The data collection in the pilot services will also feed *D8.3 Proof of Concept Results*.

The structure of this document is as follows:

- Section 3 describes the primary objectives of EPIC's evaluation strategy and the fundamental principles on which it is based.
- Section 4 describes the validation plan for the platform's core functionalities and technical features.
- Section 5 focuses on the pilot applications themselves, providing a state of the art analysis of their specific features and describing an analytical plan for their evaluation.

- Section 6 gives an analytical view of the testing phases that will validate EPIC, describing the initial steps that have to be taken, for example how the end-users are registered and given access to various applications, the different testing groups, and the type of questionnaires etc.
- Section 7 concludes the document outlining the next steps to be undertaken.
- Finally in the Annexes additional information for the evaluation details is provided.

3 EPIC Evaluation Strategy

EPIC is a visionary European Project, which will accelerate the move towards "Smart Cities" by creating an innovative ecosystem and best practices for all stakeholders. The main challenge for EPIC is to "*Drive innovation and deliver more effective and scalable 'smart' city services across Europe*" and to achieve this, EPIC combines several unique characteristics.

In WP8, the value of the proposed approach will be evaluated from all project aspects and the results will be exploited within the project to strengthen its effectiveness as technical and business solution. To this end, the unique characteristics of EPIC need to be combined with state of the art evaluation methodologies to develop a proper strategy on the processes that will be followed in the project for the evaluation and validation of its outcomes.

For ease of delivery and to ensure the greatest impact, the evaluation strategy will cover three distinct outputs of the project: a) the EPIC Platform, b) the Pilot Services and Applications and c) the Roadmap – all of which are briefly described below

One of key outputs of EPIC is (a) Smart City Test and Development Cloud **Platform**, which embraces innovative aspects to:

- Provide a secure, scalable and cost-effective computing infrastructure for the deployment of smart-city services using web-services and portlets
- Ensure interoperability with existing or new services and support for current and future devices by adopting open-standards
- Fast and agile discovery, deployment and provisioning of "intelligent" services, reducing the "time to market" for service and applications developers
- Provide easy and secure access to information and services from the Public Sector and/or SMEs.
- To provide the underpinnings for a smart-city innovation eco-system supporting the SME ICT community

For the effective design, implementation and validation of the EPIC Platform three (b) **pilot applications** are used that pose supplementary requirements and exploit different EPIC elements. These pilots offer innovative services for Relocation, Urban Planning and Smart Environment making use of the platform features for Semantics, Portlets and IoT advancing the "intelligence" of all involved stakeholders: City Administrators, Citizens and SMEs.

EPIC supports the aforementioned stakeholders with (c) a detailed **roadmap** that covers the complete lifecycle of the service delivery process. The roadmap analyses the fundamental principles involved in becoming a "Smart City" identifies sustainable business models and outlines best practices for all involved parties. It is considered as a key outcome of the project and complementary to the EPIC platform

for the transition from the autonomous eGovernment approaches to a pan-European ecosystem of "smart" services.

3.1 EPIC Evaluation Dependencies

The goal of this WP is the overall evaluation and validation of EPIC and its three dimensions through effective strategy and processes. The following figure depicts an overview of the EPIC strategy and the processes that will be implemented:

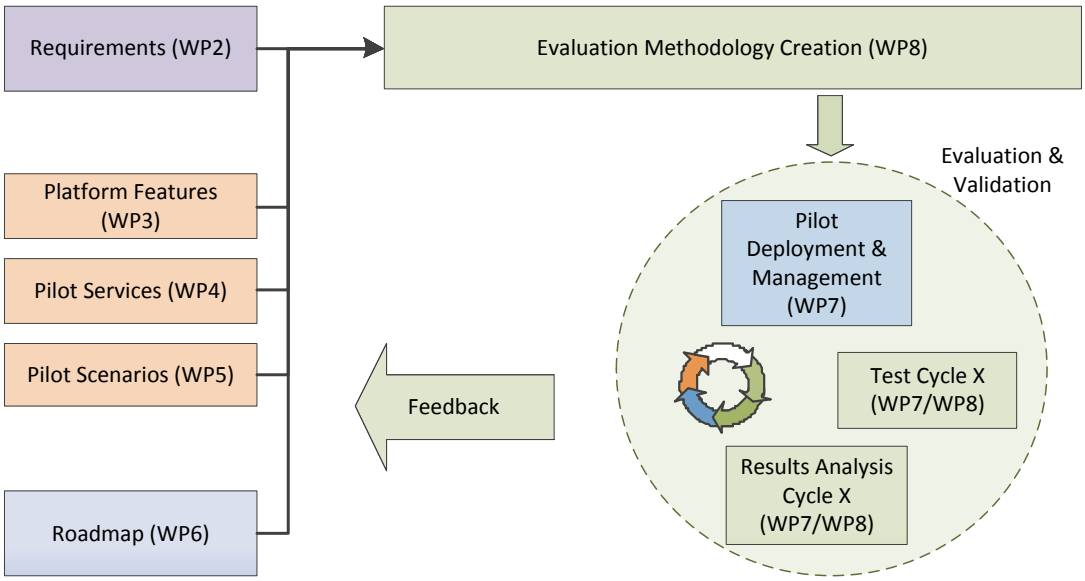


Figure 1: EPIC Evaluation Overview

The baselines for our evaluation strategy are the outcomes of the requirements analysis that took place in **WP2**. WP2 analysed, categorized and prioritised the requirements to fulfil all project objectives. To this direction, the requirements specification includes:

- technical and business requirements,
- functional and non-functional requirements,
- platform and pilot specific requirements,
- development environment requirements.

In addition, the platform features, identified in WP2 and implemented in **WP3** and **WP4**, is another valuable input for the definition of our strategy. The platform features and the respective services cover all innovative aspects of the project from the cloud infrastructure to the service catalogue and the portal front-end. The objective of this WP is to validate that the chosen technologies and respective implementations are in agreement with the requirements specifications in WP2 and cover all pilot application needs. The validation of the latter will be achieved the detailed pilot scenarios that are produced in the frame of **WP5**. The qualitative and

quantitative evaluation processes will also take into consideration the EPIC Roadmap of **WP6** especially in the final cycles.

Based on the evaluation strategy, the pilot applications will be deployed on the platform (**WP7**) and the test cycles will take place. The results of the testing process will be analysed and valuable feedback will be provided the respective WPs for tuning their work and improving their outcomes against the user requirements.

EPIC's evaluation strategy is multimodal covering all main features of EPIC as required by the respective stakeholders. From the beginning of the project the key aspects have been identified for a) security, b) usability, c) interoperability, d) ethics, e) "smartness", f) privacy and g) performance. As presented in the following figure, these aspects will be evaluated by the groups to whom they are most relevant. For instance, the developers and technology providers will focus, among others, on the performance of the platform and the deployed services while the citizens and the pilot Living Labs (LL) on the rich user experience through high usability and, if possible, if and how these services qualitatively are considered to seem to impact "smartness" for the various stakeholders involved.

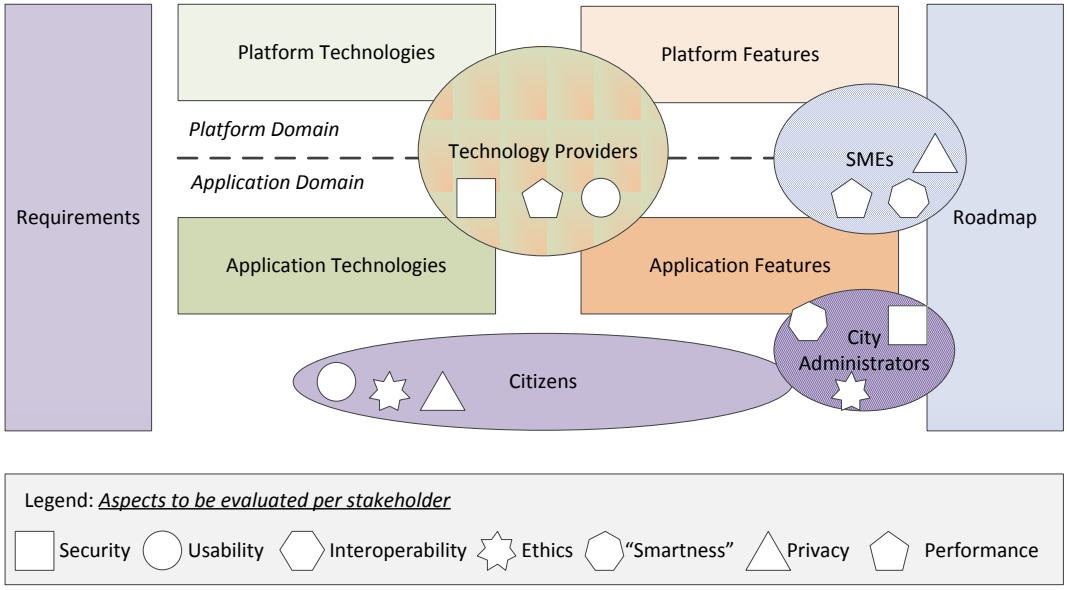


Figure 2: EPIC Evaluation Aspects

The objectives of all stakeholders that will be integrated in our methodology will be presented in the next section.

3.2 Evaluation Approaches

When developing new ICT products it is essential to investigate the needs and requirements for new services and solutions and to elaborate appropriate concepts that relate to these specified needs. It is also essential to test the new ICT products with the target group in a context which is as close as possible to real life settings, to investigate the usability and user experience of the new technology as well as possible impacts of the new technology to the target-groups' lives.

In order to achieve a proper introduction to EPIC's approach regarding the evaluation of each pilot from these two angles mentioned above, this section provides the broader theoretical framework that informed the creation of the evaluation methodology presented in sections 4, 5 and 6. It first outlines the principles of the Living Lab approach that underpins the development, testing and evaluation of EPIC and its services. Secondly, since the aim is to test the user experience and the user acceptance of EPIC, we elaborate theoretically the measures that underpin the evaluation of these two dimensions. Thirdly, it provides clarification of the concept of 'smart city' and measures that are identified in current literature to measure the 'level of smartness'.

3.2.1 Living Labs Approach for EPIC Innovation

Historically, innovation has been characterised as a linear process, driven and controlled by the industrial developers of products for the marketplace. In the information society, two trends can be detected that led to different conceptions of innovation.

Firstly, innovation is increasingly seen today as a catalyst for growth and competitiveness and has been enthusiastically promoted at regional, national and international level and included in new policy formulation. The linear concept has evolved more towards a network model involving partners supporting innovation, often focused on cycles of innovation activity. The greatest change in how we should consider innovation is coming about in open innovation. It postulates that companies should be open to outside ideas since innovation can only thrive when a company utilises a network of partnerships beyond its traditional internal resources [1] . The second trend has been the growing importance of the role of the user in the design process for product and service innovation. The resulting quality and appropriateness of a product or service will suffer if users in one way or another are not involved in the processes that make up the design stage.

While many new approaches emerge that involve users in one way or another in a stage of the development process (user centred design, crowdsourcing, wisdom of crowds, lead user), until recently the level of partnerships has focused on science parks, business incubators and other types of activities that support fledging new companies. In recent years, this context of abandoning a linear view on innovation and recognising the importance of users, a group of European organisations that characterise themselves as Living Labs have emerged. The collective name reflects their common philosophy and aim to set up a research laboratory that supports research and development and innovation activities by testing and validating them with users in their real life context and environment. Living Labs are an innovation area where users co-create with developers and researchers and are the first attempt to structure and provide governance to user involvement in a way that can be addressed by companies, research institutions, public organisations and policy makers. On November 20th 2006, under the Finnish EU presidency, the European Network of Living Labs (ENoLL), a project partner of EPIC, was set up. Since then, six successive waves of new living labs, each of them under the auspices of the EU,

have taken place and ENoLL now has about 250 members in the European Union [2] [3] [4] [5] [6] [7] .

According to the report 'Study on the potential of the Living Lab approach including its relation to experimental faculties for future internet related technologies' produced for the DG INFSO in 2009, ALTEC Consulting concluded that the essence of European Living Labs holds potential disruptive and long lasting transformational effects on the European industry, markets, regional economics and societal landscapes. Living Labs have proven to be feasible regarding the operational interaction among key pillars of society (1. citizens and community, 2. industries/business, 3. public administrations, 4. Universities and research institutes) addressed to human centred, open innovation, particularly in the early stages of ideation and concept design along the product/service development process. ALTEC assesses moreover Living Labs as truly European model of innovation that can supplement the known limitations in market size by leveraging on local communities and diversity (of actors, topics, requirements) for the provision of co-creative, user centred innovation to industrial players and especially to SME's. Thirdly, ALTEC claims that Living Labs have already generated a tangible impact in some industrial sectors/businesses, especially ICT and communication) and also have the potential to provide cross domain services in areas such as energy, environment, transportation, rural, health and social care, leisure and culture etc., mostly where the involvement of citizens is essential for a more complete definition of product/service features and feasibility. Fourthly, ALTEC identified the establishment and working of ENoLL as a necessary and beneficiary tool for assuring interoperability and thus creating on the one hand opportunities for sharing methodologies and experiences and on the other hand harmonise and diffuse best practices. The current APOLLON project, a Commission-funded initiative to bench mark and share best practice among Living Labs, will help to mainstream this new and important means of innovating [8] .

EPIC aims, in the current context of an economic crisis and growing citizen expectations that puts pressure on European cities, to provide better and more efficient infrastructures and services often for lower costs by utilising the above identified benefits of the user driven, open innovation environments of Living Labs. It will contribute in this way to the creation and development of innovative ICT-based solutions that live up to their key potential for resolving this dilemma for European cities to enable them to work 'smarter'.

The EPIC project presents an opportunity to examine the requirements of systems development in a Living Labs context. Moreover, EPIC aims at redressing the shortcomings of current Living Lab outputs that is still fragmentary by giving the opportunity for smart cities to learn from one another and exchange practical working models in a real-life context. In this sense, EPIC will represent a logical next step in EU policy as it is intentionally designed by SMEs and larger industry players and will operationalize the benchmarking work of pioneering projects like Apollon.

The EPIC Platform will therefore combine the industrial strength of IBM's 'Smart City' vision and cloud computing infrastructure with the knowledge and expertise of leading European Living Labs and municipalities of Brussels, Issy-Media and Manchester to ensure the development of a European 'innovation ecosystem' that provides an extensive range of opportunities for sustainable, user-driven web-based services for citizens and businesses.

3.2.2 Measuring User Experience and Acceptance of EPIC

The goal of the evaluation methodology is to systematically examine the acceptance and value of the EPIC platform and services underpinning the user experience as well as determining the main determinants of acceptance (i.e. the factors that affect the levels of acceptance among the stakeholders). In the last three decades, much attention has been given to the identification the conditions or factors that facilitate technology integration into a business context, thereby highlighting technology acceptance. [8] The Technology Acceptance Model (TAM) is arguably the most popular in technology acceptance studies [10] [11] [8] [1]. It has been widely accepted by the information system research community and is further verified and extended by other research domains. Overall, it has been found that the TAM has been a parsimonious representation of the ways perceptions and attitudes impact technology use [15].

Over the years, researchers have used the TAM framework to examine users' acceptance toward various technology applications such as the Graphic User Interface [16], accounting applications [17][8] , the Internet [18][19], and online consumer behaviour [20]. While most studies have focused on the introduction of technologies into organisations, there is less empirical evidence available that address voluntary usage of technologies such as mobile phones or web services by independent end users. This evaluation study, therefore, seeks to extend the literature by applying the TAM to study the factors affecting technology acceptance among various public and private, non-commercial and commercial stakeholders. In addition, to our knowledge, no previous research has included collectively user information such as age, education, income and ICT use (particular in the context of governance services in urban settings) in a single TAM-based model, even though these variables are relevant in the context of explaining the take-up of cloud-based services.

The following table shows selected studies and the most common used measures.

Table 1: TAM Measures

[1] TAM is founded on the Theory of Reasoned Action (Fishbein and Ajzen, 1975) [12] and the Theory of Planned Behavior (Ajzen, 1991) [14], positing that beliefs and attitudes are related to individuals' intentions to perform.

Reference	Topic	Measures
Cheong & Park (2005) [21]	Mobile Internet	Perceived usefulness; Perceived ease of use; Perceived playfulness; Perceived price level; Perceived contents quality; Perceived system quality; Internet experience
Dapper (2007) [22]	Enterprise 2.0	Performance expectancy; Effort expectancy; Attitude toward using technology; Social influence; Facilitating conditions; Self-efficacy; Anxiety; Behavioural intention; Voluntariness of use
Hung et al. (2003) [23]	WAP services of user & non-user	User satisfaction; Personal innovativeness; Ease of use; Usefulness; Peer influence; External influence; Self-efficacy; Facilitating condition; Attitude; Subjective norm; Perceived behavioural control; Intention
Kwon et al. (2000)[24]	Cellular phone adoption & use	Individual characteristics; Perceived ease of use; Perceived usefulness; Enjoyment/fun; Social pressure
Lu et al. (2003) [25]	Meta-analysis Mobile Internet	Technology complexity; Individual differences; Facilitating conditions; Social influences; Wireless Trust environment
Nysveen et al. (2005) [26]	Mobile Services	Composite reliability; Expressiveness; Enjoyment; Usefulness; Ease of use; Normative pressure; Behavioural control; Attitude; Intention
Porter & Donthu (2006) [19]	Internet usage	Perceived ease of use; Perceived usefulness; Perceived access barriers; Attitude; Internet usage
Yang (2005) [27]	Mobile Services	Perceived usefulness; Perceived ease of use
Teo et al. (2008) [29]	Computer use (in education)	Perceived usefulness; Perceived ease of use; Behavioural intention; Computer attitudes
Wu (2011) [30]	Cloud services	Marketing efforts; Social influence; Perceived benefits; Attitude; Security and trust; Perceived usefulness; Perceived ease of use; Behavioural intention

In the context of EPIC, based on our literature review, the following factors have been identified as measures for evaluating and determinate user experience and user acceptance:

- perceived ease of use: the degree to which a person believes that using a particular system would be free from effort

- perceived usefulness: the degree to which a person believes that using a particular system would enhance his or her job performance.
- content quality: the degree to which the content of the system is estimated by the user as being of enough quality and useful to perform the job
- attitudes: the degree to which the offered system causes a positive or negative attitude to its use
- intention: the degree to which the system does not undermine the intention of its use
- scenario: the degree to which the scenario of use of the system enables or disables a user to perform a job successfully.

3.2.3 Evaluating the "Level of Smartness" in EPIC

Since one of the key objectives of EPIC is to make cities 'smarter', part of our evaluation methodology will focus on the '*level of smartness*' that EPIC will generate in the pilot cities. We therefore elaborate first the EPIC concept of a 'smart' city and secondly present an overview of the qualitatively measures we will adopt for assessing the impact of EPIC.

3.2.3.1 The EPIC Concept of 'Smart' City

Several definitions have been proposed the past years to define the concept of 'smart' city for academic and practical purposes (see [40], [41], [42], [43],[44], [45]).

As stated in the DOW and in D2.1 - '*Epic Project Vision*' that consolidated the EPIC view on 'smart cities' and highlighted the challenges for providing and consuming 'intelligent' public services in pan-European level, the definitions and the characteristics identified by the literature vary. Nonetheless, they collectively tend to suggest the use of innovative ICT-based technologies such as the Internet of Things or Web2.0 to deliver more effective and efficient public services that improve living and working conditions and create more sustainable urban environments. In this vision, EPIC's mission is to create a cloud-based service delivery platform for the public sector that enables cities in Europe to become more 'innovative', connected and efficient. Consequently, the EPIC vision statement is therefore the following: ' *to be the first choice service innovation and delivery platform for cities across Europe, where any city can cost-efficiently share, access and adapt a range of services to meet the needs of most, if not all, of their citizens.*'

3.2.3.2 Measures for 'Levels of Smartness' in EPIC

Several projects addressing the 'smart city' have been undertaken or are undertaken currently in Europe. Giffinger and his collaborators proposed in 2007 a model that maps the different dimensions within smart cities, as well as the various factors

constituting each of these. The figure below presents these dimensions and factors. [45]:

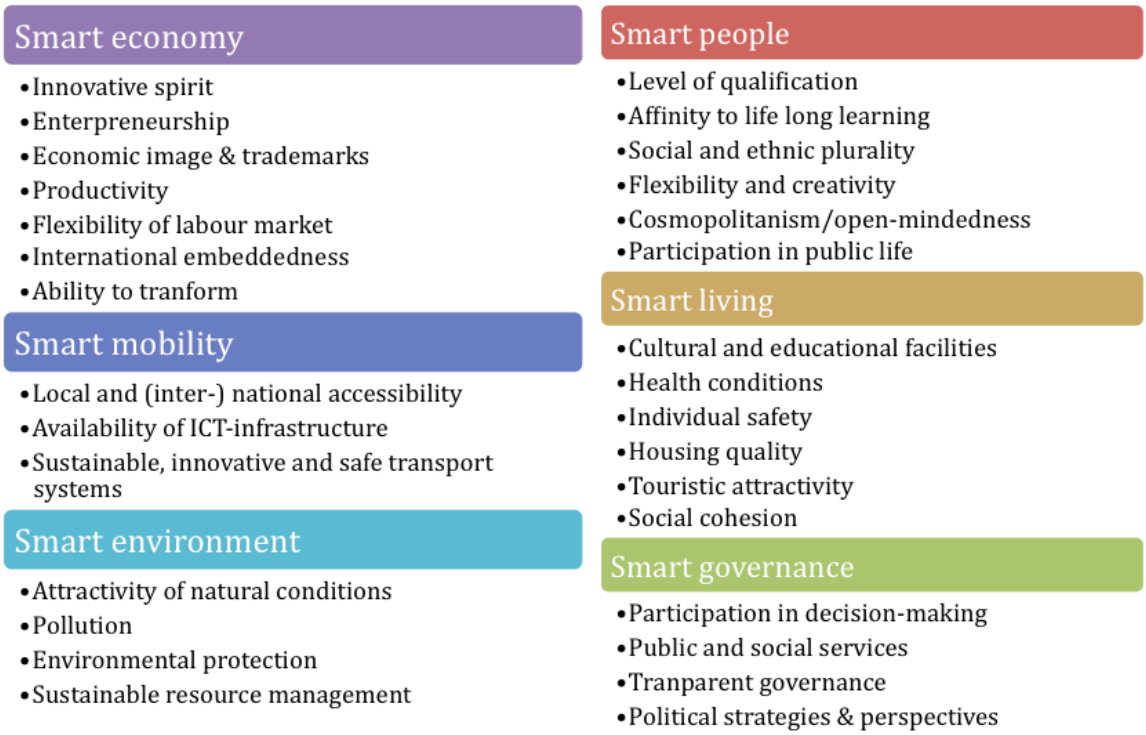


Figure 3: Smart City Factors

This table allows us to identify the dimensions within smart cities under which the platform and pilots can fall, as well as the factors which we will use as measures in order to evaluate in a qualitative way whether EPIC is likely to contribute to the move of European cities to become 'smart(er)'. The specific objectives of each pilot that relate to the identified dimensions will be further explored in section 4. We can approach whether EPIC is likely to contribute to this aim by means of the platform or the pilots or the combination of both.

Table 2: Measures of EPIC "Smartness" Evaluation

Dimension	***Measure***	***Pilot or platform***
Smart mobility	*reduce mobility need and better mobility planning* *local, national and international accessibility*	*Urban planning – Relocation*
Smart environment	*Environmental protection by reducing energy consumption*	*Smart Environment*
Smart living	*Improving quality of life*	*Relocation – urban planning*

Smart economy	*Entrepreneurship, innovative spirit and flexibility of labour market*	*Urban planning – relocation – smart environment*
Smart governance	*Legal barriers* *Privacy* *Efficient online social and public services* *Cost effective* *Security of authentication and authorization processes*	*3 Pilots and platform* *3 Pilots and platform* *3 Pilots and platform* *3 pilots and platform*

4 EPIC Platform & Technologies Evaluation Methodology

Due to the nature of the project with the close involvement of end-users and Living Labs not only for the use and evaluation of the various application elements but also in the definition of the requirements, from its beginning, a detailed list of requirements to the EPIC platform was produced. As presented in WP2, this list included several categories of requirements, which were considered as valuable input to the consortium for the specification and implementation of the platform and supporting services as well as for the effective adaptation of the application elements to the EPIC ecosystem. Therefore the first step for the validation of the EPIC project outcomes is the evaluation of the EPIC platform as soon as it is available for use and deployment of the pilot applications. The platform evaluation process will exploit various methodologies for the qualitative and quantitative fulfilment of the core platform requirements as described in D2.4.

4.1 EPIC Platform Evaluation Scope

The EPIC Platform provides all the facilities necessary to support the complete lifecycle of building and delivering innovative web applications and services for cities, citizens and SMEs. Our methodology in WP8 will evaluate all innovative cloud aspects of the platform which are summarized below:

- **Agility**: Improved, rapid and inexpensive provision technological infrastructure resources to all involved stakeholders.
- **Device and location independence** which enables users to access systems using a web browser regardless of their location or what device they are using (e.g., PC, mobile).
- **Reduced costs and low entry barriers**: The costs can be greatly reduced as the infrastructure is provided by a third-party and does not need to be purchased for one-time or infrequent intensive computing tasks.
- **Scalability** via dynamic ("on-demand") provisioning of resources on a self-service real-time basis, without users having to engineer for peak loads.
- **Security and privacy** could eventually be improved and customized ad-hoc due to centralized management of data, services and resources.

4.2 EPIC Platform Evaluation Plan

The direct evaluation of the core EPIC platform will be performed mainly internally in the project unlike the pilot evaluation that will open involving the end users and Living Labs. However, the pilot evaluation will also provide indirectly some valuable qualitative feedback on the platform functionality and operation. Based on the citizens' responses for their experience using the various pilot applications deployed on EPIC platform useful outcomes will be produced on the perceived platform performance, response time, user-friendliness, etc.

The target groups for the platform evaluation are the people that directly use the platform features and consume its services. This mainly refers to the pilot application developers that work on the adaptation and implementation of the various pilot services on the platform as well as the technology providers the focus on the design and implementation of specific platform elements extending the core platform functionality. Due to the diversity of the pilot scenarios and the multi-modal platform services we expect that the evaluation will cover all aspects of the platform. This process is already initiated in WP4 and early outcomes are presented in D4.1. The platform evaluation will be completed in PM19 and the final results will be presented in D8.2 - *Evaluation Report* in PM24.

The methods that will be followed for platform evaluation will include:

- Surveys & Interviews with the target groups
- Observation
- Documentation (written material, documents, records, etc.)
- Statistics and performance tests for the platform elements where applicable

Following the requirements and feature analysis in WP2, we concluded that the platform evaluation has the following dimensions based on which the various processes are categorized:

- Core Cloud Infrastructure
- Front-end & Mobile Services
- Development Environment

In collaboration with WP4, for each one of the platform elements specific test scenarios will take place and detailed test cases will be examined as part of them.

4.2.1 Core Cloud Infrastructure

Platform Test Scenario #1: Services

In this scenario the platform processes that are related platform functionality for new services will be considered. More specifically the following aspects will be evaluated:

1. Functionality for deployment and registration of application services
2. Functionality for subscription and use of application services that are deployed on the platform
3. Interoperability of services and compliance to standards (including both SOAP and REST services)
4. Support for semantic annotation of services
5. Performance of the services deployed on the platform (high availability, identification of bottlenecks, delays, response time, etc.)

6. Usability for 1,2,3,4 (requirements for specific tools, libraries, etc.)

Based on the aforementioned aspects, the following test cases are identified:

Table 3: Test Case CC-1-1

ID	**CC-1-1**
Name	**Service Deployment (Both REST and SOAP)**
Description	In this test case, the deployment of a new service must be validated. *This in close relation to the test cases 1-2-3 of the EPIC platform, as defined in document D4.1.*
Source	This test case will validate the FR1, FR2 and DE1 User Requirements, as defined at the D2.4 document.
Prerequisites	An administrative user account must have been already defined at the platform layer, with appropriate roles, so as to be able to login to the main platform console and deploy the services.
Steps	1. Log-in to the EPIC Platform with an administrator userid. 2. Upload the service archive files to be deployed. 3. Deploy the new service
Outputs	*Not available yet*

Table 4: Test Case CC-1-2

ID	**CC-1-2**
Name	**Service Registration to EPIC Catalogue**
Description	Verify that a service can be manually added to the service catalogue.
Source	This test case will validate the FR2, FR4, FR12 and FR14 User Requirements, as defined at the D2.4 document.
Prerequisites	An administrative user account must have been already defined.
Steps	1. Log-in to the EPIC Service Catalog with an administrator userid. 2. In the Service Documents section, click on WSDL documents. 3. Click load documents on the command bar.

	4. In the Path to the Document section, activate the Remote File Location button. 5. In the Specify URL box, enter the URL of the service. 6. When the Documents to be loaded screen appears, click Finish. **7.** The Document Loaded Successfully screen will appear.
Outputs	*Not available yet*

Table 5: Test Case CC-1-3

ID	**CC-1-3**
Name	**Service Listing in EPIC Catalogue**
Description	This test case will validate the search of the available web services offerings and will highlight the advances features provided by the EPIC's service catalogue.
Source	This test case will validate the FR3, FR6 FR16, and FR18 User Requirements, as defined at the D2.4 document.
Prerequisites	An administrative user account must have been already defined. Services should have been registered to the catalogue.
Steps	1. Log-in to the EPIC Service Catalogue with an administrator userid. 2. …In the Service Documents section, click on WSDL documents. **3.** All the service documents will be listed.
Outputs	*Not available yet*

Table 6: Test Case CC-1-4

ID	**CC-1-4**
Name	**Service deletion from the EPIC Catalogue**
Description	In this test case we must validate the proper service deletion from the EPIC platform. The complete removal of all service's configuration data and application specific schemas must be

	highlighted.
Source	The “deletion' of a service is not defined as a requirement.
Prerequisites	An administrative user account must have been already defined. Services should have been registered to the catalogue.
Steps	1. Log-into the EPIC Service Catalogue with an administrator userid. 2. …In the Service Documents section, click on WSDL documents. 3. All the service documents will be listed. 4. Check the box in front of the service to be deleted. 5. Click on Delete in the command bar. 6. The message The selected item was successfully deleted appear.
Outputs	*Not available yet*

Table 7: Test Case CC-1-5

ID	**CC-1-5**
Name	**Check all user management functions via web service**
Description	This test case must validate all user management functionalities, as defined at the 4.2.5.4 subsection of the D4.1 document: • Check adding of new EPIC user • Check deleting of a EPIC user • Check selecting all EPIC users • Check adding of new application user • Check deleting of a application user • Check selecting all application users • Check adding of a new application • Check adding specific data type for a new application • Check deleting specific data type for a new application • Check adding a new user data pilot specific • Check deleting a new user data pilot specific

	• Check updating a new user data pilot specific • Check selecting all user data pilot specific • Check adding a new pilot role • Check deleting a new pilot role • Check selecting a new pilot role • Check assigning a pilot role to a user • Check deleting a pilot role from a user • Check adding a new usage history record • Check deleting a usage history record • Check selecting all usage history records • Check updating a usage history record • Check adding a new user interaction log • Check deleting a user interaction log • Check selecting all user interaction logs
Source	The User Management component of the EPIC platform is a key component that provides all requested functionalities to address the following User Requirements, as defined at the D2.4 document: FR1, FR3, FR5, FR7, FR11, FR12, FR13, FR15, FR17, FR20, FR22, FR23, FR24, FR25
Prerequisites	
Steps	In order to test the proper function of the user management web services, an external testing client has been developed by the EPIC team. Upon running, the client does the following actions: • Fetch the web services' WSDLs file in order to ensure proper binding. • Executes one-by-one all defined methods • Compares the returned with the expected results and prints out the outcomes of the test In addition, the user management web services will be thoroughly tested within the pilots' specific test cases, as they provide supportive functionalities in all cases.
Outputs	The output of this test case will be the printed result of the test

	client application that validates the proper function of the web services, in addition to any document provided by the pilot specific test cases.

Table 8: Test Case CC-1-6

ID	**CC-1-6**
Name	**Semantic Annotation**
Description	In this test case will validate the platform support to annotate services with semantic information (metadata in Service Catalogue)
Source	This test case will validate the FR19 and FR21 User Requirements, as defined at the D2.4 document.
Prerequisites	
Steps	The validation will be performed with the registration of services in the service catalogue including metadata (application specific or generic).
Outputs	*Not available yet*

Table 9: Test Case CC-1-7

ID	**CC-1-7**
Name	**Performance test for a service deployed on the platform**
Description	The performance data from a Web Service will be collected and analyzed. Performance data collection is configured and collected on the WebSphere Application Server using the WebSphere Performance Monitoring Interface (PMI) via the administration GUI. The performance data is then downloaded to a PC running the eclipse-based WebSphere Application Server Performance Tuning Toolkit.
Source	This test case will validate the FR23, NF6, and RUP2 User Requirements, as defined at the D2.4 document.
Prerequisites	A PC with the WebSphere Performance Monitoring Toolkit installed must be available. The Toolkit must be configured with a connection to retrieve the data from the EPIC Platform Server

	where the service is located. The WebSphere Application Server PMI must be configured to collect performance information for the service that is to be monitored and analyzed.
Steps 1. Run a test case repeatedly that uses the service. 2. Use the Toolkit to retrieve the information. 3. The data may now be analyzed.	
Outputs	*Not available yet*

Table 10: Test Case CC-1-8

ID	**CC-1-8**
Name	Platform usability and ability to reach as many mobile devices as possible
Description	In this test case, the usability of the platform will be validated. We include in the term 'usability' the ability of the EPIC platform to be reached by as many mobile devices as possible.
Source	This test case will validate the NF1, NF4, NF5, and RRS3 User Requirements, as defined at the D2.4 document.
Prerequisites	
Steps	In order to test the usability of the platform, interviews and testing surveys/questionnaires/interviews will be performed.
Outputs	*Not available yet*

Platform Test Scenario #2: Data Stores

The efficient use and access to internal or external data stores will be evaluated in this scenario. Based on the DoW and pilot requirements, the platform should provide mechanisms for storing in the platform application specific data and also allow access for communicating with external data sources. The following aspects will be evaluated:

1. Customization of internal data stores for application specific data
2. Access to internal data stores from services and front-end elements

3. Access to external data stores and devices from services and front-end elements
4. Performance evaluation for the data stores (response time, support for large amounts of data) (as in the previous scenario)
5. Interoperability for 1,2,3
6. Usability for 1,2,3 (via interviews/questionnaires as in scenario #1)

Based on the aforementioned aspects, the following test cases are identified:

Table 11: Test Case CC-2-1

ID	**CC-2-1**
Name	**Acces and customize an internal data store**
Description	In this test case the ability access an internal data store and to define additional application specific data will be validated.
Source	This test case will validate the FR26 user requirement, as defined at the D2.4 document.
Prerequisites	In order to be able to validate this test case, an admin user account with appropriate access roles to the internal database of the EPIC platform must be ensured.
Steps	1. Log in to the DB2cc DB2 client tool 2. Define the appropriate application data **3.** Use the User Management web services to evaluate all CRUD functions to the newly created data
Outputs	*Not available yet*

Table 12: Test Case CC-2-2

ID	**CC-2-2**
Name	**Access external data stores using services via pilot applications (both REST and SOAP)**
Description	In this test case the access to the external data stores that provides data to the pilot applications must be validated, through the use of the appropriate web services.

Source	This test case will validate the FR9 User Requirements, as defined at the D2.4 document.
Prerequisites	At least one pilot application that exploits data provided by an external provider and stored externally.
Steps	This test case will be validated by the application developer during the development phase of its application,
Outputs	*Not available yet*

Platform Test Scenario #3: Cross-border Customization

For the pan-European operation of EPIC platform support for country specific characteristics is required. To this end, the following will be evaluated:

1. Support for different time zones
2. Support for multiple currencies
3. Multilanguage support

Based on the aforementioned aspects, the following test cases are identified:

Table 13: Test Case CC-3-1

ID	**CC-3-1**
Name	**Use different time zones**
Description	In this test case, the platform will be validated regarding its ability to manipulate data when users react with EPIC from different time zones.
Source	This requirement will validate the FR10 User Requirements, as defined at the D2.4 document.
Prerequisites	Registration to EPIC Portal
Steps	In order to validate this test case, at least two users coming from different time zones must be logged in and test that are displayed with valid time accordingly. Focus must be given when records must be stored with a timestamp (logging records).
Outputs	*Not available yet*

Table 14: Test Case CC-3-2

ID	**CC-3-2**
Name	**Use multiple currencies**
Description	In this test case pilot applications will be validated regarding their ability to present finance data with multiple currencies.
Source	This requirement will validate the FR10 User Requirements, as defined at the D2.4 document.
Prerequisites	A target pilot application that is making use of finance data must be hosted at the platform.
Steps	1. Log-in to the Relocation Application. 2. Insert a search criteria related with the amount of money that a end user is willing to spend for renting a house. **3.** Check the returned results when using different currencies (Euro, Great British Pound).
Outputs	*Not available yet*

Table 15: Test Case CC-3-3

ID	**CC-3-3**
Name	**Use multiple languages**
Description	In this test case, the platform will be validated regarding its ability to present displays according to the user's favourite language
Source	This requirement will validate the FR21 User Requirements, as defined at the D2.4 document.
Prerequisites	The user's favourite language per application must be already stored at the EPIC's User Management's internal database by the pilot administrator who associates users with application's specific roles, data and language.
Steps	1. User has to log in to the target application. 2. The user management web services must retrieve the user's

	favourite language according to the target application. 3. The target application must obtain this parameter from the corresponding web services and display the user interfaces accordingly.
Outputs	*Not available yet*

Platform Test Scenario #4: Statistics & Analytics

As a modern ICT system, EPIC platform should support natively the logging of all activities that take place in its environment. More specifically this scenario will evaluate the following aspects:

1. Support for logging and statistics
2. Access to services for logging of platform and application activities
3. Access to analytics (via application)
4. Customization of analytics and reporting (via application)

Based on the aforementioned aspects, the following test cases are identified:

Table 16: Test Case CC-4-1

ID	**CC-4-1**
Name	Correctness of logging and statistics
Description	This use case will validate the recording of the logging data, that are automatically generated by the EPIC's User Management functionalities.
Source	This requirement will validate the FR24 User Requirements, as defined at the D2.4 document.
Prerequisites	A target application that makes use of the EPIC's User Management logging functionalities.
Steps	1. Log-in to the Relocation Application. 2. Explore some pages by pushing relevant buttons. **3.** Make sure that all the previous activity has been recorded via the logging functionalities.
Outputs	*Not available yet*

Platform Test Scenario #5: Security and Privacy

Security and privacy are two very important aspects of EPIC platform. This scenario will evaluate the security and privacy capabilities of the overall EPIC ecosystem. More specifically the following will be evaluated:

1. Validation of the platform security mechanisms and identification of vulnerabilities (e.g. DoS, Brute force, Data modification, Man-in-the-middle)
2. Validation of the user access and management mechanisms (role based, groups, etc.)
3. Validation of the single sign-on mechanism
4. Privacy protection for the core platform data
5. Privacy protection for the application specific data

Based on the aforementioned aspects, the following test cases are identified:

Table 17: Test Case CC-5-1

ID	**CC-5-1**
Name	**Test the platform security mechanisms and identification of vulnerabilities**
Description	Verify that the data of all EPIC pages seen by the user is SSL encrypted to ensure security and privacy.
Source	This requirement will validate the NF2, NF3 User Requirements, as defined at the D2.4 document.
PrerequisitesCreate userids with access to all pilot pages. This means that they are registered to use all three Pilots. A PC with a browser capable of identifying and warning about pages with no SSL encryption or pages with non-SSL and SSL mixed content.	
Steps	1. Log-in 2. Visit all the pages of all three Pilots 3. Check that the browser does not issue any warnings about missing or mixed SSL encryption.
Outputs	*Not available yet*

Table 18: Test Case CC-5-2

ID	**CC-5-2**
Name	Test the user access and management mechanisms (role based, groups, etc.)
DescriptionVerify that group and role based access permissions are enforced.	
Source	This requirement will validate the FR1, FR3, FR7, FR11, FR12, FR13 and NF3 User Requirements, as defined at the D2.4 document.
PrerequisitesThree userids each registered for a different Pilot.	
Steps	1. Log-in with each userid separately 2. Attempt to access pages of other Pilots
Outputs	*Not available yet*

Table 19: Test Case CC-5-3

ID	**CC-5-3**
Name	Test the single sign-on mechanism
Description	Test that one user can be registered with two different pilots, and access each pilot with one userid.
Source	This requirement will validate the FR5 User Requirement, as defined at the D2.4 document.
Prerequisites	One userid, registered with two different Pilots.
Steps	1. Log-in 2. Verify that the user can access all the pages of both Pilots.
Outputs	*Not available yet*

Search features (former scenario #6) will be tested as part of Service Catalogue test cases.

4.2.2 Front-end and Mobile Services

Front-end and Mobile Services Test Scenario #1: Portal User Interface

The EPIC front-end is an important element of the platform. In this scenario the technical aspects of the front-end will be evaluated. It should be noted that the usability aspects will be evaluated in the pilot evaluation part.

1. Design and Implementation of portlets/elements for the user front-end
2. Effective integration of features and technologies in the front-end (JavaScript, flash, etc.)
3. Personalization support (personal space, dashboard, etc.) and subscriptions

Based on the aforementioned aspects, the following test cases are identified:

Table 20: Test Case FE-1-1

ID	**FE-1-1**
Name	**Register a new user to the EPIC platform's database**
Description	The purpose of this test case is to verify that a user can be registered successfully to the EPIC platform
Source	This requirement will validate the FR5, FR12 and FR13 User Requirements, as defined at the D2.4 document.
Prerequisites	User is registered to the EPIC platform as administrator. At least one user has been registered to the EPIC portal users
Steps	1. Log-in to the EPIC platform as administrator 2. Navigate to the Database users page (EPIC Administration -> Database users) 3. Press the "Create" button in the Database Users List portlet. 4. Fill in the Epic User Name of the user and optionally his email. The name of the user should be the same as the one he uses for logging into the portal. 5. Press the "Submit" button 6. If the list has more than one page, press the link of the last one
Outputs	*Not available yet*

Table 21: Test Case CC-1-2

ID	**FE-1-2**
Name	**Assign a pilot role to a user**
Description	The purpose of this test case is to verify that a pilot role can be assigned to an EPIC user successfully.
Source	This requirement will validate the FR12, FR13, FR14 and FR15 User Requirements, as defined at the D2.4 document.
Prerequisites	User is registered to the EPIC platform as administrator. At least one user has been registered to the EPIC database At least one pilot is registered to the EPIC platform At least one pilot role is registered to the EPIC platform for that pilot.
Steps	1. Log-in to the EPIC platform as administrator 2. Navigate to the Database users page (EPIC Administration -> Database users) 3. Click on the "Link Users to Pilots" link on the row of the user you want to register to a pilot. 4. Select a pilot from the pilots list in the User Pilot Assignments portlet. 5. Press the "Add User Role" button. 6. Select a user group and a pilot role for the user selected. 7. Press the "Submit" button. 8. If the list has more than one page, press the link of the last one
Outputs	*Not available yet*

Table 22: Test Case FE-1-3

ID	**FE-1-3**
Name	**Initialize pilot specific data for a user**
Description	The purpose of this test case is to verify that a pilot specific data for a certain user can be registered to the EPIC platform successfully.

Source	This requirement will validate the FR4 User Requirement, as defined at the D2.4 document.
Prerequisites	User is registered to the EPIC platform as administrator. At least one user has been registered to the EPIC database
Steps	1. Log-in to the EPIC platform as administrator 2. Navigate to the Database users page (EPIC Administration -> Database users) 3. Click on the "Link Users to Pilots" link on the row of the user you want to register to a pilot. 4. Select a pilot from the pilots list in the User Pilot Assignments portlet. 5. Press the "Add Data Type" button. 6. Select a data type from the list and enter a value for it. 7. Press the "Submit" button. 8. If the list has more than one page, press the link of the last one
Outputs	*Not available yet*

Front-end and Mobile Services Test Scenario #2: Portal Administration Interface

Similarly with test case #1, the administration interface will be evaluated here:

1. Design and Implementation of portlets/elements for the platform management
2. Integration with the core platform services
3. Usability of 1,2 (via interviews/questionnaires as in scenario CC#1)
4. User/Role management functionality
5. Service management functionality

Based on the aforementioned aspects, the following test cases are identified:

Table 23: Test Case FE-2-1

ID	**FE-2-1**
Name	**Register a new pilot to the EPIC platform**

Description	The purpose of this test case is to verify that a pilot can be registered successfully to the EPIC platform.
Source	This requirement will validate the FR2 User Requirement, as defined at the D2.4 document.
Prerequisites	User is registered to the EPIC platform as administrator.
Steps	1. Log-in to the EPIC platform as administrator 2. Navigate to the Pilots page (EPIC Administration->Pilots) 3. Press the "Create" button found on the Pilots List Portlet 4. Enter the pilot data. 5. Press the "Submit" button 6. If the list has more than one pages, press the link of the last one.
Outputs	*Not available yet*

Table 24: Test Case FE-2-2

ID	**FE-2-2**
Name	**Add a user role for a pilot**
Description	The purpose of this test case is to verify that a pilot role can be registered successfully to the EPIC platform
Source	This requirement will validate the FR1, FR7 and FR12 User Requirements, as defined at the D2.4 document.
Prerequisites	User is registered to the EPIC platform as administrator. At least one pilot has been registered to the EPIC platform
Steps	1. Log-in to the EPIC platform as administrator 2. Navigate to the Pilots page (EPIC Administration->Pilots) 3. Press the "Add pilot data" link of a pilot in the Pilot's List. 4. Press the "Add role" button in the Pilot Roles portlet. 5. Fill in the name of the Role and optionally the Role Caption and some Notes for the role. 6. Press the "Submit" button

	7. If the list has more than one pages, press the link of the last one.
Outputs	*Not available yet*

Table 25: Test Case FE-2-3

ID	**FE-2-3**
Name	**Add pilot specific data**
Description	The purpose of this test case is to verify that pilot specific data can be registered successfully to the EPIC platform.
Source	This requirement will validate the FR26 User Requirements, as defined at the D2.4 document.
Prerequisites	User is registered to the EPIC platform as administrator. At least one pilot has been registered to the EPIC platform.
Steps	1. Log-in to the EPIC platform as administrator 2. Navigate to the Pilots page (EPIC Administration->Pilots) 3. Press the "Add pilot data" link of a pilot in the Pilot's List. 4. Press the "Add data type" button in the Pilot Data Types portlet. 5. Fill in the name of the Data type and optionally the Description for the data type. 6. Press the "Submit" button 7. If the list has more than one page, press the link of the last one.
Outputs	*Not available yet*

Front-end and Mobile Services Test Scenario #3: Support for mobile devices

EPIC Platform will natively support communication with mobile devices to improve the user experience on using "intelligent" services. This scenario will evaluate the following:

1. Design and Implementation of a UI for mobile devices
2. Interoperability across the common mobile frameworks
3. Performance (as in the scenario CC#1)

Based on the aforementioned aspects, the following test cases are identified:

Table 26: Test Case FE-3-1

ID	**FE-3-1**
Name	**Reach at least two different types of mobile devices**
Description	The purpose of this test case is to verify that access to the pilot applications hosted by the EPIC platform, can be easily achieved by at least two different types of mobile devices.
Source	This requirement will validate the RRS2, RRS3 and RUP1 User Requirements, as defined at the D2.4 document.
Prerequisites	User is using a mobile device supported by the EPIC platform At least one pilot has been registered to the EPIC platform, that provides access to the application through a mobile device
Steps	The target application to be used for the validation of this test case will be the Relocation Scenario. In order to test the validation of this test case, a simple login to the Relocation scenario will have to be committed and a basic tour on the various portlets, using at least two different types of mobile devices.
Outputs	*Not available yet*

Front-end and Mobile Services Test Scenario #4: Complementary Front-end Services

EPIC Platform is enhanced with additional features as part of the user interface based on the requirements identified in WP2 and the market and technology trends. This scenario will evaluate:

1. Functionality of the feedback acquisition service
2. Notifications functionality to end-users

Based on the aforementioned aspects, the following test cases are identified:

Table 27: Test Case FE-4-1

ID	**FE-4-1**
Name	**View logging/feedback information regarding a pilot application**

Description	The purpose of this test case is not focused on the valid recording of logging/feedback information, rather than the appropriate presentation of the already stored data
Source	This requirement will validate the FR23 and FR24 User Requirements, as defined at the D2.4 document.
Prerequisites	At least one pilot application should invoke logging/feedback functionalities ot the EPIC platform. A user with full administrative rights must be already defined.
Steps	The target application to be used for the validation of this test case will be the Relocation Scenario. In order to test the validation of this test case, an administrative user must log in to the application and access the corresponding portlets that present the logging data.
Outputs	*Not available yet*

Table 28: Test Case FE-4-2

ID	**FE-4-2**
Name	**View the list of notifications of a target application**
Description	The purpose of this test case is focused on the validation on the notifications provided by pilot applications to the registered end users.
Source	This requirement will validate the FR17 and FR18 User Requirements, as defined at the D2.4 document.
Prerequisites	At least one pilot application should provide notifications to the registered end-users At least one user with appropriate administrative rights should be able to provide notifications regarding the target application At least one user must be registered to an application
Steps	The target application to be used for the validation of this test case will be the Relocation Scenario. The pilot administrator will have to enter a test notification

	regarding the application. In order to test the validation of this test case, an end user must login to the platform and be able to see the notification recorded at the previous step.
Outputs	*Not available yet*

4.2.3 Development Environment

Development Environment Test Scenario #1: Development Environment

The development of services, applications and UI elements in the EPIC ecosystem requires use of tools that are compliant with the used technologies. This test scenario will evaluate the development process using these tools. More specifically:

1. Evaluation of development tools
2. Features for automated integration, deployment and testing
3. Effectiveness of the adaptation of existing applications (adapters, libraries, mechanisms required)

Based on the aforementioned aspects, the following test cases are identified:

Table 29: Test Case DE-1-1

ID	**DE-1-1**
Name	**Usability and adequacy of the development tools**
Description	The purpose of this test case is to prove the usability and adequacy of the existing development tools, in order to validate that an application development has all required tools to develop his own applications that will be hosted in the EPIC platform.
Source	This requirement will validate the DE1 User Requirement, as defined at the D2.4 document.
Prerequisites	At least one application must be developed using the tools provided by the EPIC platform.
Steps	In order to validate this test case, additional online surveys, interviews and questionnaires will take place between the EPIC team and the application developers.
Outputs	*Not available yet*

Table 30: Test Case DE-1-2

ID	**DE-1-2**
Name	**Easy integration, adaptation and deployment of the pilot applications to the EPIC platform**
Description	The purpose of this test case is to prove the usability and adequacy of the migrating a pilot application to the EPIC platform.
Source	This requirement will validate the DE2 User Requirement, as defined at the D2.4 document.
Prerequisites	At least one pilot application should have dependencies to external web services.
Steps	An application developer must: • Deploy the application to the EPIC platform • Set up the required connections to external data sources • Validate the proper operation
Outputs	*Not available yet*

5 EPIC Pilot Applications Evaluation Methodology

This section presents the overall methodological considerations that underpinned the elaboration of the project's evaluation strategy. EPIC's overall evaluation orientation is geared towards performing a quantitative and qualitative assessment of the success of the services on the EPIC platform, providing refinement suggestions for the service as well as identifying key practices on how to successfully move it across borders. In this context, selecting the appropriate evaluation framework is dependent on these goals in conjunction with selecting the appropriate evaluation criteria that in turn serve these goals.

We first give a brief overview of the state of the art in evaluating web and mobile technologies as well of the specific service of each of the pilot. In this way, we highlight the challenges and opportunities that should be addressed in the testing methodology and evaluation of the services. Secondly, we elaborate on further insights from section 4 regarding the criteria for pilot testing and evaluation. Thirdly, we present our testing and evaluation methodology: the general strategy and time framework, a detailed overview of the evaluation instruments and analysis methods, and the planning of these instruments and analysis methods within the broad strategy and time framework.

5.1 State of the Art in Evaluating Web and Mobile Technologies: Challenges and Good Practice

The literature on state-of-the-art of web and mobile technology evaluation of their use revealed the following two challenges regarding web services and mobile devices and that will frame the test methodology for the EPIC-pilots.

It is now clear that web and mobile application allow for a whole new variety of communications and types of behaviour. It is therefore not only necessary to investigate how people access information or are able to use the functionality of the service or device offered to them. It is important to understand how and why they integrate a service or a device in their daily life context and settings in order to trace how this influences the acceptance and experience of it and shapes its consequent use. The evaluation of these technologies requires therefore a combination of more macro quantitative analysis with more micro qualitative analysis. In this way, broad patterns, variations across cases, interactions with the technical system as well as more personal motivations of users and impacts on an everyday use life can be discerned in order to get a full view on the acceptance and use of the technology.

Secondly, assessing web and mobile applications nowadays makes it necessary that data are no longer assembled in static office environments, but researchers have to reach out to users' everyday life. This brings issues regarding privacy on the surface. Researchers try to immerse themselves in the daily life context of users and in this way need to balance between privacy concerns of the participants and their need to gain access to data. Users can easily have the impression that researchers are intruding their personal and private space. Moreover, the collection of data and the

way it is stored by means of digital research tools needs to be seriously taken into account in order not to violate privacy legislation.

To address these two challenges, the literature points out that web and mobile technologies have led to a rethinking of methods, not so much in terms of their approach, motivation or theoretical underpinnings, but in terms of methods used to achieve data collection and in terms of dealing with privacy concerns.

First, both participants themselves as well as web and mobile technologies can be used to mediate data collection about use in natural settings. Participants can fill in online questionnaires in order to report their impressions or even self-report by means of diaries or cultural probes. On the other hand, data collection can be done automatically as a side-effect of technology use by means of log-files. Moreover, it is now an increasing practice among researchers of web and mobile technologies to mix different methods and ways of data collection in order to grasp a clearer picture.

Secondly, different incentive techniques can be mobilised to stimulate and motivate users to allow testing prototypes in their natural settings and increase researchers knowledge about how use context and user experiences shapes acceptance and use. The techniques can moreover enable a shared understanding between participants and researchers in order to dismiss the feeling of intrusion. A clear explanation of protection of user's private data to which users agree before participating is not only legally required, but a necessary keystone in building user's trust in researchers and in the research project's objectives and aims in general.[2]

5.2 EPIC Pilots State of the Art

5.2.1 State of the Art – Energy Monitoring

The Manchester pilot is based on an energy monitoring system within a cloud computing context. As a starting point it is important to distinguish between energy monitoring and smart meter equipment:

- Energy monitors are devices that give to the householder an estimate of the amount of electricity they are consuming, typically showing both instantaneous consumption and cumulative consumption. Energy monitors form no part of the energy billing infrastructure and do not transmit information the energy supplier. Most energy monitors allow you to view your real-time electricity usage in units of energy used (kWh), cost or carbon emissions. Energy monitors can be purchased at low-cost from technology sellers and are in some cases provided free-of-charge by the energy supplier to a household. They can be installed without tools by clipping the current sensor around the main feed into the electricity meter.
- Smart meters are high-tech electricity and gas meters that replace an existing (non-smart) meter. These measure gas and electricity consumption and

[2] This paragraph is based upon the following works: [31], [32], [33], [34]

transmit the information to the energy supplier where it is used for billing purposes. Commercial premises are generally fitted with fiscal smart-meters that send consumption data to the energy supplier at 30-minute intervals.

The European Commission has set a target of 80 percent of consumers to have smart meters by 2020 [35] . In 2009 the United Kingdom's Department of Energy and Climate Change announced its intention to have smart meters in all homes by 2020 [36] at a cost of £11bn. The national consumer group, which argues that this cost will be paid by consumers through their energy bills [37] . The roll-out is being led by the energy companies with no checks in place to make sure that costs do not spiral. There is evidence of consumer rejection in other countries [38] .

Smart metering allows, on the one hand, the consumers or producers-consumers (prosumers) to have a greater awareness of their consumption, which in turn results in a consumption decrease. Several projects confirm this finding in the locations where it has been installed [38] . Smart metering allows system operators to perform “quasi real-time” measurements of the consumption levels, empowering the optimisation of the system. Installation of smart meters coupled with demand side management (DSM) enables the rationalisation of energy consumptions, supporting a more responsive and flexible load. DSM will take an important role on load shifting and peak shaving in the future smart grid; however it demands bidirectional communication and a partial control of some of the customer resources, usually heavy loads. This control can be limited by contractual arrangement to a few times per year. The deployment of DSM will be an important step for the economically sustainable power balancing of the future smart grids.

However, there is a growing view that smart meters are designed principally to meet the needs of energy suppliers, nor is it consumer focused. Projects like DEHEMS [39] looked at energy monitoring both in a living labs context and also in terms of providing a greater level of functionality than smart meters. For example, incorporating semantic reasoning as well as issues of granularity via Zigbee based upon IEEE 802.15.4 standards and Power Line Communication (PLC) technologies.

A unique feature of the DEHEMS was an ability to deal with time-series data readings are taken every few seconds and sent via the households own wireless hub to a central database. This enabled users to access real-time information about their energy consumption. Hildebrand has continued this work with IBM with additional testing undertaken with simulated loads to handle well in excess of 3,000,000 households. A key issue for the smart meter industry is how to deal with the large amounts of data a nationwide system will generate as well as the absolute need for data security along with consumer confidence in the system. This is a key role for cloud computing.

The overall aim of metering is that people can make more informed decisions about energy management and change their behaviour in order to reduce electricity bills and minimize their environmental impact. The Living Labs approach is a real opening for user involvement (seen as one point of failure in other role outs). The

greater understanding of consumer concerns offers an opportunity to refine the implementation beyond trial-and error.

5.2.2 State of the Art – Relocation

The relocation service developed by I.Lab.O in collaboration with CIBG-CIRB, Immoweb and Fraunhofer is in a Brussels, Belgian but also European context for three reasons unique and innovative. Although many sites exists today that allow users to find property in a particular part of a country or a particular city, these online housing search engines still take a very narrow approach on housing, only providing information (price, contact details, number of rooms etc…) about the displayed property and showing its location on a map. Moreover, online house search engines are developed until now with the local population as the target audience. Finally, extending the housing search to the mobile web has only recently led to the creation of some mobile house search applications. In the Brussels' context, leading real estate companies like Immoweb and Immovlan launched their mobile applications in 2011.

The relocation service on the contrary takes a broader view regarding the target audience and the information offered. It is developed not only for the national Belgian market but focuses in particular on people from the other EU-member states that want to relocate to Brussels, be it for a short period or on a permanent basis. Secondly, it will adopt a holistic approach to relocation. It will not only provide house information, but also layers of Point of Interest data regarding the neighbourhood of the property and indicators (like noise pollution or demographic characteristic) about the area of Brussels in which the house or flat is situated. Moreover, it will aim to streamline government related duties the expat has to perform when relocating and installing in Brussels. The combination of a web and mobile component will on the one hand allow expats to discover in their home country or current place of living already areas and houses in Brussels and on the other hand enable him to discover his favourite property physically when discovering Brussels. Thirdly, the relocation service makes use of the newest internet-of-things technologies and by applying the methodology of Fraunhofer to support multinational communication and cooperation, will aim to reduce cultural and language barriers.

The innovative character of the relocation service, on the level of its content as well on the level of its technologies, poses however a big challenge. Since we target expats that have intentions to come to Brussels, we have, in order to have good test results that help to create a viable product, to find ways to recruit as much as possible people that don't live in Brussels. This is moreover necessary since research about expats in Brussels is hardly available. Most reports or studies in which they appear only provide general information about their dispersion in the Brussels Region (In which commune do they live?) or their number (how many in total or how many people belonging to a certain EU-nationality?). Research into their daily lives – like for example how they relocated – is hardly available, apart maybe from some studies that investigate their motivations to come to move to

Brussels. On top of this, despite some existing offline initiatives, expats have not yet been recognised by the Brussels authorities as a potential target group for their online ICT-services. Although many expats groups also are present in Brussels, there is no real formal body that takes care of their interests in the city.

In this context, the methodology to reach out to expats and to investigate and evaluate our relocation service had to be developed by I.Lab.O and must allow for as much adaptation based on lessons learned in the development process. On the other hand, this situation and the development of our own methodology and expertise provide in the long run possible new research insights and opportunities in Brussels and a fertile exchange of insights with local authorities.

5.2.3 State of the Art – Urban Planning

In a time like ours when on a global scale the population is increasingly living in cities, there's a critical need for urban arenas to sustainable balance social, economic and environmental resources. Cities are confronted with major challenges for planning, building and manage their day-to-day operations. Urban planning system using the most recent Internet technologies and applications have recently been developed in a wide range of area's in order to provide a single pervasive solution for weaving together people, services and community assets. By using the Internet as a platform to plan, build and manage day-to-day operations, urban smart mobility applications make real time networking possible between citizens, companies and authorities. The arena thus creates opportunities for regional or urban communities to interact and share knowledge, experiences and interests. Smart cities integrate urban information and create public spaces in the Internet by which people can visit and discover different parts of the cities for various purposes.

Urban smart mobility benefits to all other dimensions within a smart city and provides a real challenge for further development. Until now however, on a global scale, most smart connected urban mobility projects have either focused on the domains of smart governance (enhancing political participation of citizens), smart environment (providing information regarding sustainability of the urban natural eco-system or the climate in a city or region) and smart mobility (road planning). However, the area of smart urban development that the urban planning tool, developed by Navidis, touches upon is still emergent (e.g. Heidelberg 3D, Real time urban monitoring by cellular phones in Rome). Urban planning tools make it possible that citizens, visitors, and business explore the city in real time and city administrations can get useful information for developing urban planning policies. In this way, smart urban planning tools have the potential to benefit to all in section 3 identified dimensions within smart cities [47]. In the context of EPIC, the urban planning pilot is thus a real innovative application that will provide critical and necessary insights for further development and diffusion of smart urban planning tools.

5.3 Criteria for Pilot Testing and Evaluation

Section 3 outlined that the main objectives and measures for testing and evaluating EPIC are on the one hand the user experience and acceptance, as well the determinants of acceptance, and on the other hand the 'level of smartness'.. The following measures were identified regarding user experience and acceptance: perceived ease of use, perceived usefulness, content quality, attitudes, intention and scenario.

The second objective of the project is, by means of the pilots, to enable cities to become 'smarter' in certain areas. We identified for each pilot the dimensions and the measures that should be applied to validate the strength and weaknesses of each of the services, the integrated scenario and proof of concept according to the goals set by the project. The testing of the pilots, the integrated scenario and the proof of concept will provide insights in how far the EPIC-platform will impact cities, and in particular citizens, city administrators and SME's, in becoming 'smarter'. We therefore indicate below the various objectives within the operation flow of each of the pilots that lead up to their in section 3.2.3.2. appropriate identified measures.

5.3.1 Objectives for EPIC Pilots

The starting point for the analysis of the pilot's objectives regarding their operational flow is the definition of their respective goals according to the project vision set out in D2.1. '*Project Vision*', the use cases developed in D2.2. '*Stakeholder (user) Workshops' Results*', the requirements provided in D2.3 '*Online Service Delivery Baseline and Technical Requirements Report*' and D2.4. '*Report on technical requirements*' and, finally, the scenarios elaborated in D5.1 '*Specification of scenarios of use and ecosystems*'.

In this section, we have further elaborated and specified the objectives for each pilot and attributed them within the relating smart city dimensions and measures to one of the three target customers of EPIC: citizens, city administrations and local SME's.

In order to provide a better understanding of these objectives, we first specify the background and aim of each pilot.

5.3.1.1 Relocation

5.3.1.1.1 Background and aim:

The relocation service developed by IBBT-I.Lab.O, in collaboration with Belgian leading's online retail company Immoweb, the Brussels Regional Informatics Centre CIBG-CIRB and Fraunhofer Institute for Communication, Information Processing and Ergonomics aims to facilitate and smoothen the whole relocation process (looking for a property while still being at home via a web component – discovering the city on the spot via a mobile component – actual moment of relocating via web component) of EU-citizens moving to a foreign city in another member. By offering a holistic approach to relocating to a foreign city, the relocation service hopes to solve the following problems:

- Smart housing: finding a temporary/more permanent place to stay should become much less cumbersome;
- Smart e-government: streamlining the often tiresome practical government related duties for a person moving abroad;
- Overcoming the language barrier, and making the implicit knowledge visible;
- Offering an augmented layer of government and non-government data concerning the city, including general information newcomers in a city need to know or strongly benefit from knowing (smart city guide).

5.3.1.1.2 Objectives

Citizens: smart living, smart mobility, smart governance

Goal 1: The web component will allow expats to efficiently select and save interesting property before relocating based on their own neighbourhood preferences, housing requirements and point-of-interest exploration:

1.a) The expats' relocation profile allows to identify the necessary resources for handling his relocation process

1.b) The functionality 'Where to Live' enables, by providing a community query and the resulting display of community statistical information, expats to narrow down areas in Brussels they would like to live in

1.c) The functionality 'Finding a Place' makes it, by allowing a property and point of interest query, the display of the returned result in a list or map and the detailed exploration of a selected property or POI, easier to discover and select interesting property that matches my needs.

1.d) The description of property and poi's made choice easier since it was adapted to my cultural background

1.e) The visual display of POI and property on the map benefits the exploration of these items

1.f) The functionality 'My favourites' allows me to easy save and consult, interesting neighbourhoods, properties and POI's again on a later point

Goal 2: The mobile component allows to retrieve saved property and point of interest and discover them more profoundly while being on the spot or add new encountered property and point of interest:

2.a) The functionality 'Where to Live' enables an expat to get more information about the community and neighbourhood in which they are situated

2.b) The functionality 'Find a Place' allows an expat to find easy interesting property around him and explore them physically by displaying the results of his search query in a list and on a map

2.c) The detailed description of the property was suited to the cultural background of the expat

2.d) The augmented layer made it easier for the expat to walk through the area to see the property and explore it physically by guiding him on the spot

2.e) The functionality 'What's around me' makes it easy for an expat to discover POIs around them by displaying the results of his search query in a list and on a map

2.f.) The augmented layer made it easier for the expat to walk through the area to see the POI and explore it by guiding him on the spot

2.g) The functionality 'My favourites' allows the expat to retrieve his saved interesting property or POI and display it on a list and map or to add newly on the top discovered property and POI in the list

2.h) The synchronisation with the EPIC platform makes it easier for expats to monitor their search results since newly saved property or POI (or deleted) is immediately matched in the web application as well.

2.i) The functionalities on the expat's mobile were not limited by his type of platform

Goal 3: when relocated, the web application will smoothen the settling of expats in Brussels by providing information about the necessary government related duties to be performed as well as other necessary steps in order to organise daily life:

3.1) The added information from the mobile to the web component allows the expat to make better informed decision about the property to live and start contacting the broker or the owner of the property for sale/rent)

3.2) The functionality 'Living in Brussels' makes by giving an overview on interesting link to government institutions and other organisations less cumbersome for the expat to organise their daily life and their government related duties.

City administrations: smart governance

Goal 4: City administrators will get by means of the functionality 'City View' useful aggregated anonymous statistical data from the web and mobile component about expats preferences regarding relocating to Brussels in order to make better policies for this population

SMEs: smart economy

Goal 5: Local SMEs and businesses dealing with expats relocating to Brussels get by means of the functionality 'City View' useful aggregated anonymous statistical data from the web and mobile component for adapting their services to expats needs and demands

5.3.1.2 Urban planning

5.3.1.2.1 Background and aim

The urban planning application allows users to manage, share and communicate information on the urban planning and development projects of the city. It is a virtual space of consultation and participation, designed for professionals and citizens alike and complements the already existing 'Urban Planning Centre' of the city, a public area for consultation and communication where interested stakeholders can meet and exchange information on urban development, projects and studies that are to be carried out in Issy-les-Moulineaux. The service will be extended and adapted by Issy Media and Navidis for use within the EPIC platform with the purpose to enable efficient real time networking between businesses and citizens but also provides an interconnection between Issy-les-Moulineaux's SMEs. The urban planning application will propose new services enriched with important information on the local SME's (who is who, who does what, what are the current offers, both in direction of other businesses and the citizens). This will enhance local activity in the long run under two aspects: on the one hand citizens will have a faster access to the local economic infrastructure (especially those seeking for job offers); on the other hand the local businesses will have an insight on the local economic tissue, the competitors, and the potential partners.

5.3.1.2.2 Objectives

Citizens: smart living, smart mobility, smart economy

Goal 1: Citizens are able to discover and explore their city according to their specific needs and interests:

1.a) Flying over city or the offered topic list allows the citizen to easily access required information

1.b) The selected POI provides to citizens the needed information in an efficient way

1.c) The search query makes it easy to locate specific POI within the topic list

Goal 2: Citizens will have faster and efficient access to the local economic infrastructure

2.a) Information about a particular SME will be searched for and displayed in a more efficient way

Goal 3: Citizens will see the rich content without any performance problems

City administrations: smart governance

Goal 4: City administrators will be able to develop better urban planning policies:

4.a) City administrators will be able to have a detailed view of their economic fabric

4.b) City administrators will be able to measure the occupancy rate of buildings in business districts

Goal 5: City administrations will manage the content without performance problems

SMEs: smart economy

Goal 6: SMEs within the city can network more efficient and in real time with each other:

6.a) The list or aerial view of local SMEs makes it easier to contact other companies in Issy

6.b) The list or aerial view of local SMEs makes it easier to explore and discover other companies in Issy

Goal 7: SMEs within the city can search easier for potential employees

10.a) The SMEs can announce their job offers to the citizens more efficiently

10.b) The SMEs can reach their potential candidates more easily.

5.3.1.3 Smart Environment

5.3.1.3.1 Background and aim

Manchester City Council along with its technology partner Hildebrand will deploy an energy monitoring solution to provide information to assist citizens of Manchester reduce their energy consumption of electricity.

Hildebrand will utilise its product, Energy Hive, opening up data sources and functionality to EPIC through application programming interfaces (APIs). Energy Hive utilises data collected from its Internet gateway and sensor management system, demonstrating a real Internet of Things (IOT) system. The sensors deployed within Manchester will measure the energy dynamics of residential properties, focusing on electricity consumption. Within EPIC, this will represent a specific scenario for a more generalised solution of using data and information to inform citizens with the potential to influence behaviour to reduce electricity consumption.

From a city perspective, public officers can use the service to interrogate aggregated community electricity usage. All data is anonymous. This permits insight into the particular use of energy in the city. For example, a large number of homes have been provided with insulation based on government-funded schemes. By identifying those with thermal improvement and those without, a view of their impact could be forecasted

5.3.1.3.2 Objectives

Citizens: smart energy

Goal 1: Households will be better informed about their electricity use and take the necessary actions to monitor and reduce their consumption:

1.a) The Energy Hive profile is accurate for charting the current and complete electricity consumption of household on installation of the system

1.b) Households can examine their real time and historical overall electricity consumption more accurately and more in detail

1.c): The energy reducing tips of the system assists households in monitoring and reducing their consumption in an understandable, relevant and useful way

1.d): The comparison of users' consumption against community averages and city wide usages raises awareness in households about their own energy consumption patterns

1.e) The opportunity of free user notes allows households to raise their concerns and observations and get quickly and appropriate assistance

1.f) The service is intuitive and easy to use. Online video help for equipment installation is available with guidance and support from an installer for the registration process and set up screens.

Researchers/technical staff: smart energy

Goal 2: Researchers have a view on anonymous statistical energy consumption data

City administrations: smart energy, smart governance

Goal 3: City administrations can measure the impact of energy consumption policies such as government-funded schemes for insulation.

Goal 4: Anonymous aggregated data about energy consumption help city administrations to encourage private owners to implement energy consumption reducing measures.

SMEs: smart energy, smart economy

Goal 5: Energy Hive system can create as much end value for end users in order to sell the necessary equipment.

Goal 6: Energy Hive can get revenue from applications that utilise its data supplied by the equipment.

5.4 EPIC Methodology for Pilot Testing

As described in D7.1 '*Common Pilot Operations*', the deployment and testing of the three services will follow a common three-phased strategy with different cycles and with a certain number of users. Although continuity between and within the three stages is necessary, given the iterative nature of the development of each pilot, each phase has its own finality and focus in order to take advantage of the Living Lab approach.

5.4.1 Phase 1: Closed User Group

The commencement of this phase will signal that the EPIC system has 'gone live'. Each pilot will first be deployed in a limited, closed user group with users carefully selected by each Pilot Administrator. The goal of this phase is to make sure that the services are, from a technical point of view really working. Following the technical testing undertaken for WP4 which investigates system stability of the prototype and is carried out by the pilot technical teams, the main focus is about initial functionality and usability testing in order to retrieve user experience and initial user acceptance. Each pilot will investigate its service compliancy with the scenario and test initial user requirements. The experiences of this test phase will flow back to the technical development teams in order to deploy each of the services in an open, larger community.

Moreover, this phase will also serve to pre-test the initial evaluation instruments in order to investigate their effectiveness, their strengths and their weaknesses. In this way, the necessary changes can be made in order to have reliable testing instruments for the open group phase.

5.4.2 Phase 2: Open User Group

With the deployment of each service in the open, larger community, the open user group phase starts. This phase has two dimensions. First each individual pilot will deal with the specificities of its corresponding cities will be tested. Testing will focus on both the service and integration with the platform and its performance. The activities of this community will be monitored and accompanying user research will be conducted in order to retrieve the user experience and the user acceptance for each of the pilots.

The experiences within each of the pilots will be exchanged on a permanent basis between the pilots themselves and the technical development team of the EPIC platform. This dynamic interaction allows for adjustments and updates on the platform 'on the fly' and immediate validation of the outcomes in the pilots itself. Each of these changes will be evaluated in each of the three pilots.

The second dimension of this group is to evaluate the interoperability between the pilot applications and takes a broader view on the EPIC service. This will be done by means of the 'Keith's House' scenario. Here as well, we will chart the user experience and acceptance as well as the validation of its objectives.

5.4.3 Phase 3: Evaluation

The third and final phase is the evaluation phase. In the first place, stakeholders will evaluate the revised version of the applications and the platform. The focus here will be on validating the objectives of the three pilots.

Second, one or more of the pilots will be deployed in an open user group configuration with the so-called non-advanced city, Tirgu Mures in Romania, as a

proof of concept for EPIC. The proof of concept will also serve to evaluate the EPIC Roadmap.

5.4.4 Timing Three Phases and Cycles and User Distribution

As mentioned in D7.1 '*Pilot Operations Plan*', the closed and open group phase consists of different test cycles and each phase also has a number of users. Moreover, the three pilots will follow for each phase and each cycle within these a common time framework.

The table below shows this common time framework and the number of users recruited and their distribution among the phases. At least 350 of these will form part of the initial Closed User Group for testing prior to the wider launch with the Open User Group. This second phase will aim to recruit a minimum of 1050 users. During the evaluation phase Tirgu Mures will work with a minimum of 500 users to provide 'proof of concept'. Additionally, stakeholders from city administrations and other stakeholder groups will carry out testing completing the evaluation phase.

Compared to D7.1. '*Pilot Operations Plan*', the concrete timing of the cycles of the closed group have been slightly extended in line with the in Annex V' Risk management plan' elaborated in D.7.1. Since risk number 4 – delay in prototype and platform delivery and integration for user testing – was identified, one of the two developed mitigation strategies (extending closed user group cycles) has been implemented. In order to retain the recruited users, pilots have communicated delay to users for the first cycle and adapted the timing communication in their recruitment calls for the second cycle. Also, giving the fact that the time frame of the second cycle falls in a period of holidays in some of the pilot sides, a communication strategy to retain users in this period has been elaborated by the pilots. Contact with the technical partners has also been undertaken in order to take the necessary measures to be able to implement the iterations as well as keep the preparations for the second cycle as much as possible in place as planned in D.7.1.

Table 31: Pilot Time Framework and User Numbers

PHASE M17-M30	RELOCATION	URBAN PLANNING	SMART ENVIRONMENT	TIRGU MURES
CLOSED GROUP Cycle 1: M17 (w/c 23.04.12) Cycle 2: M18, w/c 07.05.12)	200	150	10	-
OPEN GROUP Cycle 1:M20, w/c 11.06.12 Cycle 2:M21, w/c 02.07.12	500 Advisory group:	500 Advisory group	50	-

Cycle 3:M23, w/c 10.09.12	30	20 – 50		
Integration (Keith's House) M23, w/c.24.09.12	5	5	5	-
EVALUATION				
Proof of concept: M27-M30	-	-	-	500
Stakeholders pilots: M24-M30	15	10	2	15

5.5 Overview of Evaluation Instruments

5.5.1 Framework

The evaluation of the user experience and user acceptance and the objectives of the three EPIC pilots will be conducted via a triangulation of data, which combines the quantitative data from logging and questionnaires and qualitative data from interview scripts and focus groups. Given the iterative nature of the pilot testing and evaluation, adaptation of the initial evaluation instruments and analysis methods will be taken into consideration before every new cycle in order to respond to new needs that might arise during the different iterations.

Table 32 provides a high-level overview of the evaluation measures, applied methods and the evaluation instruments and the phase in which the data are collected. The different collection instruments and the analysis methods will be described in more detail in section 5.5.2 '*Description of instruments*'.

Table 32: Evaluation Criteria and Instruments

Criteria	Instruments	Test phase
User profile		
Internet/ICT profile	Questionnaire	Closed and open group
Smart city profile	Questionnaire	Closed and open group
User profile	Questionnaire	Closed and open group
User experience		
Perceived ease of use	Questionnaire Logging	Closed and open group
Perceived use	Questionnaire Logging	Closed and open group

Content quality	Questionnaire Logging	Closed and open group
Attitudes/intention	Questionnaire	Closed and open group
Lasting impressions	Questionnaire	Closed and open group
Scenario	Questionnaire Logging	Closed and open group
Objectives for measure of 'level of smartness'	Questionnaire Interview Participant observation	Open group and Evaluation Phase

5.5.2 Description of Instruments

Pilot data will be collected and analysed by using online and offline questionnaires, semi-structured interviews and focus groups, and event logs. The templates for these various instruments for the pilots can be found in the Annex section of this deliverable:

Instruments/pilot	Relocation	Urban Planning	Smart Environment
Questionnaires for each cycle	Annex A	Annex E	Annex F
Data logging for each cycle	Annex B	Annex E	Annex F
Interview Guide (Generic for 3 pilots)	Annex C	Annex C	Annex C
Interview Guide Keith's House (Generic for 3 pilots	Annex D	Annex D	Annex D

Each method is a unique technique geared to elicit a particular kind of data to address a certain aspect underpinning the pilot tests. The questionnaire is chosen as it can assist in yielding insight into the characteristics of a set of cases and variations across cases; interviews and focus groups can provide a full and rounded understanding of particular attributes of a person (or, city or SME) in the context of other characteristics and everyday life; and, logging entries are particularly useful in highlighting (contextual) aspects of patterns and interactions on the integrated service platform [48], [49].

The research process will be both deductive and inductive, starting with a more macro quantitative analysis and moving to a more micro qualitative analysis and vice versa [8] . In this way, quantitative insights can be put to use to further develop the qualitative data. Quantitative data will be mainly used to reveal relevant relationships and the strength of user experiences. The qualitative data will be collected to understand the rationale and evaluation underlying those experiences associated with acceptance. The framework developed in previous section informs the development of the parameters, guiding the main categories for which data will be collected. 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 the various stakeholders and perceived benefits (and impacts, from a more qualitative stance during the evaluation phase). The results will allow the drawing of conclusions regarding the extent of technology acceptance, as it investigates perceived ease of use and perceived usefulness as main determinants for behavioural intention to use new technology [50].

By using several methods as evidence this project seeks to enhance the validity of the findings. Furthermore, throughout the cycles different stakeholders will review drafts of results and iterations and provide feedback. Validity will also be established through consideration of the domains to which this study's findings may be generalized, especially, the TAM literature, in general, and Living Lab-based studies, in particular. Reliability is established through the development of several protocols such as interview guides.

Next, the methods and analysis mechanisms are explained for the data that will be collected between March and October 2012 for the three pilots, and, based on development and improvements made over-time, also guide the evaluation of the proof of concept.

5.5.2.1 Questionnaires

Questionnaires will be used at all stages of the evaluation.[3] It has the advantage of scale, price, cross-sectional, quick turn-around, and the data can be directly captured and stored by the analysis software. There are, however, some important

[3] Mainly online questionnaires will be used, however, in particular when testing the mobile service offline questionnaires may be employed.

drawbacks in employing questionnaires such as coverage error, low response rates and anonymity may be troubling sources of measurement errors. Another issue is non-response error that may be caused by factors such as the interface or other technical problems of the survey software [51] [52].

The first and second cycle of the closed user group tests will be used to pre-test the questions to determine the effectiveness, the strengths and weaknesses of the questionnaire. The aim is to have a reliable question format and a good wording and order. A factor analysis is a well-known method to evaluate whether the question is measuring the construct the researcher intends to measure. The results from pre-testing are then used to adjust problematic questions in the questionnaire before fielding the survey instrument to the full yet iterative sample in the open cycles. In doing so, the choice of analysis and the standardization of the survey can be checked efficiently. Thus, it helps to check the validity of a set of measurement items in relation to their corresponding constructs. In the open cycles attention is also directed towards the evaluation of the pilots' objectives.

The questionnaire focuses on ease of use, usefulness, content quality, and attitude (see the Annex A, E and G for Questionnaire templates developed for the pilots)[4]. These types of questions serve to generate sets of measures (see the Annex A, E and G for the Item List) outlining variables guiding the examination of the user experience and acceptance in the context of the EPIC project. When in each cycle for a measure a negative response of higher than 10% is recorded, change of the iteration in that cycle is being considered.

The sample of testers for the three pilots will allow descriptive analysis, cluster analysis, correlation analysis and inferential statistics (e.g. ANOVA, t-tests) to provide a description of the data gathered and to evaluate the quality and user acceptance of EPIC.

5.5.2.2 Interviews, Focus Groups and Participant Observation

Interviews and focus groups will be used at several stages of the evaluation, and are particularly useful during the open, evaluation phase. While it is the aim to obtain feedback on the accuracy and validity of the questionnaire evidence these methods allow us to gain a deeper understanding of meaningful themes, practices, and relationships from the interviewees' own perspectives through the collection of qualitative stakeholder-related information (e.g. city admin, SMEs). It allows for a richer means to learn about possible impacts, efficiency, barriers and the level of smartness each pilot and the platform allow to reach. However, a volunteer bias factor of recruitment of interviewees can be a drawback as it is likely that particular types of users will donate their knowledge and time to this project which may be reflected in a somewhat idiosyncratic outcome of the analysis. On a similar note are the differences in data quality. Some interviewees may be very open and will go the

[4] Note that the Urban Planning questionnaire will be conducted in French. The findings, however, will be translated into English.

extra mile. With these limitations in mind, however, the mixture of methods, and existing research guiding the test framework presented here, are addressing these possible limitations.

Technically, the interviews will be audio recorded and transcribed. They will be semi-structured and will be conducted following an interview guides (see the Annex C and D for a template Interview Guide in which topics for discussion are presented). Questions will follow a similar structure and validation procedure as the questionnaire.

Interviews will last approximately one hour. Also, several informants will be asked to review, comment on and check the drafts they contribute to, thereby contributing to the validity.

The focus group methodology is a form of group interview supported by a trained facilitator that capitalises on communication between participants allowing them to share their impressions of, in this case, the integrated service platform. Focus group discussions are moderated group discussions, with approximately 5 to 10 participants. 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. The discussion with EPIC users will take approximately an hour and will collect information about their experiences with the integrated solution Keith's House on EPIC platform and services, as well as expectations and possible barriers and problems that they might face when using EPIC. The focus group discussions will be audio recorded and transcribed.

Participant observation is employed in the case of mobile testing walks in Brussels and provides a context for understanding data collected through interviews and logs. The benefit of this method is that it allows testing in actual locations that are believed to have some relevance to the research questions. All observations are recorded as field notes in a field notebook. Informal conversation and interaction with testers are also important components of the method and will also be recorded in the field notes, and data such as photos, recordings, maps etc. will also be collected).

For the analysis of the interviews, focus groups and participant observation the research team will conduct qualitative thematic/content analysis of the transcripts and field notes (for participant observation) as proposed by Mayring [53].. This method is a technique of summarization, whereby categories are created in an inductive procedure by reducing, paraphrasing and generalizing relevant text passages assisted by specialized software packages.

The three pilot teams will work together to analyse the transcripts so as to ensure improved objectivity, and hence, validity. The findings consist of a systematization of the relevance of codes, a generalization and an interpretative framework.

The derived main categories identified by the research team will yield better insight into the motivators and barriers of EPIC pilot tests and investigate the potential benefits of the usage of the EPIC solution in the future.

5.5.2.3 Data Logs

The EPIC platform and the mobile service itself will track user activities using the services. All access and error information coming from the web application will be logged. More precise, information will be logged based on user driven events in the EPIC pilot applications (E.g. 'User A clicks button X'). These user events will be logged via a set of web services, designed specifically for this purpose (and, in addition, by using scenario-type questions in the questionnaire user behaviour can be tested and validated; see the Annex A, E and F for the Questionnaires for the pilots, and the logs for the Relocation Service in Annex B, for Urban Planning in Annex E and Annex F for Smart Environment). The information itself will be stored in a database integrated into the EPIC platform.

The end result of this is a log of each Test User's session with any of the EPIC pilot applications and the actions performed by the user during this session. For each cycle, an updated list of actions and events will be created as well as actions that have a negative score of more than 10% failure will be considered for change during the iterations. For each event logged, a user ID and Timestamp is logged automatically as well.

The logged information may include 1) response time (page to be displayed and requests (when a user presses a button and the action/function is finalized) with this information we can know if everything is working and if the time response is reasonable; 2) click patterns; 3) evaluate any problems experienced while using the portal. With this information we can track and fix any problems; 4) errors in forms: empty fields, mandatory information missing; and, 5) data transfer (this serves the evaluation whether the requests/responses have the required format).

The log data will be analysed using statistical tools such as descriptive and more qualitative tools like pattern matching for the scenario-type questions.

6 Set-up of Pilot Sites

Deliverable 7.1 '*Pilot operations plan*' worked out the setting of the pilot sites. In this section we elaborate further on certain aspects of this deliverable from the focus of their implications and requirements for the methodology and evaluations of the pilot testing.

6.1 Technical Environment/Set-up

During the Living Labs testing cycles, feedback and other useful information will be gathered from the Living Labs test users in two complementary ways:

- Explicitly via on-screen surveys taken after or during the test users' use of the EPIC pilot applications to be evaluated.
- Implicitly via the automatic logging of test users' actions within the EPIC pilot applications

6.1.1 Explicit Feedback Gathering via On-screen Surveys

On-screen surveys will be integrated into the pilot applications by making use of Qualtrics.com, a leading SAAS online survey tool. Qualtrics enables us to easily create a separate online survey for each test cycle, adjusted to the specific form and functions of each pilot application. The surveys created in Qualtrics are made available as simple, themed webpages that can subsequently be integrated easily into EPIC's pilot applications.

Each EPIC pilot application will be fitted with an easy to find button that launches the survey either in a popup window or an embedded iframe, depending on the specifics of the pilot application.

The link to each survey will be provided for by IBBT and contains unique parameters that will allow us to connect each survey result with a specific test user. This will allow us to connect survey results with the users' automatically logged actions, as described below. Pilot leaders are responsible for integrating the link in their applications in the best way they see fit.

Living Labs test users will be invited to complete the survey after having tested the pilot applications.

6.1.2 Implicit Feedback Gathering via Automatic Logging

To complement the results gathered from online surveys, each pilot application will also log specific actions taken by Living Labs test users throughout their use of the EPIC pilot applications.

In order to realize this, a web service has been made available to all EPIC pilot applications that will enable them to log specific user actions. Actions that could be logged are, for example:

- User logs in

- User searches for a house
- User clicks on a point of interest

Technically there is no limit to the amount of different actions that can be logged, as the action logging web service allows for any string to be sent and stored into the logs.

Each logging entry is automatically connected to the user's ID and a timestamp, resulting in a complete workflow of each test user's session with any of the EPIC pilot applications.

Each pilot application decides, together with IBBT and other partners, which user actions are worthwhile to log for every test cycle. The pilot leads are then responsible for implementing the calls to the user action logging web service into their own pilot applications.

The logging framework is flexible, in that sense that it allows us to extend or adjust the actions to be logged from test cycle to test cycle.

All user action logs are stored automatically into the EPIC user database, hosted on the EPIC platform's DB2 database server.

6.2 Framework for Recruitment, Training, Support & Further Facilitation

6.2.1 Protocol

The EPIC pilot and user management system consists of a number of web services and portlets in order to create a friendly system for registering pilots and users on the EPIC platform and also record users' activity. It extends the portals' build-in user management system and allows more data and functionality to be added to the platform for pilots and users.

A general manager, belonging to IBBT-I.Lab.O, will operate the EPIC pilot and user management system. The general manager will be responsible for the registrations of the pilots and users on the platform as well as creating roles and assigning resource permissions to users.

In order to execute these tasks, the EPIC administration page consists of three pages with their own functionality:

The pilot page: this page allows for registration of pilot on the platform (pilot name, pilot administrator email, pilot description, pilot notes) and its deletion. It enables the panel manager to add pilot roles and pilot data types.

The portal users page: this page allows the administrator to create groups and users on the portal and assign them portal resource permission. This step is necessary before adding users to the epic database since there needs to be one to one relationship between portal and database users. The administrator must create a group for every pilot registered on the EPIC platform, for example, for the relocation pilot, there will be a relocation user group. After the creation of the

group, users will be created (user ID, password, last name, optionally first name and preferred language) and assigned to it via the 'manage users and group' portlet. Next, via the 'user and group permission' portlet, the administrator will assign to groups portal resource permissions and if necessary to users as well.

Database users list: this page allows the administrator to add epic users to the database to assign them pilot roles and configure pilot specific data for them.

A more detailed description of the EPIC Pilot and User management, highlighting the concrete steps to be undertaken for each of these functionalities, can be found in Annex I '*EPIC pilot and user management system*'.

6.2.2 Recruitment of Users and Recruitment Letters/Calls

Section 4.2 of this deliverable explained the methodology of the testing operations (the three phases, the different test cycles, the timing of phases and cycles, the number of users to be involved during all the phases and their distribution over the various phases and cycles). Here we build further on D.7.1.'*Pilot Operations Plan*' regarding the aspects of user recruitment, user retention in order to keep users interested in the project, and the guidelines to users during each test cycle in order to ensure their participation in the tests.

6.2.2.1 User Recruitment

Given pilot specific requirements regarding recruiting and testing, we distinguish between **one-time experience users** and **permanent experience users** for each pilot:

One-time experience users: only participate once in one of the cycles within either the closed or open user group.

Permanent experience users: participate in all the cycles within either the closed or the open group.

The tables below highlights for each pilot and each phase the recruitment strategy that has been elaborated in order to get the necessary number of users to get good testing results

6.2.2.1.1 Closed Group

Table 33: Closed Group

	User type	User number	Who	Recruitment tools and channel
Relocation Service	One time experience users	200	CIBG, IBBT-I.Lab.O	1. Recruitment letter via internal network CIBG 2. Recruitment call via social

				media CIBG (twitter, Facebook), 3. Recruitment letter via user panel IBBT-I.Lab.O
Urban Planning	One time experience	150	Issy Media	1. Internal recruitment letter Urban Planning Department, 2. Call for participation within local partner SMEs
Smart Environment	permanent experience users	10	Manchester City Council	1. Recruitment call to households known to the Manchester City Council

6.2.2.1.2 Open Group

Table 34: Open Group

	Users	User number	Who	Recruitment tools and channels
Relocation Service	***one time experience users***	500	IBBT-I.Lab.O	1. Online call in collaboration with Expatica
	Permanent experience users:			
	Advisory group:	30	IBBT-I.Lab.O	1. Recruitment letter via communication channels of stakeholders (website- email

				– social media)
	Stakeholders:	15	IBBT-I.Lab.O	1. Recruitment via network of IBBT-I.Lab.O
	Keith's House:	5	IBBT-I.Lab.O	1. Recruitment letter via stakeholders channels (website, e-mail, social media)
Urban Planning	One time experience users	500	Issy Media	1. Recruitment letter/call on city website, local newspaper, regional business magazine, monthly 'Les Matinales de l'innovation' shows, social networks (twitter, Facebook)
	Permanent experience users:			
	Advisory group	20-50	Issy Media	1. Recruitment letter/call on city website, local newspaper, regional business magazine, monthly 'Les matinales de l'innovation'

				show, social networks (twitter, Facebook)
	Keith's House	5	Issy Media	1. Recruitment letter/call on city website, local newspaper, regional business magazine, monthly 'Les matinales de l'innovation' show, social networks (twitter, Facebook)
Smart Environment	***Permanent experience users***	50	Manchester City Council	1. Recruit via the Manchester Living Lab cohort, part of the Smart IP project lead by Manchester 2. Work with local groups like for example Hulme Carbon Coop.
	Keith's House	5	Manchester City Council	1. Recruitment call to households known to the Manchester City Council

6.2.2.1.3 Evaluation Phase

Table 35: Evaluation Phase

	Users	User number	Who	Recruitment tools and channels
Relocation Service	Stakeholders	15	IBBT-I.Lab.O	Recruitment via network IBBT-I.Lab.O
Urban Planning	Stakeholders	10	Issy Media	Recruitment via local network Issy Media
Smart Environment	Stakeholders	2	Manchester City Council	Recruitment via network local Manchester City Council
Proof of Concept Tirgu Mures	One time experience users	500	City of Tirgu Mures	To be defined based on best practices identified by pilot testing
	Stakeholders	15	City of Tirgu Mures	To be defined based on best practices identified by pilot testing

6.2.2.2 Users' Retention

In order to retain recruited users and keep them interested in the progress of the project as well as their willingness to participate in EPIC, the three pilots will use the follow communication tools and strategies for the three types of users (one time experience users, permanent experience users and stakeholders) as shown in the tables below for the different test phases.

6.2.2.2.1 Closed Group

One time experience users (Relocation and Urban Planning)	1. email updates in cycle they participate 2. newsletters during cycle they participate and afterwards
Permanent experience users (Smart Environment)	1. user monitoring software 2. regular e-mail updates 3. newsletters

	4. telephone follow-up after every cycle

6.2.2.2.2 Open Group

One time experience users (Relocation and Urban Planning)	1. email updates in cycle they participate 2. newsletters during cycle they participate and afterwards
Permanent experience users (3 pilots)	1. user monitoring software (only Smart Environment) 2. regular e-mail updates 3. newsletters 4. telephone follow-up after every cycle (only Smart Environment)
Stakeholders (Relocation)	1. regular email updates 2. newsletters

6.2.2.2.3 Keith's House

One time experience users (3 pilots)	1. email updates during keith house phase 2. newsletters during Keith House phase and afterwards

6.2.2.2.4 Evaluation

Stakeholders (3 pilots)	1. regular email updates 2. newsletters

6.2.2.3 Test-Guidelines for Users

In order to have good test results to ensure a good evaluation of the pilots, it is crucial that users participating in each test cycle are well aware of the test procedure and feel comfortable with them. The three pilots therefore will follow these consecutive steps in order to ensure a good understanding by users of the different phases of the test procedure:

1. After having signed up as a participant, users get a confirmation mail of their participation from the pilots.
2. In this confirmation email, users give their consent to participate in the test by means of a consent form.
3. After having received their consent, users are registered onto portal and pilot. Once this is done, they receive an email from pilots with their userID and password as well as the url-link to login to Epic.
4. After having logged in on EPIC portal, users will see a welcome screen of the pilot they are registered for.
5. On the welcome screen, the instructions for the test are explained.

6. Users will be directed to the 'test' button at the end of these instructions. By pressing on the button, the users enter the pilot and can perform the test.
7. By pressing on the 'survey' button after having done the test, they get access to the online questionnaire.
8. At the end of the survey when they completed answering the questions, they press a 'finish' button
9. Testers can now log themselves out of the pilot and the platform.
10. Instructions can at all the time be accessed again in case insecurity from the tester side appears or users can consult the FAQ. The email address to reach out for pilot support is also always accessible in the help-section.

6.2.3 Training

Training is commonly defined as the teaching of a person, or group of people, a particular skill or the transferring of knowledge. This section will examine the key roles within the EPIC project and identify training needs and methods in order to let users give the full opportunity to perform in the testing and give interesting feedback on the EPIC platform and pilots

6.2.3.1 Roles

There are three key roles within the EPIC project as shown in the table below. This high level view of the roles within the project will make it easier to identify and tackle training needs

Table 36: Roles in Training

Key roles	Role
Citizen	To use pilot services in order to relocate, control and monitor energy consumption or explore a city and get the know the local economic fabric in a smarter way
City administrations	To use and adopt pilot services in order to develop smarter city policies regarding relocation, energy reduction and monitoring and urban planning
SME's	To use pilot services in order to develop smarter businesses strategies in relocation, energy monitoring and local economic fabric

6.2.3.2 Training Needs

For the EPIC project the boundaries between identifying needs for specific training, and identifying needs better suited to other communication initiatives such as publicity, advertising etc., can be difficult to define. This is especially true for the Open User Group where all interactions with the users may take place remotely. Therefore the management of training needs will be managed closely with general

communication and dissemination needs. To help identify the specific training needs of each user group, a training needs matrix has been completed below.

Table 37: Training Needs

Accessing/registering platform and pilot	Pilot	Citizens	City administrations	SME
	Relocation	X	X	X
	Urban Planning	X	X	X
	Smart Environment	X	X	X
Create user profile	Pilot	Citizens	City administrations	SME
	Relocation	-	-	-
	Urban Planning	-	-	-
	Smart Environment	X	-	-
Technical ability to work with functions of service	Pilot	Citizens	City Administrations	SME
	Relocation	X	-	-
	Urban Planning	X	X	X
	Smart Environment	X	-	-
Installation of equipment	Pilot	Citizens	City administration	SME
	Relocation	X (only for mobile component)	-	-
	Urban	-	-	-

	Planning			
	Smart Environment	X	-	-
View anonymous aggregated data	Pilot	Citizens	City administration	SME
	Relocation	-	X	X
	Urban Planning	-	-	-
	Smart Environment	X	X	-

6.2.3.3 Training Tactics and Approaches

Manuals*:* User manuals will be produced in each Pilot explaining how users can work with the Platform and the specific pilot. This manual will also serve as the first point of reference in the pilot testing for all forms of help and support in order to better serve users needing support. In the case of Manchester, installation instructions about the equipment will be supplied with its delivery at the household.

Instructional videos and navigation tutorials: Instructional videos on how to undertake certain features in the pilot or navigation tutorials demonstrating how to navigate to the pilot will also be provided in the help sections of the platform and the pilots. These videos or tutorials are produced at low cost by means of mobile cameras or mobile phones and free media tools available on the Internet.

FAQ: The FAQ-section on platform and pilot will provide questions that explain concisely but accurately how to use the pilot.

Training workshops/seminars: Training workshops or moments to take a group of users through the basic functions of the pilot will be organized for Brussels for the stakeholders' sessions and in Issy for the staff members of the Urban Planning Centre.

Personal support: In the case of Manchester, where an onsite installation takes place, the installer will demonstrate the system to the household. At Issy-les-Moulineaux, a service developer at the Urban Planning Centre can provide personal assistance to users.

User communication campaign: Given the facts that the three pilots are so designed to use technology that allows for ease of use and intuitive on-site learning and especially for the relocation service and the urban planning the interactions with users is remotely for the closed and especially the open user group, part of the training will be provided in the emails by means of the testing instructions

(especially for registering into EPIC platform and pilot) test users will receive from panel manager after having candidate and registered in user panel.

User support tools: Email and telephone help when users contact Pilot Leads for secondary support will also, if required, be used as a personal training opportunity.

The following table gives an overview of the way these training methods will be used according to the above identified training needs and users' roles within the pilot testing

Table 38: Training Tactics

User role (=target audience)	Training need (=area of training)	Tactics (=methods)
Citizens		
Relocation Service	Registering, Technical ability, installation of equipment	Email, manual, instructional video/navigation tutorial, telephone, FAQ
Urban Planning	Registering, Technical ability	Email, telephone, FAQ, manual, Personal assistance Urban Planning Centre
Smart Environment	Registering, Create user profile, Technical ability, Installation equipment	Email, FAQ, instructional video/navigation tutorial, telephone, personal support installer
City administrations		
Relocation Service	Registering/getting access, view aggregated data	Training workshop/seminar, manual, telephone, Email
Urban Planning	Registering/getting access, technical ability	Training workshop/seminar, manual, telephone, email, content management system
Smart Environment	Registering/getting access/ View aggregated data	Manual, telephone, email

SMEs		
Relocation Service	Registering/getting access, view aggregated data	Training workshop/seminar, manual, telephone, Email
Urban Planning	Registering/getting access, technical ability	Manual, Email, Telephone, content management system, personal service Urban Planning Centre
Smart Environment	-	-

6.2.4 Support Levels

The diagram below highlights the type of support that will be offered to general users and the corresponding various levels of support and appropriate support suppliers and support communication tools

Table 39: Support Levels

Type of support	Kind of support and giver of support information	Communication support tools
User help	**REMOTE SUPPORT** User's directed to the FAQ/Help sections of the EPIC Portal and EPIC Pilots	Website platform/pilot
User queries	**PRIMARY SUPPORT** Pilot Site Leads try to address all user queries	Email Call back
Technical support	**SECONDARY SUPPORT** Technical partners IBM, Navidis, Hildebrandt to answer all technical queries that the Pilot Site Leads can't answer (i.e….. technical downtime)	Email Call back

6.2.4.1 Remote Support

EPIC will aim to answer the majority of user queries at the remote level through strategically placed information on the portal site and within the pilots. FAQ's, instructional videos etc., will take users through simple steps that will explain how to navigate through platform and Pilots as well as to contact pilot leads.

For example, for the web component of the Relocation pilot (Brussels), the FAQ section will cover among others the following issues:

- What is EPIC?
- How is EPIC funded?
- Who works on EPIC?
- How do I register to EPIC?
- What happens to my details?
- Where to find updates of testing and progress of EPIC?
- What is the aim of Pilot?
- Who works for my Pilot?
- How to work with the Pilot?
- How to search and select an area of interest?
- How to search and select a property for rent or for buying?
- How to search and select a point of interest?
- How to save interesting houses and point of interests into favourites?
- How to use 'Living in Brussels' section?

6.2.4.2 Primary Support

If a user still has an outstanding issue then the Platform or Pilot will lead them to contact their pilot lead by email providing their name and contact number. As this is a pilot project there is no set SLA for response and resolution time, although in the interests of customer service, Partners are encouraged to contact the user as soon as possible to reassure them that their issue is being addressed and their participation in the testing (filling in the online questionnaire) is not in danger. All issues should be recorded in a log so any emerging patterns can be seen, and therefore the remote support can be updated accordingly throughout the testing phases.

6.2.4.3 Secondary Support

If the Partner cannot solve the issue (probably because it is a technical issue) then the Pilot Lead will contact IBM or the developer of the pilot prototype (Hildebrandt for Manchester, Navidis for Issy-les-Moulineaux and i.Lab.O for Brussels). These technical partners will look into the query and provide a solution to the Pilot Lead who will in turn feedback the information to the user. These technical partners won't be expected to resolve the queries with the EPIC-user directly.

6.2.5 Work Plan and Time Schedule – Assessment/Iteration Process

The table below provides a high level overview of the work plan, time frame and involved partners for every phase and stage in the testing operations of the pilots.

In line with our remark in 5.4.4., the time frames in this work plan has been adapted to the mitigation strategies as a consequence of risk 4, stated in the risk management plan of D7.1.

In the Annex G one can find a more elaborated work plan detailing all necessary actions that need to be undertaken as well assigning specific responsibilities and deadlines.

Table 40: Work Plan

Phase	Cycle	Stage	Timeframe	Partners involved
Closed Group	***Cycle 1***	*Preparation*	M17, w.12.03- till M18, 20.04.2012	Pilot Leads and Technical Partners
		Implementation	M18, w.23-27.04.2012	Pilot Leads and Technical Partners
		Iteration	M18, w.28.04.2012 till M19, 05.05.2012	Pilot Leads and Technical Partners
	Cycle 2	*Preparation*	M18, 16-30.04.2012	Pilot Leads and Technical Partners
		Implementation	M19, w.07-11.05.2012	Pilot Leads and Technical Partners
		Iteration	M19, w.14-18. 05.2012 till M19, w.28.05-01.06.2012	Pilot Leads and Technical Partners
Open Group	***Cycle 1***	*Preparation*	M20, w.04-08.06.2012	Pilot Leads and Technical Partners
		Implementation	M20, w.11-	Pilot Leads and Technical

			15.06.2012	Partners
		Iteration	M20, w.18-22.06.2012 until w.25-29.06.2012	Pilot Leads and technical Partners
	Cycle 2	*Preparation*	M20, w.25-29.06.2012	Pilot Leads and Technical Partners
		Implementation	M20, w.11-15.06.2012	Pilot Leads and Technical Partners
		Iteration	M21, w.09-13.07.2012 until M23, w.03-07.09.2012	Pilot Leads and Technical Partners
	Cycle 3	*Preparation*	M23, w.03-07.09.2012	Pilot Leads and Technical Partners
		Implementation	M23, w.10-15.09.2012	Pilot Leads and Technical Partners
		Iteration	M23, w.17-21.09.2012 till w.24-28.09.2012	Pilot Leads and Technical Partners
	Keith's House integrated scenario	*Preparation*	M23, w.17-21.09.2012	Pilot Leads and Technical Partners
		Implementation	M23, w.24-28.09.2012	Pilot Leads and technical Partners
		Iteration	M24, 01-05.10.2012	Pilot Leads and Technical Partners

Evaluation	***Pilots***	*Preparation*	M24	Pilot Leads
		Implementation	M25-M30	Pilot Leads
		Iteration	M25-M30	Pilot Leads
	Proof of Concept	*Preparation*	M24	City of Tirgu Mures
		Implementation	M25-M30	City of Tirgu Mures
		Iteration	M25-M30	City of Tirgu Mures

6.2.6 Possible Risks and Corrective Actions

In D7.1 some risks in the context of the pilots' operation plan were outlined such as recruitment and drop-out of users, however, additional risks related the operationalization of the evaluation tests can also occur.

Risk: Participants are frustrated when technical problems occur using the online services and/or survey software during testing (high).

Action: The services will be tested in detail before being tested by end user people in the pilot sites. We will provide end-users with a bug tracking system where they can report about problems with the system – the services' developers will stand by ready to try to resolve the identified problems as quick as possible. Furthermore we will have some trained facilitators who are responsible for providing support whenever needed.

Risk: Scientific differences

Action: In any field of science, differences might arise as to the topics studied, for example regarding definitions or interpretations of study results. To deal with such differences might they arise, the following process will be used: 1) Differences or different viewpoints are made explicit; 2) These different viewpoints will be tested during the analysis work; 3) If necessary, the different viewpoints will be discussed with the EC and could be used to improve overall quality; 4) The Project Leader has the final decision.

Risk: Leaks of personal data from tests organisers (medium).

Action: Acquired data transmission statistics and logging data will be anonymised by end-users organisations and technical partners.

Risk: One or more partner(s) are not willing to fulfil their duties that are demanded based on user queries, feedback and iterations (low).

There are many reasons to believe that harmony will be the core of Consortium, ranging from previous collaborations and alliances between research labs and companies as well as recent experiences between partners. Yet, in case it happens, the Project Management Board will specify a clear and fair time limit for improvement. The coordination organization together with the project management board may decide to reshape the organization chart or the persons that are assigned key roles in the project. In case of failure the conflict resolution procedure will be applied.

Risk: User management tool is not working properly (medium).

Action: While tests have been conducted it is possible that problems may occur. The panel manager therefore has also a back-up user management tool at hand, developed by iLab.o so to minimize possible delays.

6.2.7 EPIC Partners Responsibilities in Testing

This document outlines many actions that need to be undertaken by different project partners in order to create and organize the testing methods and instruments chosen, plan and implement them, capture and analyse the data form the test users and implement the necessary changes on platforms and pilots based on user feedback. The table below gives an overview of the role of each partner and their responsibilities within WP8.

Table 41: Testing Responsibilities

Partner	Country	Project Role	Role in testing and evaluation
IS-Practice BVA	Belgium	Project Coordination / Management	Project management support Quality control
IBBT I.Lab.O	Belgium	Project Coordination, Living Lab & Pilot support	Project management support Quality control Pilot Lead Relocation Service Brussels Setting up pilot site and management (recruitment, panel management, support, training, communication) Setting up pilot strategic evaluation methodology Designing and implementing evaluation instruments Relocation Service

			Data gathering and analysis Relocation Service Implementing user feedback in technological development Relocation Service and Platform
National Technical University of Athens	Greece	Usability Requirements and Evaluation	Setting up pilot strategic evaluation methodology
Issy Media	France	Living Lab and Pilot Partner	Pilot Lead Urban Planning Setting up pilot site and management (recruitment, panel management, support, training, communication) Designing and implementing evaluation instruments Data gathering and analysis Urban Planning Feedback data to technological development teams Urban Planning and Platform
Manchester City Council	UK	Living Lab and Pilot Partner	Pilot Lead Smart Environment Setting up pilot site and management (recruitment, panel management, support, training, communication) Designing and implementing evaluation instruments Smart Environment Data gathering and analysis Smart Environment Feedback data to technological development teams Smart Environment and Platform
Navidis	France	Technology Specialist and	Technological development

		Pilot Support	Urban Planning Provide input (storyboards) for designing evaluation instruments Urban Planning Implement users feedback in technological development Urban Planning Data gathering and analysis support Urban Planning User support (remote and secondary)
Hildebrand Technology LTD	UK	Technology Specialist and Pilot Support	Technological development Smart Environment Provide input (storyboards) for designing evaluation instruments Smart Environment Implement users feedback in technological development Smart Environment Data gathering and analysis support Smart Environment User support (remote and secondary)
Birmingham City University	UK	Technology Specialist and Pilot Support	Technical development platform Integration services on platform Hosting surveys DB2 User management tools development Data gathering support
IBM Germany	Germany	Core Technology	Technological development platform Hosting surveys User support (remote and secondary) User management tools

			development Data gathering support Implement user feedback in development platform
ATC	Greece	Font Office Integration	Technological support Front Office Implement user feedback in development platform
Fraunhofer Institute FKIE	Germany	Technology Specialist and Pilot Support	Technological development relocation service Implement user feedback in technological development Relocation Service
Brussels Regional Informatics Centre	Belgium	Pilot testing and Support	Support user recruitment and testing closed group Technological development Relocation Service
Immoweb	Belgium	Technology Specialist and Pilot Support	Technological development Relocation Service
City of Tirgu Mures	Romania	Proof of concept Pilot Site	Proof of concept site management (recruitment, support, training, communication) Designing and implementing evaluation instruments Data gathering and analysis
21c Consultancy	UK	Dissemination and business planning	Links to wider dissemination
European Network of Living Labs	Belgium	Dissemination	Links to wider dissemination
Deloitte	Belgium	Deployment	Links to further development of

Consulting		Road Map	Roadmap

6.2.8 Communication Strategy for Strategic Evaluation

Designing and implementing effective evaluation instruments and capturing, collecting and analysing data accurately in order to evaluate the objectives of the EPIC project demands a good communication strategy in order to let the different partners involved work and collaborate efficiently. This work package will therefore follow meticulously the framework regarding target audience, communication type, delivery method, delivery frequency and responsible actors provided by the communication plan for the pilot operations, outlined in Annex III of D.7.1. '*Pilot Operations Plan*'.

6.2.9 Ethical Considerations

In order to achieve the goals defined within our evaluation task we need to collect personal data from various EPIC stakeholders, such as interaction data with the system, demographic data and responses to questionnaires. This data is essential for validating the project's impact and to improve the development of the technology. In this view, the EPIC team seeks to safeguard the interests of those involved in or affected by EPIC, to ensure that its methods of investigation are appropriate, to report its findings accurately and truthfully, and to consider the consequences of its work or its misuse for those they study and other interested parties. Therefore, this section sets out the ethical research principles for the EPIC project. They adhere to, and were partially adapted from, the guidelines for research of the following organisations:

- The London School of Economics (http://www2.lse.ac.uk/intranet/researchAndDevelopment/researchPolicy/ethicsGuidanceAndForms.aspx);
- The Association of Internet Researchers (www.aoir.org/reports/ethics.pdf);
- The Market Research Society (www.mrs.org.uk/standards/codeconduct.htm).

Guided by a checklist (see Annex H '*Ethics research checklist*'), in practice, the following steps are undertaken:

Freely given written consent will be sought from all people participating in the research (and, if the situation occurs, from their parent or guardian if the volunteer is under the age of 16 years). Potential participants will need to sign this consent form before s/he can continue taking part in the pilot tests.

All will be given written information, in understandable language and appropriate format. This will include what the research is about, who is undertaking it, why it is being undertaken, how it will be communicated and how the data will be stored and shared with other researchers. Furthermore, participants can refuse to take part or

withdraw from the research at any point and they may reject the use of data-gathering devices, such as logs (see D2.4).

The privacy of all participants will be respected and all data will be kept confidential. To protect the participants further, identifiers through loggings, questionnaires, etc. will be removed from the data therefore the data would not be able to be traced back to the individual, and pseudonyms will be used. Data will be stored only in anonymous form so the identities of the participants will only be known by the panel manager involved and will not be communicated to the whole consortium. Lastly, feedback on research findings will be provided to the people who participated in the research as part of acknowledging their contribution and seeking their views on outputs and dissemination, unless they do not wish to be informed.

7 Conclusions

This document describes the strategic evaluation methodology that will be followed by the EPIC consortium in order to validate the platform and to provide high quality results. It firstly gives a wide description about the general principals of the proposed methodology and its relation with the work that has previously been done by the former WPs. Then it analyses how the different parts of the EPIC will be validated. The core platform engine and its basic services and functionalities will be evaluated internally, mainly by the technology providers and experts of the consortium and then by the pilot application developer, in order to ensure that it delivers all the requirements that has been identified during the initial phases of the project. Then, the pilot application themselves will be validated by a wide group of test users. The whole procedure about how each user is registered and granted access to specific parts or applications of the EPIC platform is extensively described, along with the various group cycles in the testing procedure that will help to highlight different issues.

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 whole platform, and will validate the work that has been previously done by the former work packages.

8 References

[1] Chesbrough H., Open innovation: the new imperative for creating and profiting from technology, Boston, Harvard Business School, 2003.

[2] Almirall S. & Wareham J., *Living labs and open innovation: roles and applicability* IN: *Ejov. The electronic journal for virtual organisations and networks*, 10, Special issue on Living Labs, August 2008.

[3] Ballon P., Pierson J. & Delaere S., *Test and experimentation platforms for broadband innovation: examining European practice*, in: *Conference Proceedings of 16th European Regional Conference by the International Telecommunications Society (ITS)*, Porto, Portugal, 4-6 September, 2005.

[4] Bergvall-Kareborn B. – Stahlbrost A., *Living Lab: an open and citizen centric approach for innovation* In: *International Journal of Innovation and Regional Development*, 2009, 1, 4, pp. 356-370.

[5] Mulvenna M., Bergvall-Kareborn B., Wallace J., Galbraith B. & Martin S., *Living Labs as Engagement Models for Innovation.* In: Proceedings eChallenges-2010. (Eds: Cunningham, Paul and Cunningham, Miriam), IIMC International Information Management Corporation, pp. 1-11.

[6] Feuerstein K., Hesmer A., Hribernik K.A., Thoben K.-D., Schumacher J., Living Labs: a new development opportunity In: Schumacher J., Niitamo V.-P. (eds.), European Living Labs – A new approach for human centric regional innovation, 2008.

[7] Folstad A., Living Labs for innovation and development of information and communication technology: a literature review In: Ejov. The electronical journal for virtual organisations and networks, 10, special issue on Living Labs, August 2008.

[8] ALTEC, Study on the potential of the Living Lab approach, including its relation to experimental facilities for future internet related technologies. Final Report, 9 March 2009, pp.5-6.

[9] Legris, P., Ingham, J., & Collerette, P. (2003). Who do people use information technology? A critical review of the technology acceptance model. Information & Management, 40, 191-204.

[10] Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989) User acceptance of computer technology A comparison of two theoretical models. Management Science, 35(8), 928-1003.

[11] McCoy, S., Galletta, D., & King, W. (2007). Applying TAM across cultures: the need for caution. European Journal of Information System, 16, 81-90.

[12] Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior. New York:

[13] Addison-Wesley Pub. Co Reading, Mass.

[14] Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.

[15] Sivo, S., & Pan, C. (2005). Undergraduate engineering and psychology students' use of a course management system: A factorial invariance study of user's characteristics and attitudes. Journal of Technology Studies, 31(2), 94-103.

[16] Agarwal, R., & Prasad, J. (1999). Are individual differences germane to the acceptance of new information technologies? Decision Sciences, 30(2), 361-391.

[17] Jackson, C.M., Chow, S., & Leitch, R.A. (1997). Toward an understanding of the behavioral intention to use an information system. Decision Sciences, 28(2), 357-89.

[18] Riemenschneider, C. K., Harrison, D. A., & Mykytn, P. P. Jr. (2003) Understanding IT adoption decisions in small business: Integrating current theories. Information & Management, 40(4), 269-285.

[19] Porter, C. S. & Donthu, N. (2006). Using the Technology Acceptance Model to Explain How Attitudes Determine Internet Usage: The role of perceived access barriers and demographics. Journal of Business Research, 59, 999-1007.

[20] Bruner II GC, Kumar A. Explaining consumer acceptance of handheld internet devices. Journal of Business Research, 58, 553–558.

[21] Cheong, J. H. and Park, M.-C. (2005) Mobile internet acceptance in Korea, Internet Research, 15 (2), 125-140.

[22] Dapper, G. (2007). *User acceptance of Enterprise 2.0. A case study at an internationally operating private bank.* Available at: http://referaat.cs.utwente.nl/new/paper.php?paperID=282

[23] Hung, S.-Y., Ku, C.-Y. and Chang, C.-M. (2003) Critical factors of WAP services adoption: an empirical study, Electronic Commerce Research and Applications, 2 (1), 42-60.

[24] Kwon, H. S. and Chidambaram, L. (2000) A Test of the Technology Acceptance Model - The Case of Cellular Telephone Adoption, 33rd Hawaii International Conference on System Sciences, Hawaii.

[25] Lu, J., Yu, C.-S., Liu, C. and Yao, J. E. (2003) Technology acceptance model for wireless Internet, Internet Research, 13 (3), 206 - 222.

[26] Nysveen, H., Pedersen, P. E. and Thorbjornsen, H. (2005) Intentions to Use Mobile Services: Antecedents and Cross-Service Comparisons, Journal of the Academy of Marketing Science, 33 (3), 330-346.

[27] Yang, K. C. C. (2005) Exploring factors affecting the adoption of mobile commerce in Singapore,

[28] Telematics and Informatics, 22 257-277.

[29] Teo, T., Lee, C. B., & Chai, C. S. (2008). Understanding pre-service teachers' computer attitudes: Applying and extending the Technology Acceptance Model (TAM). Journal of Computer Assisted Learning, 24(2), 128-143.

[30] Wu, W. (2011). Developing an Explorative Model for SaaS Adoption. Expert Systems with Applications, 38(12), 15057-15064

[31] Hagen (P.), Robertson (T.), Kan (M.) & Sadler (K.), Accessing data: methods for understanding mobile technology use In: Australian Journal of Information Systems, 13, 2, 2006, pp.135-148 –

[32] Hagen (P.) & Robertson (T.), Dissolving boundaries: social technologies and participation in design, OZCHI 2009, November 23-27, 2009 –

[33] Hewson (C.), Yule (P.), Laurent (D.) & Vogel (C.), Internet research methods. A practical guide for the social and behavioural sciences, London, Sage, 2003 –

[34] Brynin (M.) & Kraut (R.), Social studies of domestic information and communication technologies In: Kraut (R.), Brynin (M.) & Kriesler (S.) (eds.), Computers, phone and the internet: domesticating information technologies,, Oxford, Oxford University Press, 2006, pp. 3-18

[35] Energy Efficiency Plan 2011, Communication From The Commission To The European Parliament, The Council, The European Economic and Social Committee And The Committee Of The Regions.

[36] The UK Low Carbon Transition Plan National strategy for climate and energy July 2009, ISBN 978-0-10-850839-4.

[37] Smart Meter Campaign. Available online at: http://www.which.co.uk/campaigns/energy-and-environment/smart-meter-campaign/

[38] 2011 Technology Map of the European Strategic Energy Technology Plan (SET-Plan) EUR 24979 EN – 2011.

[39] DEHEMS Final Report D1.3, http://www.dehems.eu

[40] Harrison (C.), Eckman (B.), Hamilton (R.), Hartswick (P.), Kalagnanam (J.), Parasczak (J.) and Williams (P.), Foundations for smarter cities in: IBM Journal of Research and Development, 54, 4, 2010, pp.1-16

[41] Washburn (D.), Sindhu (U.), Balaouras (S.), Dines (R.), Haynes (N.M.) and Nelson (L.E.), Helping CIOs understand 'smart city' initiatives: defining the smart city, its drivers, and the role of the CIO, Cambridge (MA.), Forrester Research Inc, 2010

[42] Toppeta (D.), The Smart City vision: how innovation and ICT can build smart, 'liviable', sustainable cities, The Innovation Knowledge Foundation, 2010

[43] Caragliou (A.), Del Bo (Ch.) & Nijkamp (P.), Smart cities in Europe, 3rd Central European Conference in Regional Science –CERS, 2009

[44] Hollands (R.G.), Will the real smart city please stand up? In: City, 12, 3, 2008, pp.303-320

[45] Giffinger (R.), Fertner (C.), Kramar (H.), Kalasek (R.), Pichler-Milanovic (N) & Meijers (E.), Smart Cities: Ranking of European medium-sized cities, Vienna, Centre of Regional Science (SRF), Vienna University of Technology, 2007

[46] See for example this study on carpooling: CORREIA (G.) and VIEGAS (J.M.), A conceptual model for carpooling systems simulation In: Journal of simulation, 3, 2009, pp.61-68

[47] NAVIDIS, Smart city Introduction, s.l., 2011.

[48] de Vaus, D. (2002). Surveys in Social Research (5 ed.). London: Routledge.

[49] Yin, R. K. (2003). Case Study Research: Design and methods (3 ed.). London: Sage.

[50] Davis, F. D. (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.

[51] Bryman, A. (2004). Social Research Methods (2 ed.). Oxford: Oxford University Press.

[52] Deutskens, E. (2006). From Paper-and-Pencil to Screen-and-Keyboard: Studies on the effectiveness of Internet-based marketing research. Unpublished Ph.D., University of Maastricht, Maastricht

[53] Mayring, P. (2000). "Qualitative Content Analysis." Forum Qualitative Sozialforschung / Forum: Qualitative Social Research, Online Journal 1(2). Available at: http://www.qualitative-research.net/index.php/fqs/article/view/1089/2385UTH

9 Glossary of Acronyms

21c	21c Consultancy Limited
API	Application Programming Interface
BCU	Birmingham City University
DoS	Denial of Service
ENOLL	European Network of Living Labs
EPIC	EU Platform for Intelligent Cities
HIL	Hildebrand Technology Limited
IBBT	Interdisciplinary Institute For Broadband Technology
IoT	Internet of Things
IM	Société d'économie mixte Issy-Média (SEM Issy Média)
ISP	IS-Practice
LL	Living Lab
MCC	Manchester City Council
NAV	Navidis
NTUA	National Technical University of Athens
POI	Point Of Interest
REST	Representational State Transfer
SME	Small and Medium Enterprise
SOAP	Simple Object Access Protocol
TAM	Technology Acceptance Model
W/C	Week/commencing
WP	Work package

Annex A. Questionnaire Relocation Service

List of items by construct (and cycle)

(W = Web, M = Mobile, C = Cycle)

[Note that based on pre-test and feedback questions and scenarios for the web and mobile services may get adjusted accordingly for the upcoming cycles]

[Note that Living in Brussels is not a feature for the mobile service]

Construct		Item (list individual questions per construct)
Perceived ease of use		PEU1 Learning how the Relocation Service works is easy for me (W C1-3, M C2) PEU2 I find it easy to get the Relocation Service to do what I want to do (W C3-5, M C5) PEU3 I find the Relocation Service very difficult to use without a manual (W C1-5, M C2, 5) PEU4 I find that the Relocation Service is designed for all levels of users (W C1-5, M C2, 5) PEU5 Interacting with the Relocation Service is clear and understandable (W C2-5, M C5) PEU6 I find the Relocation Service unnecessarily complex (W C1-5, M C2, 5) PEU7 I find the installation of the mobile app easy (M, C5)
Perceived usefulness		PU1 Using the Relocation Service would improve my relocation to Brussels (W C3-5, M C5) PU2 Using the Relocation Service would enable me to accomplish finding a property more quickly (W C1-5, M C2, 5) PU3 Showing the search results in a list and display is useful (W C1-5, M C2, 5) PU4 Saving and reviewing properties of interest in 'Favourites' is useful (W C1-5, M C2, 5) PU5 Adding and deleting points of interests in 'Favourites' is useful (W C2-3, M C2, 5) PU6 Overview and display of areas in Brussels is

		useful (W C3-5) PU7 Links to organisations and documents assisting in relocating is helpful (W C2-5) PU8 The Relocation Service is an essential service for a city to offer to new/potential citizens (W C3-5, M C5) PU9 Finding an available property to rent/buy in an area around me (M C2, 5)
Content quality		CQ1 Font and size (readability) of the words on the page (W C1-5, M 2-5) CQ2 Viewing the map on the page (W C1-5, M C2-5) CQ3 Overall look and feel of the pages (W C1-5, M C2-5) CQ4 Search criteria (W C1-5, M C2-5) CQ5 Terms used to describe the functions (e.g. points of interest) (W C1-5, M C2-5) CQ6 Options for user input (W C3-5, M C2-5) CQ7 Information richness (W C3-5, M C2-5) CQ8 Position of items on the page (W C2-3, M C2-5) CQ9 Error messages (W C3-5, M C2-5) CQ10 Augmented reality mode (M C5)
		CQ12 Where to live (W C3-5, M C2, 5) CQ13 Find a place (W C1-5, M C2, 5) CQ14 My favourites (W C1-5, M C2, 5) CQ15 Living in Brussels (W C2-5) CQ16 Brussels Survival Manual (M C5)
Attitudes/intention		A1 I find the various functions in this Relocation

		Service are well integrated (W C1-5, M C2, 5) A2 I would recommend the Relocation Service to others (W C1-5, M C5) A3 Accessing the Relocation Service through the portal is convenient (W C3-5, M C5) A4 I think that I would like to use this Relocation Service in my move to Brussels (W C3-5, M C5) A5 Unless I am rewarded for using the Relocation Service in some way, I see no reason to spend extra effort in using it (W C4-5, M C5) A6 I would pay a small fee for this Relocation Service (W C4-5, M C5) A7 I have fun using the Relocation Service (W C3-5, M C2, 5) A8 I think it would be very good to use the Relocation Service in addition to traditional relocation methods (W C3-5, M C5) A9 I think the Relocation Service can replace traditional relocation methods (W5)
		A9 Speed (W C2-5, M C2, 5) A10 Reliability (W C1-5, M C2, 5) A11 Search (W C2-5, M C5) A12 Map (W C1-5, M C5) A13 Save and review information of interest (W C2-5, M C2, 5) A14 Security (W C3-5) A15 Social space (W C3-5, M C5)
Lasting Impressions		LI1 List the most negative aspects (W C1-5, M C2, 5) LI2 List the most positive aspects (W C1-5, M C2, 5) LI3 List your recommendations (W C1-5, M C2,

		5)
Scenario		S1 Overall, I am satisfied with the ease of completing the tasks in this scenario (W C2-5, M C2) S2 Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario (W C2-5, M C2) <INPUT TITLE=\ Comment SRC= http://hcibib.org/perlman/note.gif NAME= c2 TYPE= image > MACROBUTTON HTMLDirect S3 I enjoyed executing this scenario (W C3-5, M C2) S4 The scenario helped me to understand the Relocation Service better (W C3-4, M C2) S5 I can execute the full scenario (W C3-5, M C2)
		S6 Where to live (W C3-5, M C2) S7 Find a place (W C3-5, M C2) S8 My favourites (W C3-5, M C2) S9 Living in Brussels (W C3-5)

Web & Mobile (M = mobile only)

[Note that screenshots can be added to assist respondents in answering the questions]

Perceived ease of use

Q1. How easy is it to use the Relocation Service? *Please indicate to what extent you agree or disagree with the following statements.*

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**	**NA**
Learning how the Relocation Service works is easy for me						
I find it easy to get the Relocation Service to do what I want to do						
I find the Relocation Service difficult to use without a manual						
I find that the Relocation Service is designed for all levels of users						
Interacting with the Relocation						

Service is clear and understandable						
I find the Relocation Service unnecessarily complex						
(M) I find the installation of the mobile app easy						

Perceived usefulness

Q2. How useful is the Relocation Service for you? *Please indicate to what extent you agree or disagree with the following statements.*

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**	**NA**
Using the Relocation Service would improve my relocation to Brussels						
Using the Relocation Service would enable me to accomplish finding a property more quickly						
Showing the search results in a list and display is useful						
Saving and reviewing properties of interest in 'Favourites' is useful						
Adding and deleting points of interest in 'Favourites' is useful						

Overview and display of areas in Brussels is useful						
Links to organisations and documents assisting in relocating is helpful						
The Relocation Service is an essential service for a city to offer to new/potential citizens						
(M) Finding an available property to rent/buy in an area around me						

Content quality

Q3a. How would you rate the content of the Relocation Service? *Please indicate to what extent you find the quality poor or excellent with the following statements.*

	Poor	Fair	Good	Excellent	Not sure	NA
Font and size (readability) of the words on the page						
Viewing the map on the page						
Overall look and feel of the pages						
Search criteria						
Terms used to describe the functions (e.g. points of interest)						
Options for user input						
Information richness						
Position of items on the page						
Error messages						
(M) Augmented reality mode						

Q3b. How useful is the content of the following features for you? *Please indicate to what extent you agree or disagree with the following statements.*

	Very useful	Sufficient	Neither useful nor useless	Insufficient	Useless	NA
Where to live						
Find a place						
My favourites						
Living in Brussels						
Brussels Survival Manual (M)						

Q4a. What is your attitude towards the Relocation Service? *Please indicate to what extent you agree or disagree with the following statements.*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	NA
I find the various functions in this Relocation Service are well integrated						
I would recommend the Relocation						

Service to others						
Accessing the Relocation Service through the portal is convenient						
I think that I would like to use this Relocation Service in my move to Brussels						
Unless I am rewarded for using the Relocation Service in some way, I see no reason to using it						
I would pay a small fee for this Relocation Service						
I have fun using the Relocation Service						
I think it would be very good to use the						

Relocation Service in addition to traditional relocation methods						
I think the Relocation Service can replace traditional relocation methods						

(Ranking)

Q4b. How important are the following items to you? *Please rank in order of importance (1 – Highest, 7 – Lowest).*

( ) Speed (e.g. speed that webpage appears on your screen)
( ) Reliability (e.g. up-to-date housing information)
( ) Search criteria (e.g. housing prices)
( ) Map (e.g. display of properties)
( ) Add, delete, save and review information of interest (e.g. houses, points of interest)
( ) Security (e.g. userid and password)
( ) Social space (e.g. a way to interact with other users of the service such as a 'I like this property' button)

Q5. Lasting impressions. *Please list the most negative and positive aspects of the Relocation Service, we appreciate your recommendations as well.*

List the most **negative** aspect(s):

1.

2.

List the most **positive** aspect(s):

1.

2.

List your recommendations:

1.

2.

Q6. Scenario

Cycle 2 - A) Your company has offered you to work in Brussels for an undefined period of time. You and your family have discussed this and are really looking forward to relocate and live in Brussels for a few years.

- Select an old house in a neighbourhood spacious enough to provide comfortable living for you, 2 kids, and adequate office space for your partner's architect bureau. It also should be near a school for your children. The younger child will enter a High School and the elder one a University in Brussels.

After-scenario questionnaire

Q6a. What is your overall experience of executing the Relocation scenario? *Please indicate to what extent you agree or disagree with the following statements.*

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**	**NA**
Overall, I am satisfied with the ease of completing the tasks in this scenario						
Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario						
I enjoyed executing this						

scenario						
The scenario helped me to understand the Relocation Service better						
I can execute the full scenario						

Q6b. How useful is the content of the following features for you to find the necessary information to execute the scenario? *Please indicate to what extent you agree or disagree with the following statements.*

	Very useful	**Sufficient**	**Neither useful nor useless**	**Insufficient**	**Useless**	**NA**
Where to live						
Find a place						
My favourites						
Living in Brussels						

Cycle 3 - B) Your company has offered you to work in Brussels for an undefined period of time. You and your family have discussed this and are really looking forward to relocate and live in Brussels for a few years.

- Select an old house in a neighbourhood spacious enough to provide comfortable living for you, 2 kids, and adequate office space for your partner's architect bureau. It also should be near a school for your children. The younger child will enter a High School and the elder one a University in Brussels.
- As you will be a new citizen in Brussels you are also interested in looking up information how to register yourself.

Cycle 4 - C) Your company has offered you to work in Brussels for an undefined period of time. You and your partner have discussed this and are really looking forward to relocate and live in Brussels for a few years.

- Select a rental apartment in a neighbourhood spacious enough to provide comfortable living for you. As you won't have a car it should be near public transport. You also like to live in the vicinity of some entertainment (e.g. restaurants).
- As you will be a new citizen in Brussels you are also interested in looking up information where you can register yourself.

Cycle 5 - D) Your company has offered you to work in Brussels for an undefined period of time. You and your partner have discussed this and are really looking forward to relocate and live in Brussels for a few years.

- Select a rental apartment in a neighbourhood spacious enough to provide comfortable living for you and your partner. As you won't have a car it should be near public transport. You also like to live in the vicinity of some green (e.g. park).
- As you will be a new citizen in Brussels you are also interested in looking up information where you can register yourself.

Questionnaire User Profile – Relocation Service

List of items by construct

Construct		Item (list individual questions per construct)
Internet/ICT profile		IP1 Usage IP2 Use from home IP3 Use from work IP4 Use a computer IP5 Use a laptop IP6 Use a mobile phone IP7 Use a tablet IP8 Online purchases IP9 Online banking IP10 Social networking IP11 National/local government website IP12 Download forms from government website IP13 Mobile/smart phone ownership
Smart city profile		SCP1 (Temporary) Job mobility across countries SCP2 Quality of housing SCP3 Transparency of local (city) government SCP4 Availability of online public and social services SCP5 Environmental protection
Demographic profile		UP1 Gender UP2 Age UP3 Family status UP4 Country of residence UP5 Language UP6 Employment

User Profile Questionnaire

[Note: The user profile questionnaire will be integrated in each cycle for the Relocation Service and the Urban Planning Service; only in cycles 1 and 2 for the Smart Environment Service; all questions are optional]

Q1a. Do you use the Internet, at least occasionally? *(optional)*

- Yes

- No
- No answer (NA)

Q1b. Thinking about your overall internet use how often do you use the internet from…? *(optional)*

	Everyday	**One/twice a week**	**Once/twice a month**	**Rarely**	**Never**	**NA**
Home						
Work						
Computer						
Laptop						
Mobile Phone						
Tablet (e.g. Ipad)						

Q1c. Do you ever use the internet to…? Choose all that apply. *(optional)*

	Very often	**Often**	**Sometimes**	**Never**	**NA**
Make online purchases (e.g. music, clothing, travel)					
Use online banking					
Use social					

networking sites like Facebook or LinkedIn					
Use your national or local government (city) website					
Access or download online forms such as tax forms provided on your national or local government (city) website					

Q1d. How important are the following statements for you? Please indicate to what extent you think the following statements are important. *(optional)*

	Very important	**Important**	**Somewhat important**	**Not important at all**	**NA**
(Temporary) Job mobility across nations					
Quality of housing					
Transparency of local (city) governance					

Online public and social services					
Environmental protection					

Q1e. Do you have a smart phone? *(optional)*

- Yes
- No
- Don't know
- NA

Q2. What is your gender? *(optional)*

- Male
- Female
- NA

Q3. What is your age? Please enter a number in the box. *(optional)*

Q4. What is family status? Please choose one answer from the drop box. *(optional)*

- Single
- In a relationship
- Married
- Divorced
- NA

Number of children

- 0
- 1-2
- 3-4
- 5 or more
- NA

Do your children live with you?

- Yes
- No
- NA

Q5. What is your country of residence? Please choose one answer from the drop box. *(optional)*

- Afghanistan
- …
- Zimbabwe
- NA

Q5a. What is your native language? *(optional)*

Q5b. What is your primary speaking language? *(optional)*

Q6. The following questions ask you about your employment. *(optional)*
What is your employment status?

- Full-time employed
- Part-time employed
- Self-employed / business owner
- Homemaker
- Student, working
- Student, not working
- Unemployed
- NA

What is your employment sector?

- Academic/education
- Arts
- Accountancy, finance, business services
- Broadcast, film
- Engineering
- Fashion
- Games, interactive media
- Government
- Health
- Hospitality
- IT, information systems
- Legal services
- Marketing
- Publishing
- Retail
- Other
- NA

What is your annual income (Euro€)?

- Below €30,000
- Between €30,000-€49,999
- Between €50,000-€74,999

- Between €75,000-€99,000
- Between €100,000-€149,999
- Above €150,000
- NA

Q7. Comments or suggestions? (*optional*)**.**

If you would like to be updated about the results of this research, fill out your email address below. *(optional)*.
E-mail

Thank you for your interest!

Annex B. Data Logging Per Cycle – Relocation Service

Table 42: Closed Group Phase - user actions to be logged (Web Component)

Web Component		
Component	**Cycle 1**	**Cycle 2 (to 5)**
General	• User logs in • User accesses Welcome page • User accesses Survey page • User logs out	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1 •
Find a place	• User opens 'Find a place' page • User runs search query on properties with given search credentials • User opens a specific Property detail page by selecting one from the search results • User adds or removes property to/from favourites	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1 • User adds or removes point of interest to list of favourites
My Favourites	• User opens 'My favourites' page	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1 •
Living in Brussels	•	• User opens Living in Brussels page
Easy copy pastable all in one cell (total of the above)	• User logs in • User accesses Welcome page • User accesses Survey page • User logs out • User opens 'Find a place' page • User runs search query on properties with given search credentials • User opens a specific Property detail page by selecting one from the search results • User adds or removes property to/from favourites	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1 • User adds or removes point of interest to list of favourites • User opens Living in Brussels page •

	• User opens 'My favourites' page	

Table 43: Closed Group Phase - user actions to be logged (Mobile Component)

Mobile Component	
Component	**Cycle 2**
General	• User opens application • User logs in • User opens main menu • User logs out • User closes application
Find a place	• User opens 'Find a place' screen • User runs search for properties with specific criteria • User taps a result • User opens Property detail screen • User adds or removes property to/from favourites • User views points of interest around property • User taps point of interest
My Favourites	• User opens my favourites screen • User visits favourite properties tab • User visits favourite POI's tab • User taps specific favourite
Easy copy pastable total of the above	• User opens application • User logs in • User opens main menu • User logs out

	• User closes application • User opens 'Find a place' screen • User runs search for properties with specific criteria • User taps a result • User opens Property detail screen • User adds or removes property to/from favourites • User views points of interest around property • User taps point of interest

Table 44: Open Group Phase - user actions to be logged (Web Component)

Web Component			
	Cycle1	**Cycle 2**	**Cycle 3 (to 5)**
General	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2	• Open group phase Cycle 1 logged actions + adjustments based on experiences in Open group Cycle 1	• Open group phase Cycle 2 logged actions + adjustments based on experiences in Open group Cycle 2
WHERE TO LIVE		• User opens 'where to live page' • User selects region and views details	• Open group phase Cycle 2 logged actions + adjustments based on experiences in Open group Cycle 2
FIND A PLACE	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2 • Individual settings are adjusted on the search form • User switches between list and map view	• Open group phase Cycle 1 logged actions + adjustments based on experiences in Open group Cycle 1	• Open group phase Cycle 2 logged actions + adjustments based on experiences in Open group Cycle 2

	• User previews property in map view •		
MY FAVOURITES	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2	• Open group phase Cycle 1 logged actions + adjustments based on experiences in Open group Cycle 1	• Open group phase Cycle 2 logged actions + adjustments based on experiences in Open group Cycle 2
LIVING IN BRUSSELS	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2	• Open group phase Cycle 1 logged actions + adjustments based on experiences in Open group Cycle 1	• Open group phase Cycle 2 logged actions + adjustments based on experiences in Open group Cycle 2 • User taps link categories • User clicks link
Easy copy pasteable stuff	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2 • Individual settings are adjusted on the search form • User switches between list and map view • User previews property in map view	• Open group phase Cycle 1 logged actions + adjustments based on experiences in Open group Cycle 1 • User opens 'where to live page' • User selects region and views details	• Open group phase Cycle 2 logged actions + adjustments based on experiences in Open group Cycle 2 • User taps link categories • User clicks link

Table 45: Open Group Phase - user actions to be logged (Mobile App)

Mobile app	
	Cycle 5

General	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2
WHERE TO LIVE	• User opens 'Where to live' screen • User selects region • User views region screen
FIND A PLACE	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2 • User opens up indicators around selected property screen • User views search results in Augmented Reality mode • User views POI around property in Augmented Reality mode
MY FAVOURITES	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in Closed group Cycle 2
Handy copy paste stuff	• Closed group phase Cycle 2 logged actions + adjustments based on experiences in • User opens 'Where to live' screen • User selects region • User views region screen • User opens up indicators around selected property screen • User views search results in Augmented Reality mode • User views POI around property in Augmented Reality mode

Annex C. Interview Guide (Generic)

[Note that these topics can serve all stakeholders, and are posed in addition to questionnaire; topics/specific questions will be further developed based on feedback from previous cycles]

Introduction

- Introduction of the research project, confidentiality, recording
- Introduction interviewee: name, gender, age, nationality, employment, computer/Internet proficiency, background/company sketch.

A. User experience and acceptance

Perceived ease of use

- Platform
- Service
- User management

Perceived usefulness

- Want, need (e.g. mobility)
- Aggregated data
- eServices (number and types of services, core services, recipients, process of delivering, channels)

Content

- Features
- Information quality (e.g. type of information, databases, website features)
- Upgrades

Attitude

- Competition
- Costs
- Ownership
- Smartness

B. 'Level of smartness'

Objectives and impact [especially for cycle 5 and evaluation purposes]

Generic for 3 pilots

Does the operation of the service fit into existing legal frameworks or are there legal barriers that should be tackled?

Does the services have the potential to efficiently expand to a bigger user population or should improvements still be made?

Does the EPIC solution pose certain security concerns?

Does the EPIC solution works technically efficient from your perspective and needs?

Can the EPIC solution be an efficient tool in the use context of citizens, SMEs and city administrations?

Which barriers do you identify for implementation and use of EPIC?

Is the pilot self-intuitive to use by citizens in order to let them work with the smart applications and get smart solutions for their needs and demands?

Pilot specific

Relocation

Smart living:

Does the relocation service improve the process of finding an area and property that meets demands and needs of citizen in an unknown city?

Smart mobility:

Does the relocation service help in better planning and organising a housing search, in this way making the mobility needs in the process more efficient?

Smart governance:

Does the relocation service make interactions with the local government more efficient and contributes to a more qualitative settling process in Brussels?

Does the relocation service provide better and fruitful insights in preferences of expats, thus given a sounder base for developing policies or initiatives regarding this population in Brussels?

Smart economy:

Does the relocation service improve the efficiency of the retail sector and other businesses with expats as clients to adapt their business strategies to preferences of expats in Brussels?

Urban Planning:

Smart living:

Does the urban planning system improve the quality of life of citizens by enabling them to discover the city from a specific need?

Smart mobility

Does the urban planning system help to reduce citizen's mobility needs by providing useful city information and better plan their mobility?

Smart economy

Does the urban planning service improve the access of citizens to the local economic fabric?

Does the urban planning service enable the city administration to have a more accurate view on their economic fabric?

Does the urban planning service improve the networking between SMEs and stimulates it entrepreneurship?

Does the urban planning service enable SMEs to better reach potential employees in the labour market?

Smart governance

Does the urban planning service provide better and accurate data for the development of urban planning policies?

Smart Environment:

Smart energy:

Does the smart environment service improve the awareness of households about their energy consumption?

Does the smart environment service enable households to take necessary actions in order to monitor their energy consumption?

Smart governance:

Does the smart environment service improve the ability of city administration to encourage private owners to implement energy reducing measures?

Does the smart environment service provide reliable data to measure the impact of their various energy consumption policies and initiatives?

Does the smart environment service stimulate business to improve and enhance the creation of smart energy tools and applications?

Debriefing

Thank you!

Annex D. Interview Guide Keith's House (Generic)

Introduction

- Introduction of the research project, confidentiality, recording
- Introduction interviewee: name, gender, age, nationality, employment, computer/Internet proficiency, background sketch.

Explain integrated scenario

You are relocating to a house in Issy-les-Moulineaux which is called "Keith's House". The information that can be retrieved is three-fold:

- You can explore the property listing of "Keith's House"
- You can explore the energy usage data for "Keith's House"
- You can explore the 3D area around "Keith's House"

After-scenario questionnaire

Q1a. What is your overall experience of executing the "Keith's House" scenario? *Please indicate to what extent you agree or disagree with the following statements.*

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**	**NA**
Overall, I am satisfied with the ease of completing the tasks in this scenario						
Overall, I am satisfied with the amount of time it took to complete the tasks in						

this scenario						
I enjoyed executing this scenario						
I can execute the full scenario						

Q1b. How useful is the content of the following features for you to find the necessary information to execute the scenario? *Please indicate to what extent you agree or disagree with the following statements.*

	Very useful	**Sufficient**	**Neither useful nor useless**	**Insufficient**	**Useless**	**NA**
Property details						
Exploring 3D surroundings						
Energy usage						

Discussion

- Based on pilot questionnaires
- eGov/Smart Cities: Public and social services, transparent governance, cosmopolitanism, housing quality, environmental protection

Debriefing

Thank you!

Annex E. Questionnaire Urban Planning Service (French Version) and Data Logging PerCycle

A.) Questionnaire

List of items by construct

[Note that all questions will be used starting with Cycle1 and that based on feedback they may get adjusted accordingly for the upcoming cycles]

Construct		Item
Facilité d'utilisation		FU1 L'accès à l'application est simple FU2 L'application est simple d'utilisation FU3 L'application se manipule facilement avec la souris FU4 La navigation dans la ville est intuitive et simple FU5 L'application est graphiquement compréhensible FU6 La sensation d'immersion proposée par la 3D est satisfaisante FU7 Les interactions au sein de l'application sont claires et compréhensibles FU8 Les informations obtenues sont claires et compréhensibles FU9 Aucun soutien technique n'est nécessaire pour utiliser l'application FU10 L'application est utilisable par tous les publics
Utilité		U1 ISSY 3D est un moyen ludique pour découvrir la ville d'Issy-les-Moulineaux au travers de ses lieux majeurs U2 Issy 3D est un moyen efficace pour voir l'évolution et les grands chantiers de la ville d'Issy-les-Moulineaux U3 Issy 3D permet de connaitre rapidement les principaux lieux de loisirs et de culture de la ville d'Issy-les-Moulineaux

		U4 Issy 3D fait connaitre les initiatives majeures liées au développement durable à Issy-les-Moulineaux U5 Issy 3D permet d'identifier et d'accéder aux informations des entreprises présentes sur le territoire U6 Issy 3D est un moyen efficace pour la ville pour communiquer vers ses concitoyens sur les éléments structurants du territoire U7 Issy 3D est un outil efficace de promotion et de valorisation au niveau local, national et international des initiatives de la ville U8 Issy 3D est un outil efficace pour mieux faire connaitre son tissu économique local U9 Issy 3D est un outil efficace pour les entreprises pour une communication et un partage de proximité (en réseau) U10 Issy 3D est un service essentiel qui devrait être proposé par les villes à leurs PME
Contenu		C1 Le design général de l'écran C2 La représentation symbolique en 3D C3 La sélection des thèmes C4 La lisibilité d'accès aux informations (les infos bulles) C5 La structure et le contenu des « média center » (mini chaine d'information) C6 L'intérêt des informations communiquées C7 Richesse des informations C8 Disponibilité des médias comme les photos, les vidéos C9 Les 5 thématiques couvertes C10 L'outil d'administration permettant d'actualiser les informations de l'application C11 L'outil permettant la communication entre entreprises

		C12 Informations générales sur la ville C13 Informations sur les loisirs et la culture C14 Informations sur le développement durable C15 Informations sur les projets d'urbanisme C16 Informations sur les entreprises C17 Informations de valorisation des lieux et des services de la ville (Media Center) C18 Informations de valorisation des produits et services des entreprises (Media Center) C19 Informations sur les compétences techniques locales pour les entreprises C20 Informations sur les offres d'emploi des entreprises C21 Informations sur les échanges entre entreprises
Opinions		O1 L'accès à Issy 3D à travers le portail est simple O2 Le temps de chargement et d'accès aux informations est acceptable O3 Les différentes thématiques proposées sont essentielles O4 Les fonctionnalités proposées dans Issy 3D sont parfaitement intégrées O5 Issy 3D permet de m'informer ou de rechercher une information de la ville O6 Issy 3D permet de rechercher une information sur les entreprises d'Issy-les-Moulineaux O7 Je pense utiliser Issy 3D pour promouvoir et communiquer sur mon entreprise O8 Je suis prêt à payer une faible contribution pour utiliser le service Issy 3D O9 Issy 3D doit proposer des services complémentaires en mobilité O10 Issy 3D doit intégrer d'autres services et d'autres acteurs économiques du territoire

		O11 Je suis prêt à payer une faible contribution pour utiliser des services additionnels disponibles dans Issy 3D
		O12 Performance O13 Robustesse O14 Fiabilité O15 Recherche O16 Ergonomie O17 Cartographie O18 Thématiques O19 Sécurité O20 L'aspect social O21 Média Center
Impressions finales		IF1 Listez les aspects positifs IF2 Listez les aspects à améliorer ou manquants IF3 Vos recommendations

Facilité d'utilisation

Q1. L'application Issy 3D est-elle facile à utiliser? *Indiquez s'il vous plaît dans quelle mesure vous êtes d'accord avec les déclarations suivantes.*

	Tout à fait d'accord	**D'accord**	**Neutre**	**Pas d' accord**	**Pas du tout d'accord**	**N/A**
L'accès à l'application est simple						
L'application est simple d'utilisation						
L'application se manipule facilement avec la souris						
La navigation dans la ville est intuitive et simple						
L'application est graphiquement comprehensible						
La sensation d'immersion proposée par la 3D est satisfaisante						
Les interactions (sélection, survol, choix) au sein de l'application sont claires et compréhensibles						

Les informations obtenues sont claires et compréhensibles						
Aucun soutien technique n'est nécessaire pour utiliser l'application						
L'application est utilisable par tous les publics						

Utilité

Q2. Quelle est l'utilité de l'application Issy 3D pour vous ? *Indiquez s'il vous plaît dans quelle mesure vous êtes d'accord avec les déclarations suivantes.*

	Tout à fait d'accord	**D'accord**	**Neutre**	**Pas d' accord**	**Pas du tout d'accord**	**N/A**
L'application ISSY 3D est un moyen ludique pour découvrir la ville d'Issy-les-Moulineaux au travers de ses lieux majeurs						
Issy 3D est un moyen efficace pour voir l'évolution et les grands chantiers de la ville d'Issy-les-Moulineaux						

Issy 3D permet de connaitre rapidement les principaux lieux de loisirs et de culture de la ville d'Issy-les-Moulineaux						
Issy 3D fait connaitre les initiatives majeures liées au développement durable à Issy-les-Moulineaux						
Issy 3D permet d'identifier et d'accéder aux informations des entreprises présentes sur le territoire						
Issy 3D est un moyen efficace pour la ville pour communiquer vers ses concitoyens sur les éléments structurants du territoire						
Issy 3D est un outil efficace de promotion et de valorisation au niveau local, national et international des initiatives de la ville						

Issy 3D est un outil efficace pour mieux faire connaitre son tissu économique local						
Issy 3D est un outil efficace pour les entreprises pour une communication et un partage de proximité (en réseau)						
Issy 3D est un service essentiel qui devrait être proposé par les villes à leurs PME						

Contenu

Q3a. Quelle note donnez-vous à l'interface et au contenu d'Issy 3D ? *Indiquez s'il vous plaît quelle est selon vous la qualité des points suivants.*

	Faible	**Moyenne**	**Bonne**	**Excellente**	**Pas d'avis**	**N/A**
Le design général de l'écran						
La représentation symbolique en 3D						
La sélection des thèmes						
La lisibilité d'accès aux informations (les infos bulles)						
La structure et le contenu des « média center » (mini chaine d'information)						
L'intérêt des informations communiquées						
Richesse des informations						
Disponibilité des médias comme les photos, les vidéos, etc…						
Les 5 thématiques couvertes						
L'outil d'administration permettant d'actualiser les informations de l'application						
L'outil permettant la communication entre						

entreprises						

Q3b. Quelle est selon vous l'utilité des services suivants offerts par Issy 3D ?
Indiquez s'il vous plaît dans quelle mesure vous êtes d'accord avec les points suivants.

	Très utile	**Utile**	**Moyennement utile**	**Utilité médiocre**	**Inutile**	**N/A**
Informations générales sur la ville						
Informations sur les loisirs et la culture						
Informations sur le développement durable						
Informations sur les projets d'urbanisme						
Informations sur les entreprises						
Informations de valorisation des lieux et des services de la ville (Media Center)						
Informations de valorisation des produits et services des entreprises (Media Center)						
Informations sur les compétences techniques						

locales pour les entreprises						
Informations sur les offres d'emploi des entreprises						
Informations sur les échanges entre entreprises						

Q4a. Quelle est votre opinion sur le service Issy 3D? *Indiquez s'il vous plaît dans quelle mesure vous êtes d'accord avec les déclarations suivantes.*

	Tout à fait d'accord	**D'accord**	**Neutre**	**Pas d' accord**	**Pas du tout d'accord**	**N/A**
L'accès à Issy 3D à travers le portail est simple						
Le temps de chargement et d'accès aux informations est acceptable						
Les différentes thématiques proposées sont essentielles						
Les fonctionnalités proposées dans Issy 3D sont parfaitement intégrées						
Issy 3D permet de m'informer ou de rechercher						

une information de la ville						
Issy 3D permet de rechercher une information sur les entreprises d'Issy-les-Moulineaux						
Je pense utiliser Issy 3D pour promouvoir et communiquer sur mon entreprise						
Je suis prêt à payer une faible contribution pour utiliser le service Issy 3D						
Issy 3D doit proposer des services complémentaires en mobilité (sur smartphone par exemple)						
Issy 3D doit intégrer d'autres services et d'autres acteurs économiques du territoire pour la valorisation et la promotion de leurs produits et services						
Je suis prêt à payer une faible contribution pour utiliser des services additionnels disponibles dans						

Issy 3D						

(Classement)

Q4b. Quelle est l'importance des points suivants pour vous? *Merci de classer ces points en fonction de leur importance (1 – le plus important, 10 – le moins important).*

( ) Performance (temps d'accès aux informations)
( ) Robustesse (fonctionne sans blocage intempestif)
( ) Fiabilité (qualité des informations disponibles)
( ) Recherche (facilité pour trouver une information)
( ) Ergonomie (compréhension et facilité d'utilisation de l'application)
( ) Cartographie (affichage géolocalisé des informations)
( ) Thématiques (richesse des informations et des thèmes couverts)
( ) Sécurité (identifiant et mot de passe)
( ) L'aspect social (possibilité d'interagir avec d'autres utilisateurs du service)
( ) Média Center (service de valorisation et promotion géolocalisé pour les acteurs du territoire)

Q5. Impressions finales. *Veuillez lister les aspects positifs, à améliorer ou manquants du service Issy 3D. Vos recommandations sont également les bienvenues.*

Aspect(s) positif(s):

1.

2.

<INPUT NAME=\ negative3 VALUE= SIZE= 60 > MACROBUTTON HTMLDirect

Aspect(s) à améliorer ou manquant(s):

1.

2.

Vos recommandations:

1.

2.

Questionnaire User Profile

List of items by construct

Construct		Item (list individual questions per construct)
Profil Internet		PI1 Usage PI2 Connexion depuis le domicile PI3 Connexion depuis le travail PI4 Connexion depuis un PC fixe PI5 Connexion depuis un PC portable PI6 Connexion depuis un téléphone mobile PI7 Connexion depuis une tablette tactile PI8 Messages instantanés PI9 Articles sur blog personnel PI10 Achats en ligne PI11 Services bancaires en ligne PI12 Réseaux sociaux PI13 Site web de la ville ou du gouvernement français PI14 Téléchargement des formulaires divers PI15 Possession d'un smartphone
Profil Smart City		PSC1 Mobilité professionnelle en Europe PSC2 Qualité du logement PSC3 Transparence du gouvernement local PSC4 Services publics en ligne PSC5 Protection de l'environnement
Profil démographique		PD1 Sexe PD2 Age PD3 Situation familiale PD4 Pays de résidence PD5 Langue PD6 Situation professionnelle

Q1a. Utilisez-vous internet, au moins de manière occasionnelle? *(Optionnel)*

- Oui
- Non
- Pas de réponse (N/A)

Q1b. A quelle fréquence vous connectez-vous à l'internet… ? *(Optionnel)*

	Plusieurs fois par jour	**Tous les jours**	**Plus d'une fois par semaine**	**Plus d'une fois par mois**	**Rarement**	**Jamais**	**N/A**
Depuis votre domicile							
Depuis votre travail							
Depuis un PC fixe							
Depuis un PC portable							
Depuis un téléphone mobile							
Depuis une tablette tactile (type iPad)							

Q1c. Dans quel but utilisez-vous l'internet ? Veuillez choisir toutes les options applicables. *(Optionnel)*

	Très souvent	Souvent	Parfois	Jamais	N/A
Pour envoyer des messages instantanés					
Pour poster des articles sur votre blog personnel					
Pour faire des achats en ligne					
Pour accéder aux services bancaires en ligne					
Pour utiliser les réseaux sociaux (Facebook, Twitter, LinkedIn)					
Pour consulter le site web de votre ville ou le site web du gouvernement français					
Pour télécharger des formulaires divers					

Q1d. Quelle importance accordez-vous aux thèmes suivants? *(Optionnel)*

	Très important	**Important**	**Assez important**	**Pas du tout important**	**N/A**
Mobilité professionnelle en Europe					
Qualité du logement					
Transparence du gouvernement local					
Services publics en ligne					
Protection de l'environnement					

Q1e. Avez-vous un smartphone? *(Optionnel)*

- Oui
- Non

Q2. Vous êtes… *(Optionnel)*

- Un homme
- Une femme

Q3. Quel est votre age? *(Optionnel)*

Q4. Quelle est votre situation familiale? *(Optionnel)*

- Célibataire
- En couple
- Marié (e)

- Divorcé (e)
- N/A

Nombre d'enfants:

- 0
- 1-2
- 3-4
- 5 ou plus
- N/A

Est-ce que vos enfants habitent avec vous?

- Oui
- Non
- N/A

Q5. Quel est votre pays de résidence? *(Optionnel)*

Q5a. Quelle est votre langue maternelle? *(Optionnel)*

<INPUT TYPE=\ TEXT SIZE= 20 MAXLENGTH= 255 > MACROBUTTON HTMLDirect

Q6. Les questions suivantes concernent votre situation professionnelle. *(Optionnel)*

Quelle est votre situation actuellement ?

- Employé (e) à temps plein
- Employé (e) à temps partiel
- Entrepreneur/ dirigeant d'entreprise
- Personne au foyer
- Etudiant, salarié
- Etudiant, non salarié
- Sans emploi
- N/A

Quel est votre secteur d'activité ?

- Art
- Cinématographie
- Commerce
- Communication & Marketing
- Comptabilité & Finances
- Edition
- Education
- Gouvernement
- Informatique & Technologie

- Ingénierie
- Jeux, média interactives
- Mode
- Restauration & Hôtellerie
- Santé
- Services juridiques
- Autre
- N/A

Quel est votre revenu annuel?

- Entre 0 et 30.000 €
- Entre 30.000 et 49.999 €
- Entre 50.000 et 74.999 €
- Entre75.000 et 99.000 €
- Entre 100.000 et 149.999 €
- Supérieur à 150.000 €
- N/A

Q7. Avez-vous des commentaires ou suggestions à faire? *(Optionnel).*

B. Data logging Urban Planning

Table 46: user data to be logged during cycles closed and open user group phase

Web Component		
Component	**Cycle 1**	**Cycle 2 (to 5)**
General	• User logs in • User accesses Welcome page • User accesses Survey page • User logs out	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1
Select a layer	• User select 1 to 5 layers on the main page : o Discovery of the City o Sustainable Development o Urban Planning o Leisure and Culture o Economic Development	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1
POI	• Click on any POIs	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1
Media Center	• Double Click on enriched POIs • Select Text • Select Picture • Select Video • Select Document • Select Web link	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1
City Administration	• Select the City Porlet • Select a POI • Add Text • Add Media	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1
Enterprise Administration	• Select the Enterprise Porlet • Select POI • Add Text • Add Media	• Cycle 1 logged actions + adjustments based on experiences in Cycle 1

Annex F. Smart Environment: Questionnaire and Data Logging Per Cycle

A. Questionnaire

List of items by construct

Construct		Item	Timing
Perceived Ease of Use	PEU1	I find the Smart Environment Service easy to use	All cycles
	PEU2	I think I would need technical support to use the Smart Environment Service	All cycles
	PEU3	I have found improvements in the service have made it easier to use	C4, C5
	PEU4	I find this service is designed for all levels of users	C2, C5
Perceived Usefulness	PU1	Using the Smart Environment service I was able to understand my electricity consumption better	All cycles
	PU2	I have been able to lower my energy consumption by using this service	C2, C5
	PU3	I have found monitoring my electricity usage has helped me reduce my energy consumption	C2, C4
	PU4	I have found that a city-wide view has helped me reduce my energy consumption	C2, C5
	PU5	I have found that I have been able to sustain energy savings by using this service	C5
	PU6	I find the city-wide view of consumption useful	C1, C3, C5
	PU7	I feel that this is a service essential for me to help my city meet its carbon reduction targets	C1, C3, C5
	PU8	I find historical electricity information useful in reducing my energy consumption	C1, C3, C5
	PU9	I found energy saving and understanding tips useful in reducing my energy consumption	C2, C4
Content Quality	CQ1	How would you rate the content of the Smart Environment Service? Colours used on the website	C1, C3, C5

	CQ2	Language clear and understandable	C1,, C3, C5
	CQ3	Layout and position of items on screen	C1,, C3, C5
	CQ4	Quality of graphs	C1,, C3, C5
	CQ5	Accuracy of readings	C1,, C3, C5
	CQ6	Accuracy of spend forecasts	C1, , C3, C5
	CQ7	How useful is the content of the following features? Real time display of my usage	C1, , C3, C5
	CQ8	Real time display of city-wide usage	C1, , C3, C5
	CQ9	My forecast spend of the day	C1, , C3, C5
	CQ10	City-wide forecast spend of the day	C1, , C3, C5
	CQ11	My historical consumption	C1, , C3, C5
	CQ12	City-wide historical consumption	C1, , C3, C5
Attitudes/Intentions	A1	In my opinion protecting the environment is an important issue	C1, C3,
	A2	I think I should make a positive impact on carbon reduction	C2, C3
	A3	I know how I can save energy	C2, C4
	A4	I can reduce my electricity use quite easily	C1, C3
	A5	After using this service I think I have made a positive impact on carbon reduction	C2, C5
	A6	I am engaged with my city by using this service	C2, C4
	A7	I think the city cares about my view by using this service	C2, C4
	A8	I would use this service on an ongoing basis	C2, C5
	A9	How often did you use the Smart Environment Service Energy Hive – individual usage	All cycles
	A10	Epic – city-wide usage	All cycles

PERCEIVED EASE OF USE

Q1 How easy is it to use the Smart Environment Service?

Please indicate to what extent you agree or disagree with following statements.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	N/A
I find the Smart Environment Service easy to use (PEU1)	o	o	o	o	o	o
I think I would need technical support to use this service (PEU2)	o	o	o	o	o	o
I have found improvements in the service have made it easier to use (PEU3)	o	o	o	o	o	o
I find this service is designed for all levels of users (PEU4)	o	o	o	o	o	o

PERCEIVED USEFULNESS

Q2 How useful is the Smart Environment Service?

Please indicate to what extent you agree or disagree with following statements.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	N/A
Using the Smart Environment Service I was able to understand my electricity consumption better (PU1)	o	o	o	o	o	o
I have been able to lower my energy	o	o	o	o	o	o

consumption by using this service (PU2)						
I have found monitoring my electricity usage has helped me to reduce my energy consumption (PU3)	o	o	o	o	0	o
I have found that a city-wide view has helped me reduce my energy consumption (PU4)	o	o	o	o	0	o
I have found that I have been able to sustain energy savings by using this service (PU5)	o	o	o	o	o	o
I find the city-wide view of consumption useful (PU6)	o	o	o	o	o	o
I feel that this service is essential for me to help my city meet its carbon reduction targets (PU7)	o	o	o	o	o	o
I find historical electricity information useful in reducing my energy	o	o	o	o	o	o

consumption (PU8)						
I found energy saving and understanding tips useful in reducing my energy consumption (PU9)	o	o	o	o	o	o

CONTENT QUALITY

Q3a How would you rate the content of the Smart Environment Service? *Please indicate how you would rate the content of the service using the following statements.*

	Excellent	Good	Fair	Poor	Not Sure	N/A
Colours used on the website (CQ1)	o	o	o	o	o	o
Language clear and understandable (CQ2)	o	o	o	o	o	o
Layout and position of items on screen (CQ3)	o	o	o	o	o	o
Quality of graphs (CQ4)	o	o	o	o	o	o
Accuracy of readings (CQ5)	o	o	o	o	o	o
Accuracy of spend forecasts (CQ6)	o	o	o	o	o	o

Q3b How useful is the content of the following features? *Please indicate how you would rate the content of the service using the following statements.*

	Excellent	Good	Fair	Poor	Not Sure	N/A
Real time display of my usage (CQ7)	o	o	o	o	o	o
Real time display of city-wide usage (CQ8)	o	o	o	o	o	o
My forecast spend of the day (CQ9)	o	o	o	o	o	o
City-wide forecast spend of the day (CQ10)	o	o	o	o	o	o
My historical consumption (CQ11)	o	o	o	o	o	o
City-wide historical consumption (CQ12)	o	o	o	o	o	o

ATTITUDES/INTENTION

Q4a What is your attitude towards the Smart Environment Service? *Please indicate to what extent you agree or disagree with following statements.*

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	N/A
In my opinion protecting the environment is an important issue (A1)	o	o	o	o	o	o
I think I should make a positive impact on carbon reduction (A2)	o	o	o	o	o	o
I know how I can save energy (A3)	o	o	o	o	o	o
I can reduce my electricity use quite easily (A4)	o	o	o	o	o	o
After using this service I think I have made a positive impact on carbon reduction (A5)	o	o	o	o	o	o
I am engaged with my city by using this service (A6)	o	o	o	o	o	o
I think the city cares about my view by using this service (A7)	o	o	o	o	o	o
I would use this service on an ongoing basis (A8)	o	o	o	o	o	o

Q4b How often did you use the Smart Environment Service? *Please indicate with following statements.*

	More than once a day	Once a day	Several times a week	Once a week	Several times a month	Once a month	Less frequently	N/A
Energy Hive – individual usage **(A9)**	o	o	O	o	o	o	o	o
EPIC – city-wide usage (A10)	o	o	O	o	o	o	o	o

Questionnaire User Profile – Smart Environment Service

Construct		Item
Internet/ICT Profile	IP1	Internet Usage
	IP2	Use from home
	IP3	Use from work
	IP4	Other place
	IP5	Internet accessed by Desktop computer/laptop/tablet
	IP6	Smartphone
	IP7	Internet used for Communication – email/instant messaging
	IP8	Research
	IP9	Social networking
	IP10	Creating documents
	IP11	Sharing files and photos
	IP12	Download information
Smart City	SCP1	(Temporary) Job mobility across nations

Profile	SCP2	Quality of housing
	SCP3	Transparency of local (city) governance
	SCP4	Online public and social services
	SCP5	Environmental protection
Demographic Profile	DUP1	Gender
	DUP2	Age
	DUP3	Family Status
	DUP4	Children
	DUP7	Employment

Internet/ICT Profile

Q1a Do you use the internet, at least occasionally? (IP1) (*Optional)*

- Yes
- No
- Not applicable

Q1b Thinking about your overall internet use, how often do you use the internet from (*Optional)*

	More than once a day	Once a day	Several times a week	Once a week	Several times a month	Once a month	Less frequentl y	N/A
Home (IP2)	o	o	o	o	o	o	o	o
Work (IP3)	o	o	o	o	o	o	o	o
Some other place (IP4)	o	o	o	o	o	o	o	o

Q1c What technology do you use to access the internet and how frequently do you use this method? (*Optional)*

	More than once a day	Once a day	Several times a week	Once a week	Several times a month	Once a month	Less frequently	N/A
Desktop computer/laptop/tablet (IP5)	o	o	o	o	o	o	o	o
Smartphone (IP6)	o	o	o	o	o	o	o	o

Q1d What do you use the internet for and how often do you do these things? (*Optional)*

	More than once a day	Once a day	Several times a week	Once a week	Several times a month	Once a month	Less frequently	N/A
Communication – email/instant messaging (IP7)	o	o	o	o	o	o	o	o
Research information (IP8)	o	o	o	o	o	o	o	o
Social networking (IP9)	o	o	o	o	o	o	o	o
Creating documents (IP10)	o	o	o	o	o	o	o	o
Sharing information - files & photos (IP11)	o	o	o	o	o	o	o	o
Download information (IP12)	o	o	o	o	o	o	o	o

Smart City Profile

Q2 How important are the following statements for you? *Please indicate to what extent you think the statements are important (optional)*

	Very Important	Important	Somewhat Important	Not important	N/A
(Temporary) Job mobility across nations (SCP1)	o	o	o	o	o
Quality of housing (SCP2)	o	o	o	o	o
Transparency of local (city) governance (SCP3)	o	o	o	o	o
Online public and social services (SCP4)	o	o	o	o	o
Environmental protection (SCP5)	o	o	o	o	o

Demographic Profile

Q3 What is your gender (DUP1) (optional)

- Male
- Female
- Prefer not to say

Q4 What is the age range of the head of household (DUP2) *(optional)*

- Under 18 years
- 18 to 34 years
- 35 to 54 years
- 55 to 74 years
- Over 75 years
- Prefer not to say

Q5a What is the family status (DUP3) *(optional)*

- Single
- In a relationship
- Married
- Divorced

- Prefer not to say

Q5b Number of children living with you (DUP4) *(optional)*

- None
- 1 to 2
- 3 to 4
- 5 or more
- Prefer not to say

Q6a What is your employment status (DUP5) *(optional)*

- Full-time employed
- Part-time employed
- Self-employed / business owner
- Retired
- Homemaker
- Student
- Unemployed
- Prefer not to say

Q6b Which sector do you work in (DUP6) *(Optional)*

- Academic/education
- Arts
- Accountancy, finance, business services
- Broadcast, film
- Engineering
- Fashion
- Games, interactive media
- Government
- Health
- Hospitality
- IT, information systems
- Legal services
- Marketing
- Publishing
- Retail
- Other
- Prefer not to say

Q7. Comments or suggestions? (*optional*).

If you would like to be updated about the results of this research, fill out your email address below. *(optional)*.

Thank you for your interest!

B. Data logging

Smart Environment is putting Google Analytics on pages - the pages are more informational than interactive (at least for the City view).

Smart Environment will track during the test cycles which page the user has been on either with Google or with the logging that is being developed; specifically:

- Logged in
- Welcome page
- Dashboard
- Terms and Conditions
- Press button to Survey

Annex G. Detailed Work Plan and Time Schedule

The work plan and schedule below provides a detailed framework with all necessary actions that need to be undertaken by whom and when in order to evaluate the pilots throughout the whole testing operations.

It is in accordance with the work plan presented in D.7.1. '*Pilot Operations Plan*' but highlights in yellow within this framework the actions specially needed for WP8.

Pilot closed group

Table 47: Pilot preparation closed group phase

Activity	Responsible	Deadline
Provisioning of story boards service to pilot leads	Navidis, Hildebrand, IBBT-I.Lab.O	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till M19, 04.05.2012
User management requirements platform and pilots ready	IBM, BCU	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till M19, 04.05.2012
User panel recruited	IBBT - I.Lab.O, CIBG, Manchester City Council, Issy Media	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till M19, 04.05.2012
User panel management in place	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till M19, 04.05.2012
Training methods decided and training material prepared	IBBT-I.Lab.O, Manchester City Council, Issy Media, Navidis, Hildebrand, IBM	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till M19, 04.05.2012
Evaluation instruments provided and adapted/refined in case	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till

of experience of previous iterations		M19, 04.05.2012
Storing evaluation instruments in DB2 (logging,…)	IBM, BCU	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till M19, 04.05.2012
Importing questionnaires in survey software	IBBT-I.Lab.O	Cycle 1: M 18, w. 16-21.04.2012 Cycle 2: M18, w.30.04 till M19, 04.05.2012
Iterations ready for launch new cycle	IBBT-I.Lab.O, Hildebrand, Navidis, IBM	Cycle 2: M18, w.30.04 till M19, 04.05.2012

Table 48: Pilot implementation closed group phase

Activity	Responsible	Deadline
Launch tests cycles in closed group:	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M18, w.23-27.04.2012 Cycle 2: M19, w.07-11.05.2012
Managing user panel during test implementation	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M18, w.23-27.04.2012 Cycle 2: M19, w.07-11.05.2012
Capturing data logging	IBM, BCU, Navidis, Hildebrand, IBBT-I.Lab.O	Cycle 1: M18, w.23-27.04.2012 Cycle 2: M19, w.07-11.05.2012
Capturing data survey	IBBT-I.Lab.O	Cycle 1: M18, w.23-27.04.2012 Cycle 2: M19, w.07-11.05.2012
Securing support	I.Lab.O, Manchester City Council, Issy Media,	Cycle 1: M18, w.23-27.04.2012

	Hildebrand, Navidis, IBM	Cycle 2: M19, w.07-11.05.2012
Training users	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M18, w.23-27.04.2012 Cycle 2: M19, w.07-11.05.2012

Table 49: Pilot data analysis and feedback closed group phase

Activity	Responsible	Deadline
Analysis captured data	IBBT-I.Lab.O, Manchester City Council, Issy Media, Navidis, Hildebrand	Cycle 1: M18, w.30.04-M19,.04.05. 2012 Cycle 2: M19, w.14-19.05.2012 – till M19, w.28.05-01.06.2012
Reporting analysis of data to technical development teams	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M18, w.30.04-M19,.04.05. 2012 Cycle 2: M19, w.14-19.05.2012 – till M19, w.28.05-01.06.2012
Implementing user feedback in pilot development and platform	IBBT-I.Lab.O, Hildebrand, Navidis, IBM	Cycle 1: M18, w.30.04-M19,.04.05. 2012 Cycle 2: M19, w.14-19.05.2012 – till M19, w.28.05-01.06.2012
Follow up user participation panel management	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M18, w.30.04-M19,.04.05. 2012 Cycle 2: M19, w.14-19.05.2012 – till M19, w.28.05-01.06.2012

Pilot open group

Table 50: Pilot preparation open group phase

Activity	Responsible	Deadline
Iterations ready for each	IBBT-I.Lab.O, Hildebrand,	Cycle 1: M20, w.04-

pilot	Navidis,	08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
Adapting platform and ready for each cycle	IBM, BCU	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
Providing storyboards about services to Pilot Leads	IBBT-I.Lab.O, Hildebrand, Navidis	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
User management EPIC platform ready	IBM, BCU	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
User panel recruited	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
User panel management	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-

		07.09.2012
Training methods and material provided	IBBT-I.Lab.O, Manchester City Council, Issy Media, Navids, Hildebrand, IBM, BCU	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
Evaluation instruments provided and adapted/refined due to experience of previous iterations	IBBT-I.Lab.O, NTUA, Manchester City Council, Issy	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
Storing evaluation instruments (logging,…)	BCU, IBM	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
Importing questionnaires into survey software	IBBT-I.Lab.O	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012
Preparations practicalities interviews (date, hour, place, installation) fixed	IBBT-I.Lab.O	Cycle 1: M20, w.04-08.06.2012 Cycle 2: M20, w.25-29.06.2012 Cycle 3: M23, w.03-07.09.2012

Table 51: Pilot implementation open group phase

Activity	Responsible	Deadline
Launch cycle in open group	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.11-15.06.2012 Cycle 2: M21, w.02-06.07.2012 Cycle 3: M23, w. 10-15.09.2012
Managing user panel during test	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.11-15.06.2012 Cycle 2: M21, w.02-06.07.2012 Cycle 3: M23, w. 10-15.09.2012
Capturing data evaluation instruments	BCU, IBM, Navidis, Hildebrand, I.Lab.O	Cycle 1: M20, w.11-15.06.2012 Cycle 2: M21, w.02-06.07.2012 Cycle 3: M23, w. 10-15.09.2012
Capturing data survey software	IBBT-I.Lab.O	Cycle 1: M20, w.11-15.06.2012 Cycle 2: M21, w.02-06.07.2012 Cycle 3: M23, w. 10-15.09.2012
Securing support	IBBT-I.Lab.O, Manchester City Council, Issy Media, Hildebrand, Navidis, IBM	Cycle 1: M20, w.11-15.06.2012 Cycle 2: M21, w.02-06.07.2012 Cycle 3: M23, w. 10-15.09.2012
Training users	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.11-15.06.2012 Cycle 2: M21, w.02-

		06.07.2012 Cycle 3: M23, w. 10-15.09.2012
Interviews with stakeholders	IBBT-I.Lab.O	Cycle 1: M20, w.11-15.06.2012 Cycle 2: M21, w.02-06.07.2012 Cycle 3: M23, w. 10-15.09.2012

Table 52: Pilot data analysis and feedback open group phase

Activity	Responsible	Deadline
Analysis of captured data	IBBT-I.Lab.O, Manchester City Council, Issy Media, Navidis, Hildebrand	Cycle 1: M20, w.18-22.06.2012 until w.25-29.06.2012 Cycle 2: M21, w.09-13.07.2012 untill M23, w.03-07.09.2012 Cycle 3:M23, w.17-21.09.2012 till w.24-28.09.2012
Executing follow up telephone interviews and analysis	Manchester City Council	Cycle 1: M20, w.18-22.06.2012 until w.25-29.06.2012 Cycle 2: M21, w.09-13.07.2012 untill M23, w.03-07.09.2012 Cycle 3:M23, w.17-21.09.2012 till w.24-28.09.2012
Reporting analysis data to technical development teams	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.18-22.06.2012 until w.25-29.06.2012 Cycle 2: M21, w.09-13.07.2012 untill M23,

		w.03-07.09.2012 Cycle 3:M23, w.17-21.09.2012 till w.24-28.09.2012
Follow up user participation panel management	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.18-22.06.2012 until w.25-29.06.2012 Cycle 2: M21, w.09-13.07.2012 untill M23, w.03-07.09.2012 Cycle 3:M23, w.17-21.09.2012 till w.24-28.09.2012
Update/retain users participating in all cycles about pilot progress and adjustments made	IBBT-I.Lab.O, Manchester City Council, Issy Media	Cycle 1: M20, w.18-22.06.2012 until w.25-29.06.2012 Cycle 2: M21, w.09-13.07.2012 untill M23, w.03-07.09.2012 Cycle 3:M23, w.17-21.09.2012 till w.24-28.09.2012

Open group: Keith's House integrated scenario

Table 53: Keith's House preparation

Activity	Responsible	Deadlines
Technical preparations Keith House	IBBT-I.Lab.O, Navidis, Hildebrand, Manchester City Council, Issy Media	M23, w.17-21.09.2012
Providing storyboards/screen shots to Pilot Leads	IBBT-I.Lab.O, Navidis, Hildebrand	M23, w.17-21.09.2012
User management EPIC platform	IBM, BCU	M23, w.17-21.09.2012

Capturing data (logging)	IBM, BCU	M23, w.17-21.09.2012
User group recruited	IBBT-I.Lab.O, Manchester City Council, Issy Media	M23, w.17-21.09.2012
Training methods decided and material in place	IBBT-I.Lab.O, Manchester City Council, Issy Media	M23, w.17-21.09.2012
Providing evaluation instruments and adapted/refined due to experience previous iterations	IBBT-I.Lab.O, NTUA	M23, w.17-21.09.2012
Storing evaluation instruments (logging)	IBM, BCU	M23, w.17-21.09.2012
Necessary practicalities for focus groups fixed	IBBT-I.Lab.O	M23, w.17-21.09.2012

Table 54: Keith's House implementation

Activity	Responsible	Deadline
Launch Keith House scenario	IBBT-I.Lab.O, Manchester City Council, Issy Media	M23, w.24-28.09.2012
User panel management	IBBT-I.Lab.O, Manchester City Council, Issy Media	M23, w.24-28.09.2012
Providing support	IBBT-I.Lab.O, Manchester City Council, Issy Media, Hildebrand, Navidis, IBM	M23, w.24-28.09.2012
Capturing data	I.Lab.O, Manchester City Council, Issy Media	M23, w.24-28.09.2012

Table 55: Keith's House evaluation

Activity	Responsible	Deadline
Analyzing captured data	IBBT-I.Lab.O, Manchester	M24, w.01-05.2012

	City Council, Issy Media	
Reporting analysis data to technical development teams	IBBT-I.Lab.O, Manchester City Council, Issy Media	M24, w.01-05.2012
Implementing user feedback in pilots	IBBT-I.Lab.O, Navidis, Hildebrand	M24, w.01-05.2012
Follow up user participation panel management	IBBT-I.Lab.O, Manchester City Council, Issy Media	M24, w.01-05.2012
Update/retain users participating in all cycles about pilot progress and adjustments made	IBBT-I.Lab.O, Manchester City Council, Issy Media	M24, w.01-05.2012

Evaluation Phase

Table 56: Activities Evaluation Phase

Activity	Responsible	Deadline
3 Pilots		
Preparing and providing interviews for stakeholders	IBBT-I.Lab.O, Manchester City Council, Issy Media	M24-M30
Interviews with stakeholders	IBBT-I.Lab.O, Manchester City Council, Issy Media	M24-M30
Analysis of interviews	IBBT-I.Lab.O, Manchester City Council, Issy Media	M24-M30
Proof of concept preparations	Tirgu Mures	M24-M30

Annex H. Ethics Research Checklist[5]

	Yes	No	Not certain
Does the study involve participants who are in any way vulnerable or may have any difficulty giving consent? *As general guidance, the Research Ethics Committee feels that research participants under the age of 18 may be vulnerable.*		**X**	
Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g. covert observation of people in public places)		**X**	

Research Design/Methodology

Does the research methodology use deception?		**X**	
Are there any significant concerns regarding the design of the research project? a) If the proposed research relates to the provision of social or human services is it feasible and/or appropriate that service users or service user representatives should be in some way involved in or consulted upon the development of the project? b) Does the project involve the handling of any sensitive information?		**X**	

Financial Incentives/Sponsorship

Will the independence of the research be affected by the source of the funding?		**X**	
Are there payments to researchers/participants that may have an impact on the objectivity of the research?		**X**	
Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?		**X**	

[5] See LSE Research Ethics Checklist: http://www2.lse.ac.uk/intranet/researchAndDevelopment/researchPolicy/ethicsGuidanceAndForms.aspx (Retrieved 15 December 2011).

Research Subjects

Is pain or more than mild discomfort likely to result from the study?		**X**	
Could the study induce unacceptable psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life? Will the study involve prolonged or repetitive testing?		**X**	
Are drugs, placebos or other substances to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?		**X**	

Risk to Researchers

Do you have any doubts or concerns regarding your (or your colleagues) physical or psychological wellbeing during the research period?		**X**	

Confidentiality

Do you have any concerns regarding confidentiality, privacy or data protection?		**X**	

Dissemination

Are there any particular groups who are likely to be harmed by dissemination of the results of this project?		**X**	

Annex I. EPIC Pilot and User Management

Epic Pilot and User management version 1

The EPIC pilot & user management system is comprised of a number of web services and portlets that their purpose is to create a friendly management system for registering pilots and users on the EPIC platform and also record user's activity. It extends the portals' build-in user management system and allows more data and functionality to be added to the platform for pilots and users.

A general administrator is responsible for the registration of pilots and users to the platform as well as creating roles and assigning resource permissions to users. In order to do that there are three administration pages, Pilots page, Portal Users page and Database Users page under the EPIC Administration Page each one with its own functionality.

Pilots page

The Pilots page contains the Pilots List portlet, the Pilot Roles portlet and the Pilot Data Types portlet. All list views of the portlets have paging capabilities, that is results are spanned in many pages and only 5 are visible every time, and also some columns with sorting capabilities, that is by clicking on them the results are reordered ascending or descending based on column's values.

Pilots List

The Pilots List portlet is the main portlet for registering pilots on the platform. It shows a paged list view of all the pilots registered on the platform and allows registration of new pilots (add button), deletion of a pilot (deletion column) and addition of pilot roles and pilot data types (the link in pilot data column refreshes the other two portlets). The administrator can also see details about a pilot selected (link on Pilot ID column).

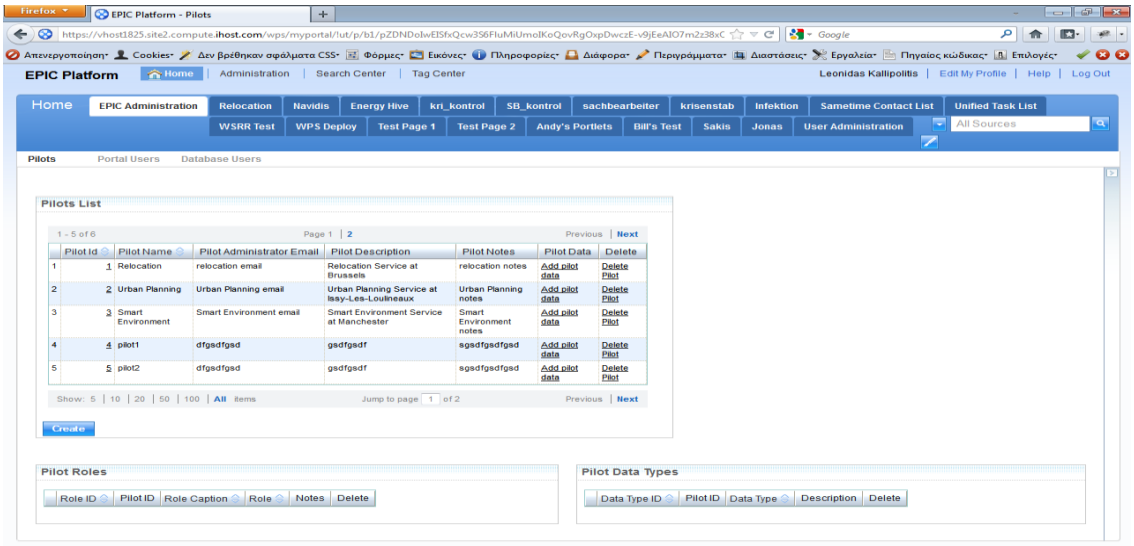


Figure 4: Pilots List View

When the administrator wants to add a new pilot simply clicks on the "Create" button and the portlet refreshes. The administrator adds pilot name (obligatory) and pilot administrator email, pilot description, pilot notes if available and clicks "submit" button to save the data or "cancel" button to return to the list view without saving the data.

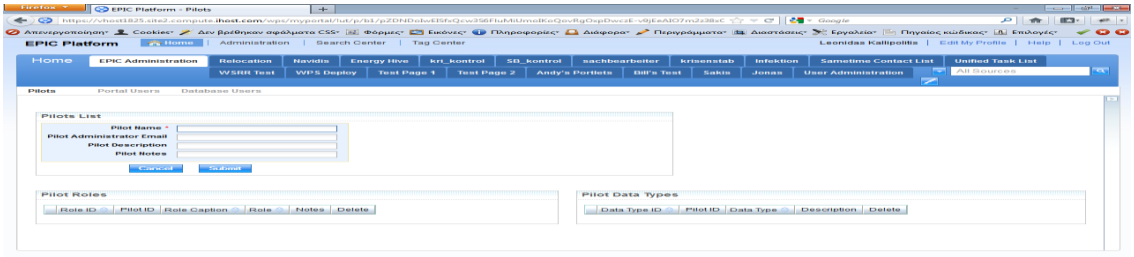


Figure 5: Add pilot view

For the details view of the pilot, administrator clicks on the pilot ID and the portlet refreshes to show the pilot's data.

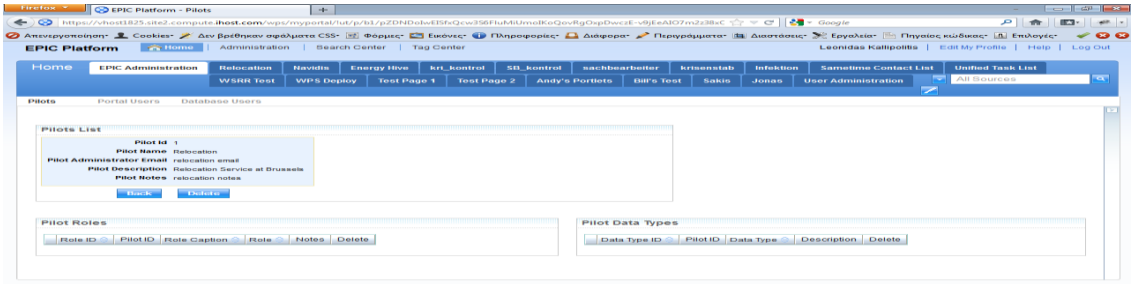


Figure 6: Pilot Details View

In order to delete a pilot, administrator simply presses the link in the correct pilot row (there is no error control here, once the link is clicked the pilot is deleted), or the "delete" button in the details view.

Pilot Roles & Data Types

The activation of the pilot roles and pilot data types portlets requires the use of the links on the Pilot Data column of the pilots list portlet. Each link activates the portlets for the pilot of the same row.

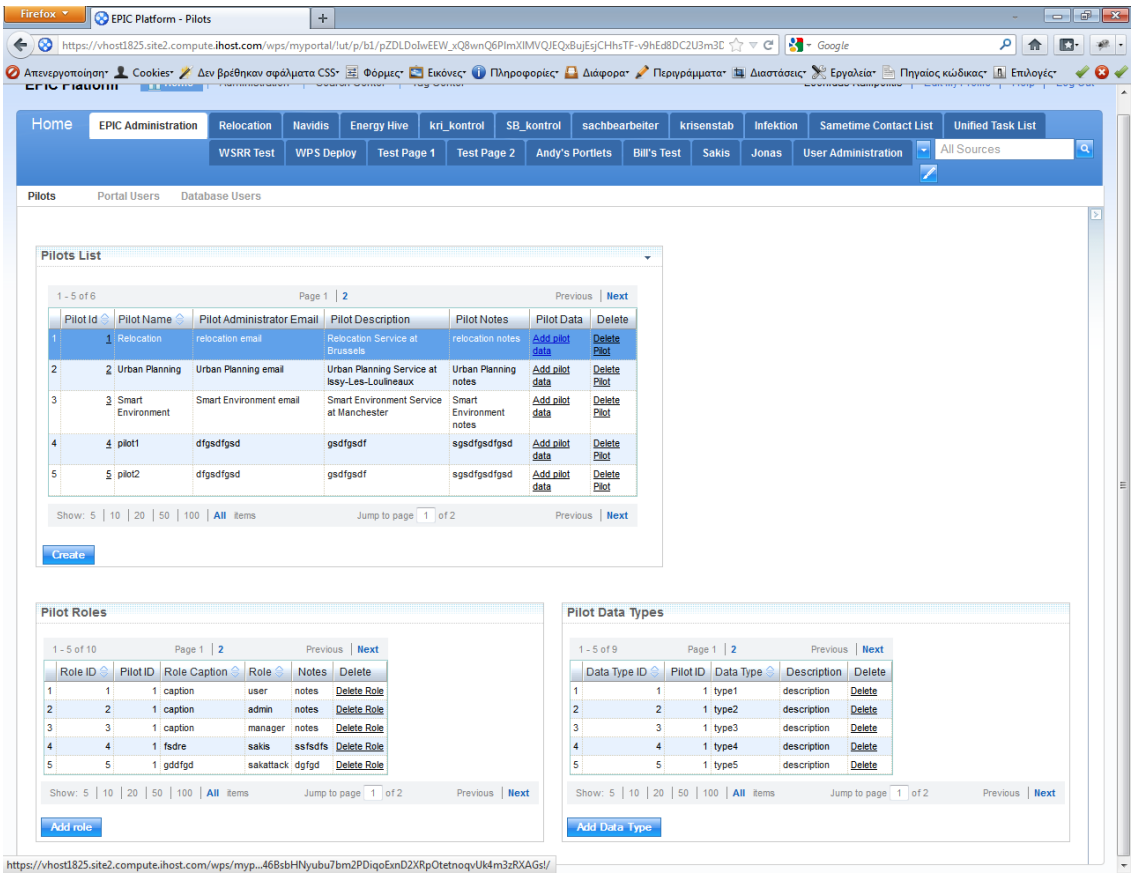


Figure 7: Pilot Roles & Pilot Data Types for relocation Pilot example

In the list view administrator can see all the roles and data types related with the pilot selected. He can also delete a pilot role or a pilot data type by using the delete links on each row of the two lists.

In order to add a role or data type administrator clicks on the “add role” or “add data type” buttons respectively and the portlets refresh. Pilot ID is not writable but administrator should at least provide Role or Data Type respectively in order to submit the data.

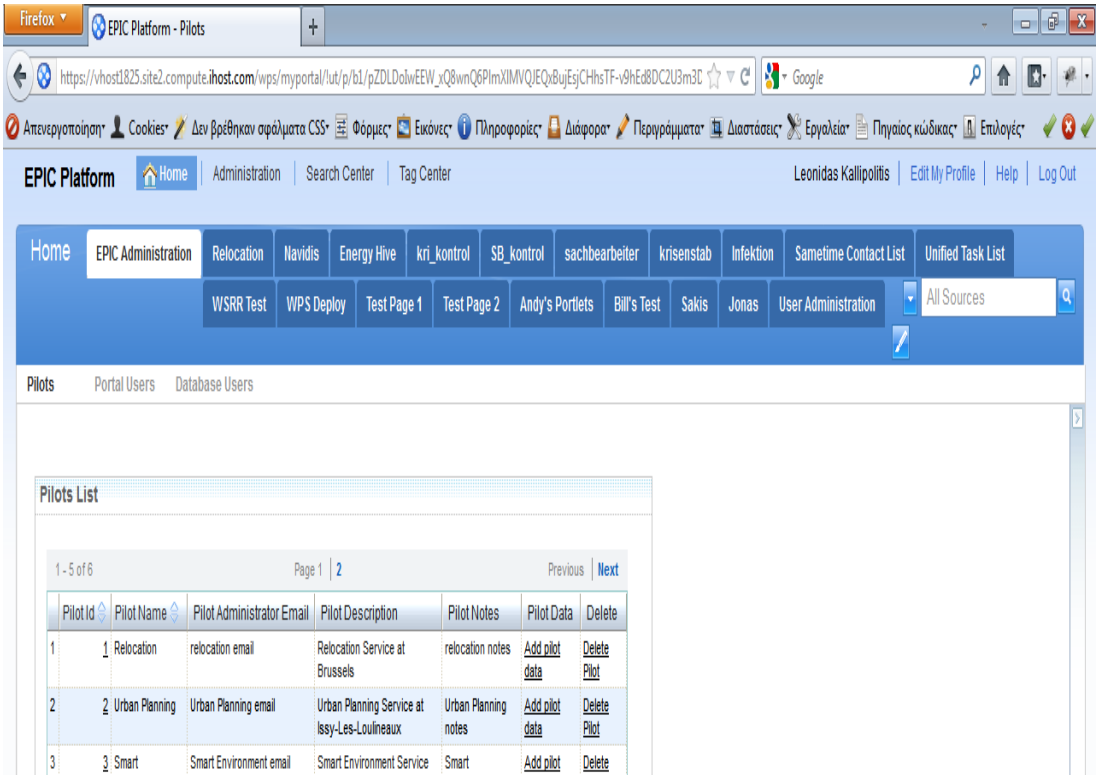


Figure 8: Add view for pilot roles & data types

Portal Users

From this page, administrators can create groups and users on the portal and assign them portal resource permissions. This step is necessary before adding users to the epic database since there needs to be a one to one relationship between portal and database users.

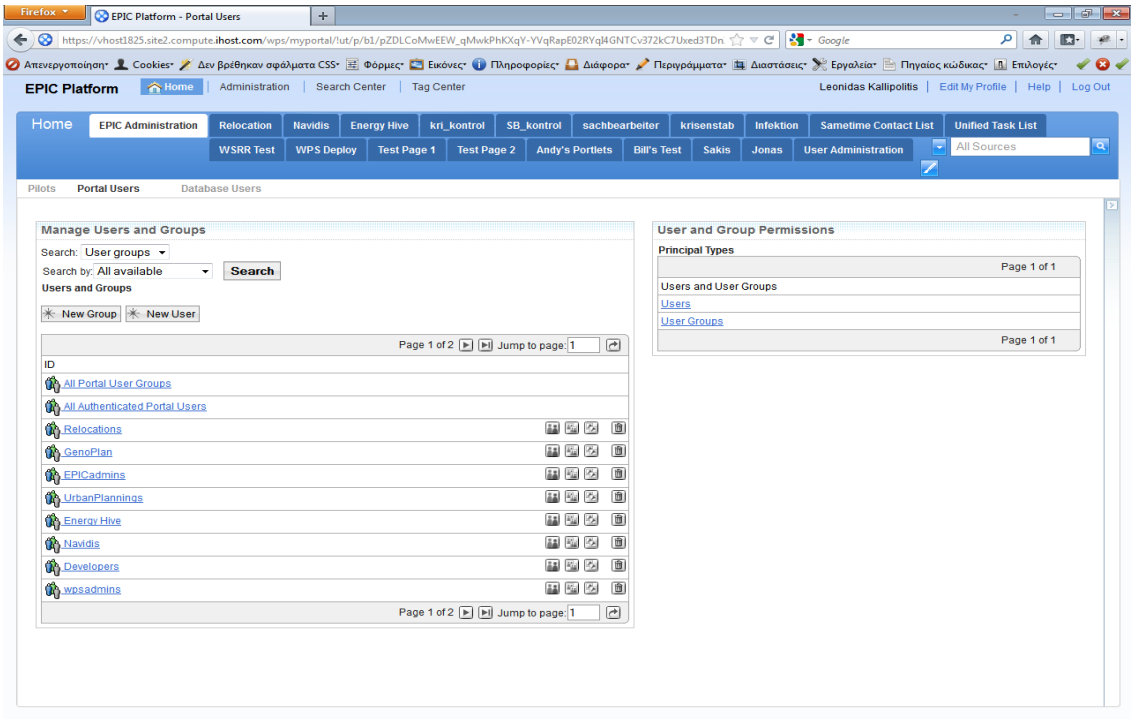


Figure 9: All available portal user groups

Administrator must create a group for every pilot registered on the epic platform from the Manage Users and Groups Portlet. For example for the Relocation pilot there is a Relocation User Group.

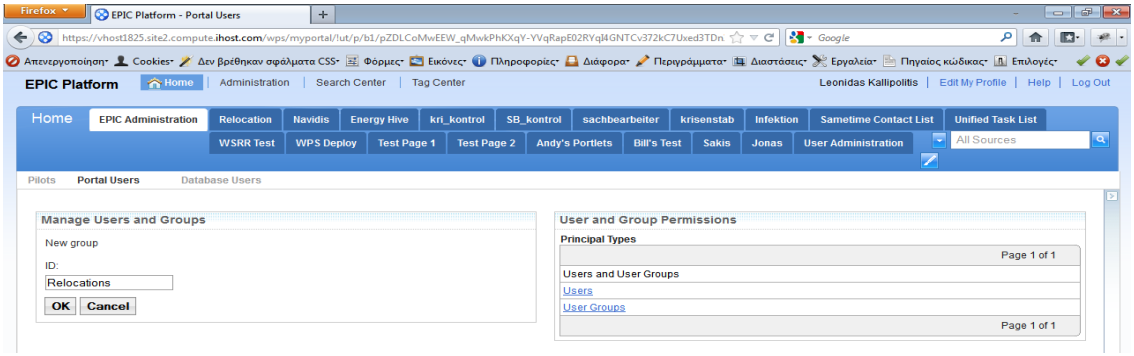


Figure 10: Add a user group

After the creation of the group, users can be created and assigned to it. In the "Manage Users and Groups" Portlet administrator clicks on the "New User" button. Administrator fills in the data required (User ID, password, last name) and optionally user's first name and preferred language.

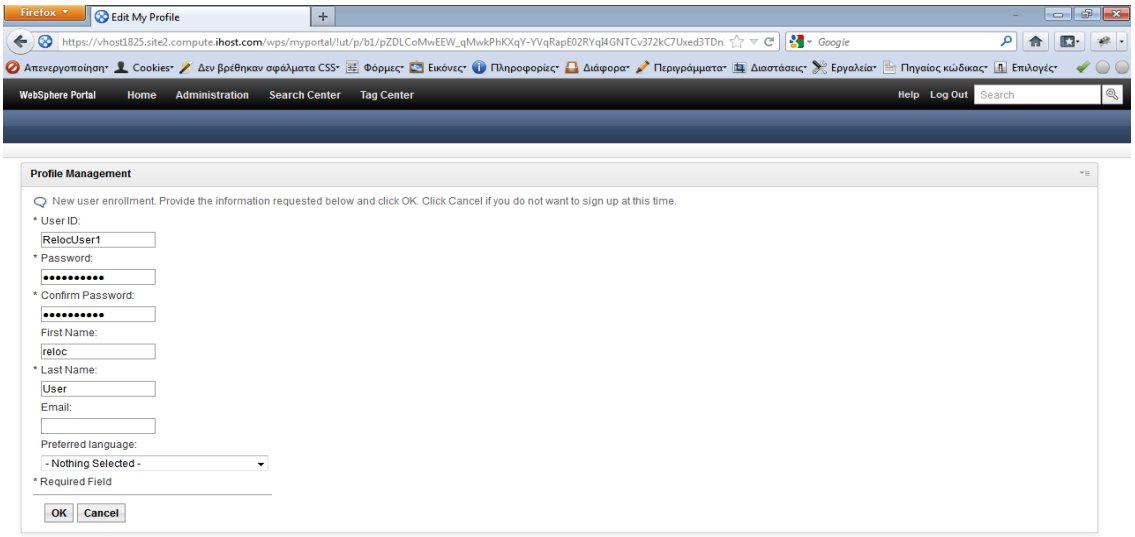


Figure 11: Creation of a new portal user

After creating the user, administrator can search for him by selecting "users" on the search list, "uid" on the search by list and writing the uid of the user created.

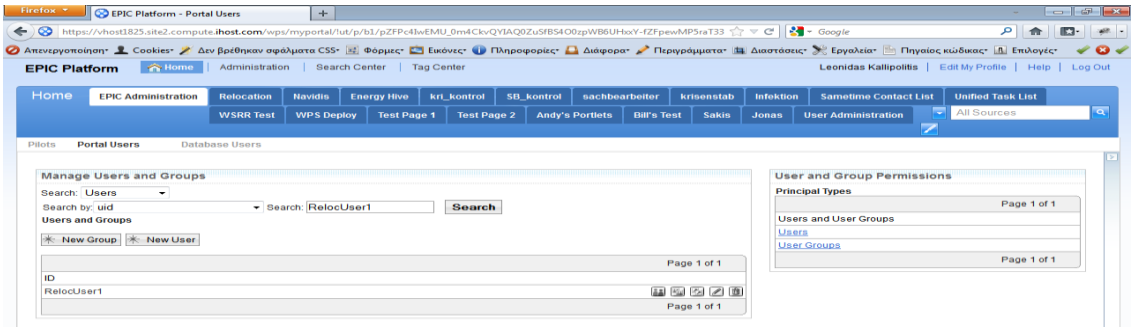


Figure 12: Search for newly created user

The new user can be added to a group by selecting the group and click "Add member". From the new screen any user to be added to group can be selected.

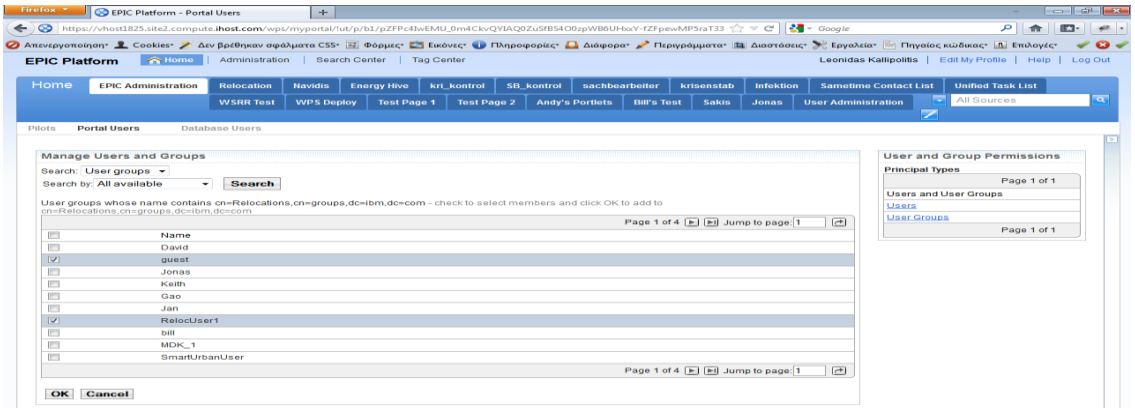


Figure 13: Adding users to groups

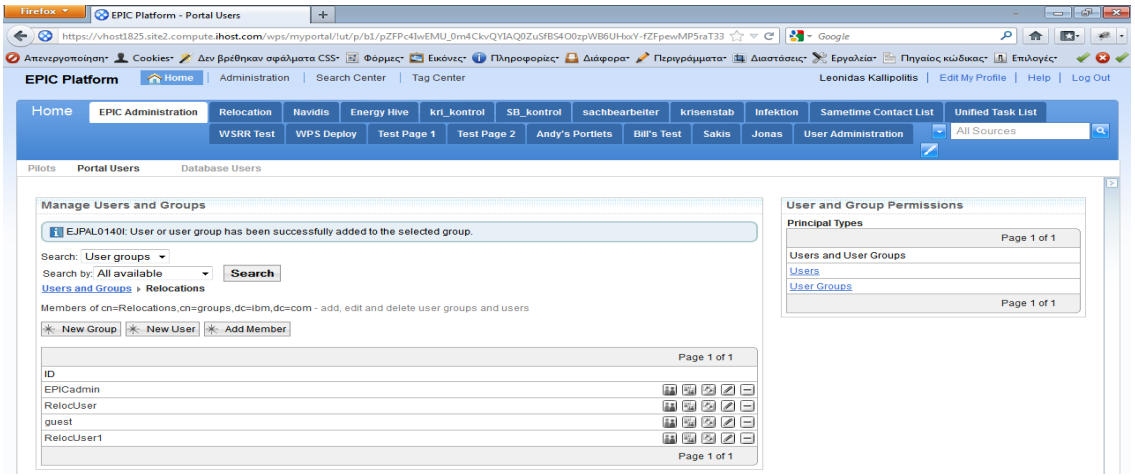


Figure 14: Users Added to group

After the group and users creation, administrator has to assign to groups portal resource permissions and if necessary to users as well. This can be done with the "User and Group Permissions" portlet.

Administrator selects User Groups -> search all available and then the "select resource type" button next to the group (example Relocations).

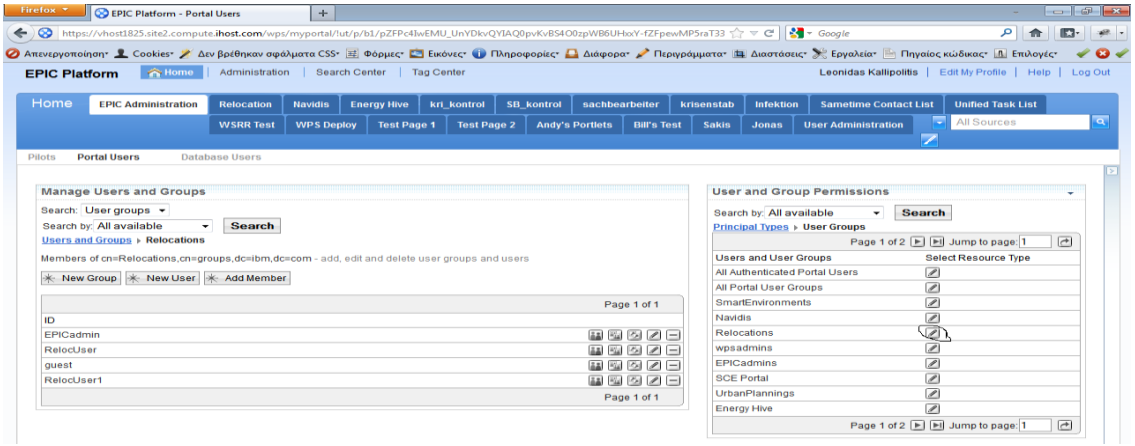


Figure 15: Assign Permissions to groups

First we need to assign permissions to pages (Pages-> Content Root-> Home). Administrator clicks on the "Assign Access" button next to appropriate page (ex. Relocation). From there the selection of appropriate roles can be selected.

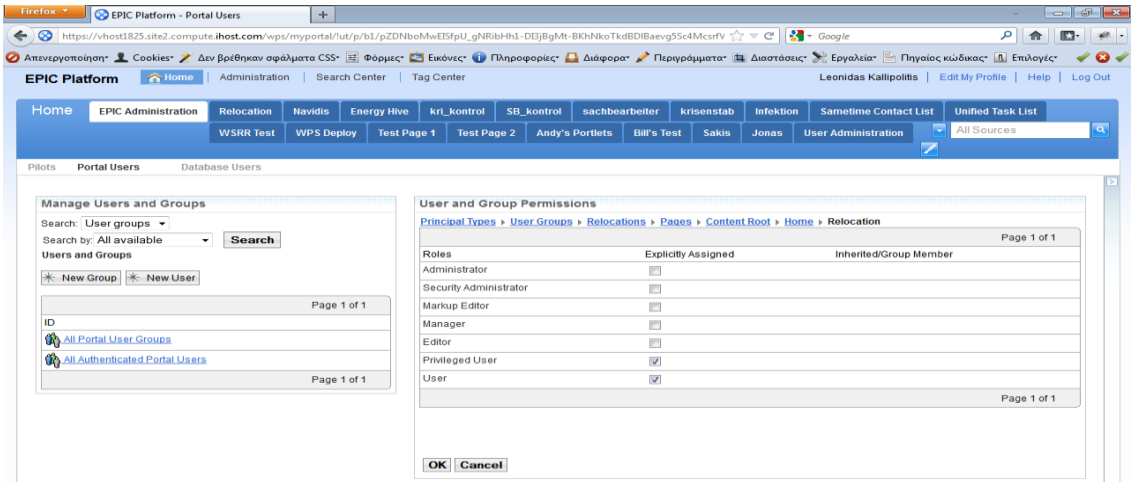


Figure 16: Assignment of roles

If the permissions are not inherited automatically to the pages below the root page (Relocation here) then the same process must be repeated for these pages as well.

Permissions must also be given for accessing portlets that are included on these pages (User Groups ->Relocations -> Portlets).

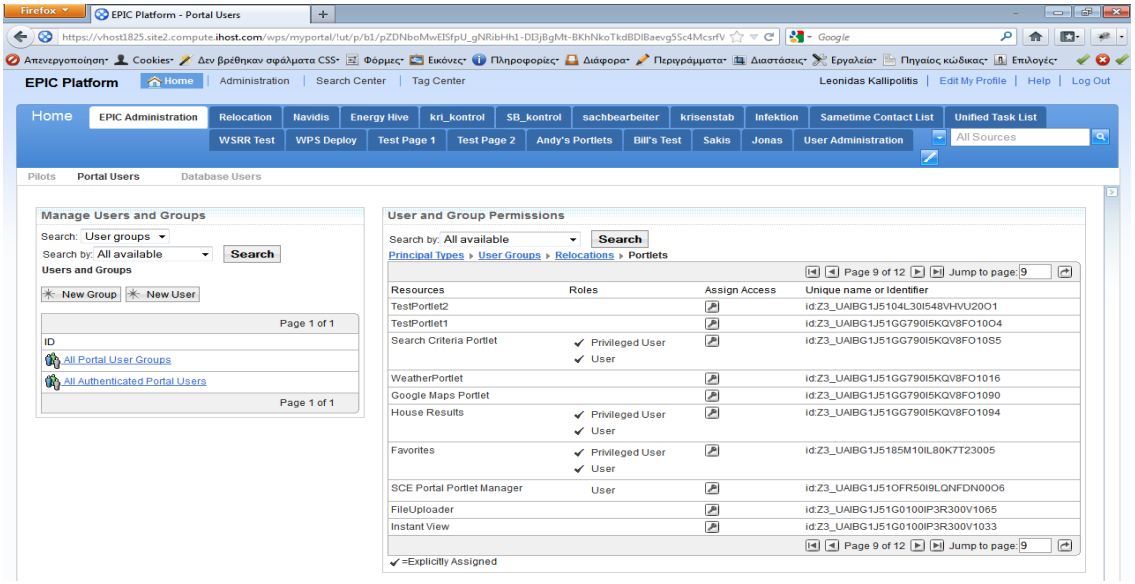


Figure 17: Assign permissions for portlets

Every portlet that the group needs to have access to must be selected (through "assign access" button), following the same process as before.

Database Users

From this page administrators add epic users to the database assign them pilot roles and configure pilot specific data for them. There are three portlets, Database Users List,

Functionality is similar to the Pilots List Portlet. Administrator can view a list of users already registered in the epic database, add users, delete them and see details about them.

In order to see details about a user, there is a link to the Epic User Name of each user. For the moment the details are only comprised by data from the USERS_DATA_COMMON_ANON table that is user id, email and user name but in future version the full profile of the user can be retrieved and displayed in the details view.

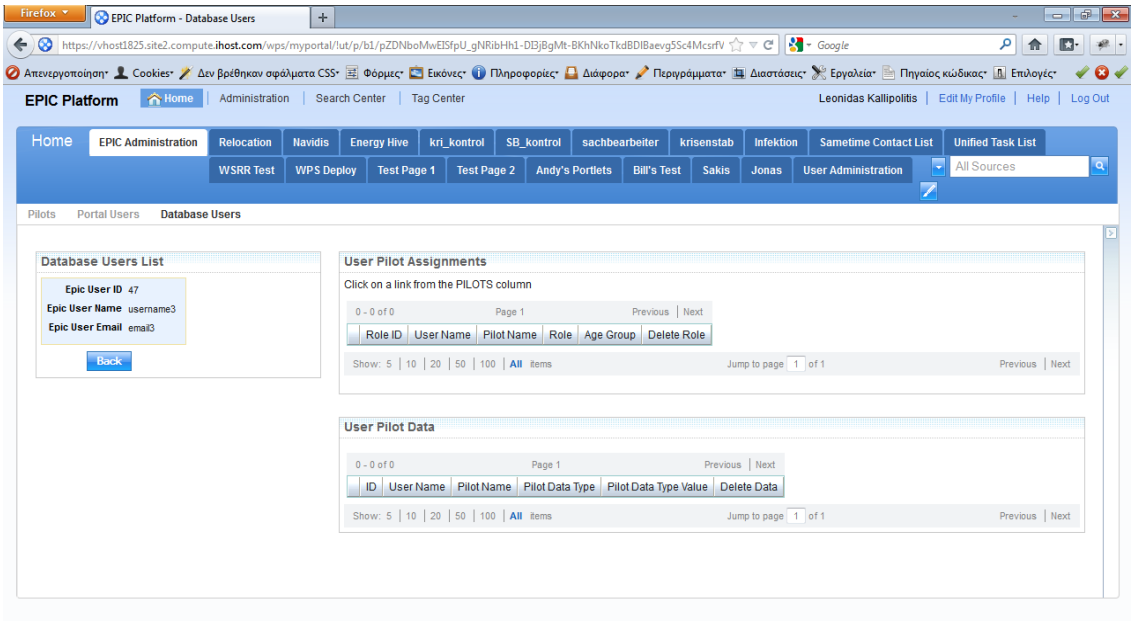


Figure 18: User Details View

Adding a new user can be done by clicking the "Create" button and completing the necessary data in the next form. The only user data that can be added for the moment are username (mandatory) and email (optionally), but in future versions all user data will be available for addition. **The username must be the same as the portal user id used for the registration of the user to the portal.**

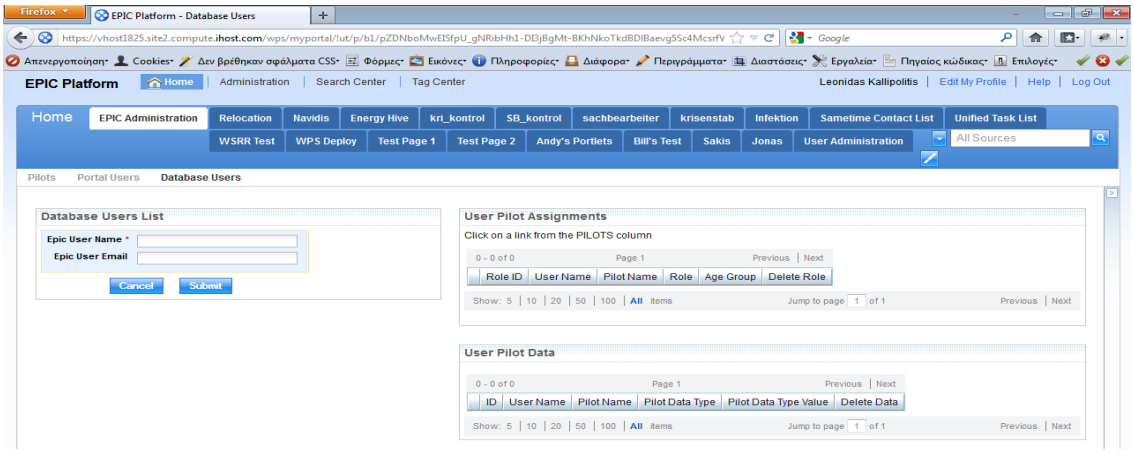


Figure 19: Adding a user to database

User Pilot Roles & User Pilot Data

In order the administrator to assign pilot roles and pilot specific data to the user, first needs to click on the user's row link in the Pilots column. This way administrator selects a user and is ready to select a pilot. This can be done from the pilots list in the "User Pilot Assignments" portlet.

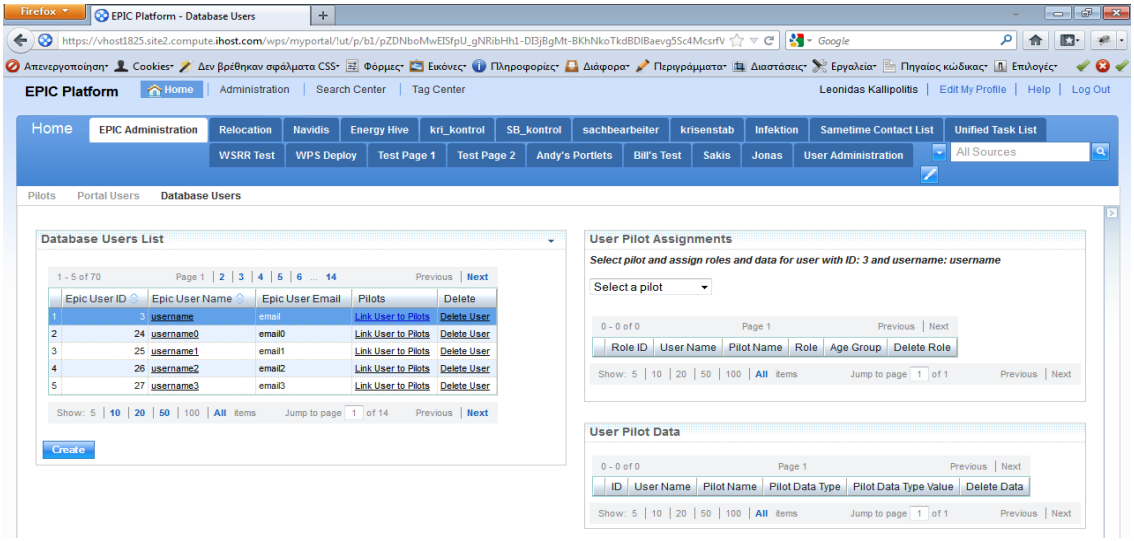


Figure 20: User selection for user pilot assignments

After selecting a pilot, the portlets are refreshed and the data related to the user and pilot selected populate the two portlet lists.

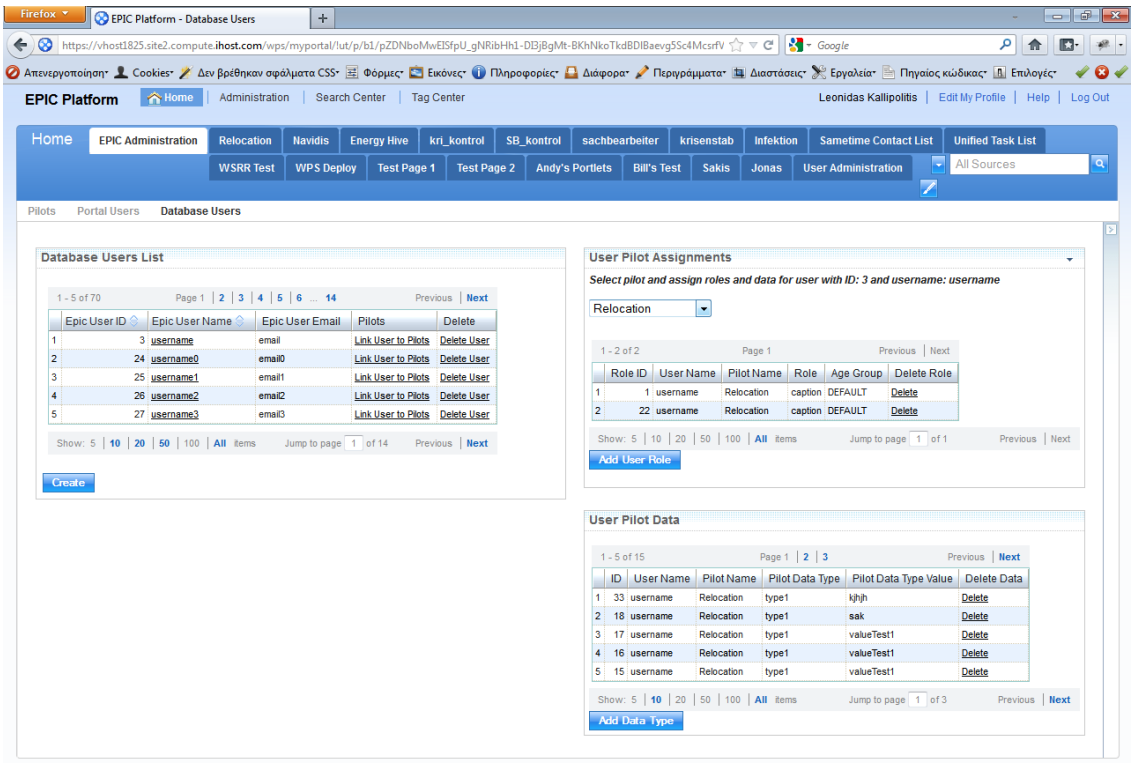


Figure 21: Pilot selection for user pilot assignments

Adding a new role assignment or a new pilot data configuration for user is done by clicking the "Add User Role" and "Add Data Type" buttons. Roles, Age groups and Pilot Data Types are automatically retrieved for each pilot into lists so that the administrator can select from. The value of the Pilot Data Type is also obligatory for submission.

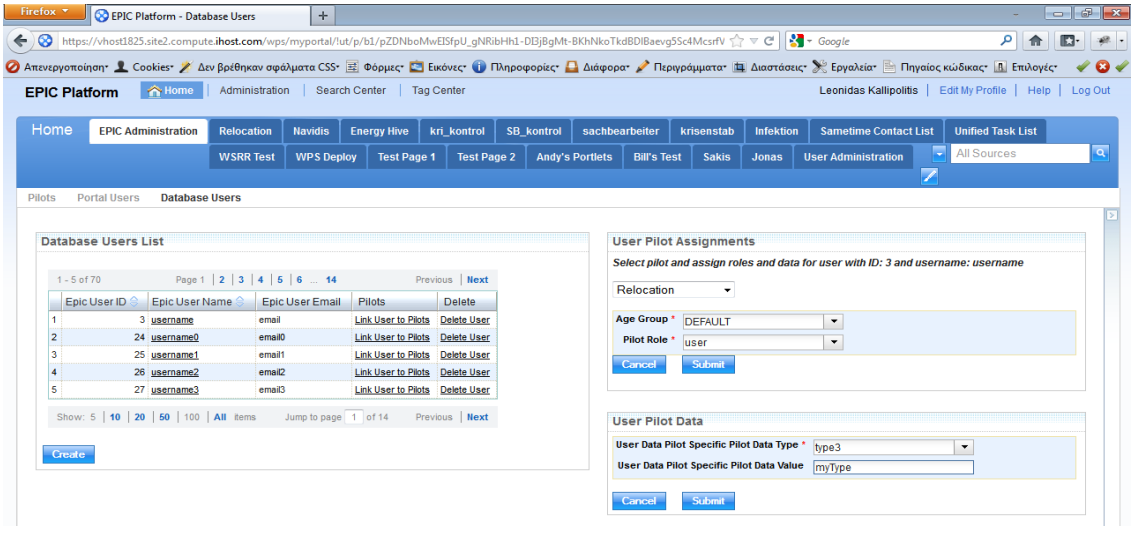


Figure 22: Assigning user roles and user data types