

open**gov**intelligence
OpenGovIntelligence

**Fostering Innovation and Creativity in Europe through Public
Administration Modernization towards Supplying and Exploiting
Linked Open Statistical Data**

Deliverable 4.3

Pilots and Evaluation Plan — V2

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Abstract:	This report presents the evaluation methods and measures for the OGI project. It was updated taking into consideration the 1 st evaluation report (D4.2) and the H2020 reviewers' comments in April 2017. The evaluation has four areas: Co-creation, ICT Toolkit, Acceptance of ICT Toolkit and Outcomes.
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List of Abbreviations

The following table presents the acronyms used in the deliverable in alphabetical order.

<i>Abbreviation</i>	<i>Description</i>
OGI	OpenGovIntelligence
LOSD	Linked Open Statistical Data(sets)
ICT	Information and Communication Technology
EC	European Commission
R&D	Research and Development
PA	Public Administration
DP	Data Provider
PSP	Public Service Provider
PSC	Public Service Consumer
NGO	Non-Governmental Organisation
UX	User Experience
UI	User Interface
IT	Information Technology
FP7	Seventh Framework Programme
ISO	International Organization for Standardization
IS	Information System
K-ACT	Knowledge Access, Creation and Transfer
KM	Knowledge Management
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
WP	Work Package

Executive Summary

The OpenGovIntelligence (OGI) innovation ecosystem provides a framework and an architecture as well as an ICT toolkit for data-driven public service co-creation using Linked Open Statistical Datasets (LOSD). In this report, the pilots and evaluation plan are presented, updated from the first plan presented at Deliverable D4.1, in October 2016. The pilots are still using agile development with continuous and strong stakeholder participation. The design and implementation team have been working close and together to validate and prove the usability and effectiveness of the OGI Information and Communication Technology (ICT) toolkit for innovative co-creation ecosystems.

The second evaluation plan takes into account the multiple stakeholders' perspectives and the context which each pilot showed to us on the first evaluation round (Deliverable D4.2). This second evaluation plan will focus on different parts of evaluation not yet executed during the first evaluation round as described in D4.2. Each of the four dimensions to be evaluated have a question driving the evaluation:

- 1) **Co-Creation Framework Evaluation.** How do stakeholders influence the design and implementation of the OGI ICT Toolkit?
- 2) **OGI ICT Toolkit** (Building blocks and Cubes Design). Are the building blocks suitable for providing the functionality needed? How does the toolkit serve its purpose to support application development?
- 3) **Acceptance of OGI innovation ecosystem.** Will the users accept and work with the developed applications?
- 4) **Outcomes.** What is the result of pilot applications on elements like administrative burden and transparency?

Each of the dimensions has its own evaluation methods and measures. The evaluation will demonstrate how the various elements of the project achieve the targeted impact. Due to the initial stage of maturity, it is expected to evaluate the co-creation, OGI ICT Toolkit and acceptance of OGI innovation ecosystem. Maybe it is still early to expect and evaluate outcomes from the OGI ICT Toolkit usage. It is anticipated that in the long term the project outcomes will become important in the areas of engagement, participation, transparency, accountability, empowerment and administrative burden of public services.

1 Introduction

The OGI environment provides an ICT toolkit comprising easy-to-use and user centric tools to facilitate realizing a Linked Open Statistical Data (LOSD) based innovation ecosystem. Pilots will be executed to validate and prove the usability and effectiveness of the OGI ICT toolkit to co-create and innovate ecosystems. As defined in Deliverable D1.1- Challenges and Needs and D2.1- Framework 1st release, an innovation ecosystem is a compression of two weakly coupled economies, the knowledge economy and the commercial economy, that influence each other Jackson (2011).

In an ecosystem, there are different stakeholders who view the pilots from their own different perspectives. Developers might want to evaluate the pilots based on meeting the technical requirements. Decision-makers might look at the impact on the requirements in terms of number of users and Return on Investment (ROI). Policy-makers in terms of societal impact and public value, reducing administrative burden, enhancing transparency and contributing to solving societal problems, and end-users for satisfying their needs. Hence, evaluation needs to take into account the multiple stakeholders' perspectives.

This report D4.3 contains the updated version of the report D4.1- Pilots and Evaluation Plan V1 combined with reviewers' comments in the evaluation meeting of April 2017. The evaluation will consider the dimensions of the co-creation framework (co-initiation, co-design, co-implementation and co-evaluation), the OGI ICT toolkit (Information and Communication Technologies - ICT - building blocks and cubes design), the Acceptance and the Outcomes (i.e. reducing administrative burden and transparency).

The co-creation framework is described in detail in Deliverable D2.1, of the WP 2 Framework Creation and its updated version in the D2.2. The OGI ICT Toolkit is also described in detail in another Deliverable D3.1- ICT Tools 1st Release and D3.2.- Report on ICT Tools 1st Release, on the WP 3 ICT tools development. Furthermore, this report is linked to D1.1. OGI Challenges and Needs, on the WP1 Challenges and needs identification. These interconnections and interdependencies are summarised in Figure 1.

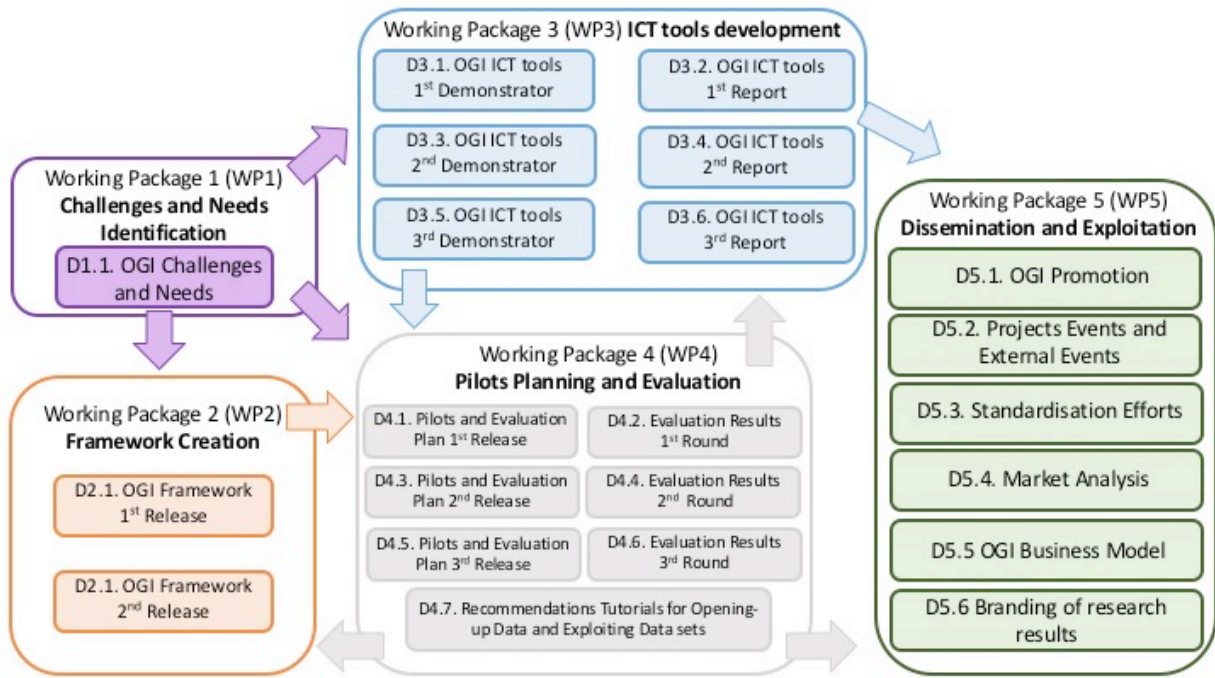


Figure 1 - Interconnections and Interdependencies of OGI Working Packages and Deliverables

The evaluation is based on activities performed, the stakeholders and the outputs and outcomes of activities on/with the stakeholders identified.

1.1 Scope

The present document is the deliverable 4.2 “D4.1 Pilots and Evaluation plan — Second Version” (henceforth referred to as D4.1) of the OGI project. The main objective of D4.1 is to provide the pilots evaluation plans.

1.2 Audience

This document is aimed at the:

- Pilot partners of OGI consortium (implementers and users); and,
- European Commission (EC).

1.3 Structure

In the next chapter, we start by explaining the pilots’ implementation plan, as this is the basis for the other activities. The structure of the document is as follows:

- Section 2 provides the Pilots' implementation plan;
- Section 3 describes the Evaluation plan;
- Section 4 presents Conclusions;
- Section 5 presents the Annexes;
- Section 6 presents the References.

2 Pilots Implementation Plan

Pilots will deploy the OGI toolkit to implement an application that can be used by others. The pilot will be used to test the OGI toolkit's technical capabilities and acceptance. This implementation of the OGI Toolkit in the pilots is guided by the Co-Creation Framework. The expected outcomes resulted from this interaction between OGI ICT Toolkit and Co-Creation Framework are the reduction of administrative burden (costs, time) and enhancing transparency. The use within and test on/in real-life environments demonstrates if the OGI toolkit and co-creation framework meet the organisation's requirements. The outcomes and outputs from the results provide us insights for further evaluation and improvement of the OGI toolkit.

OGI project will be evaluated using six pilot projects:

1. The Greek Ministry of Administrative Reconstruction (Greece);
2. Enterprise Lithuanian (Lithuania);
3. Trafford Council (United Kingdom);
4. The Flemish Government (Belgium);
5. The Marine Institute (Ireland); and,
6. The Estonian Ministry of Economics (Estonia).

The description of pilots can be found in Deliverables D1.1- Challenge and Needs and D4.2- Evaluation Results – First Round.

The pilot participants (implementers and users) will use the evaluation instrument proposed in this deliverable to provide feedback about how the OGI toolkit and co-creation framework are working in the context of each pilot. The feedback will be collected mostly using questionnaires or interviews to measure the user acceptance, the level of participation and the quality of the OGI ICT toolkit and the OGI co-creation framework. The feedback then will be used for further improvement and enable the pilots to identify the most appropriate method to support the implementation of LOSD usage via the OGI toolkit and co-creation framework.

This section is structured as follows, in the next section the use of Agile Methods for the pilots' implementation is explained. Then, the Pilot Stakeholder analysis is described followed by a list of information items needed for each pilot.

2.1 Agile Development in the Pilots

The OGI pilots plan was developed using the agile model proposed by (Beck, Beedle et al. 2001). The Agile method focuses on "agility" and "adaptability" in development. Instead of one time-consuming and rigid development schedule, agile models involve multiple iterative development schedules that seek to improve the output of every iteration. Each iteration will be within a short time frame and contain all the steps of requirement specification, design, implementation, testing, deployment, evaluation. The iterative cycle continues until the final product meets the expectations. OGI has three product releases, each one developed in agile way.

Pilots will be organized in three iterations in which each time the OGI toolkit will be more advanced and further developed. Currently we are in the second year, implementing the second round of iteration. This enables a relatively short cycle-time and improvement opportunity, hence reducing

and avoiding errors at the final of the implementation. Furthermore, functionalities can be evaluated:

1. The first (initial) iteration will use an early version of the evaluation of OGI services and tools. This feedback will be used to further improve the OGI toolkit
2. The second iteration will use a more advanced version. Again, this feedback will be used to further improve the OGI toolkit;
3. The final iteration of pilots will also benefit from the lessons learned in the first two pilot iterations.

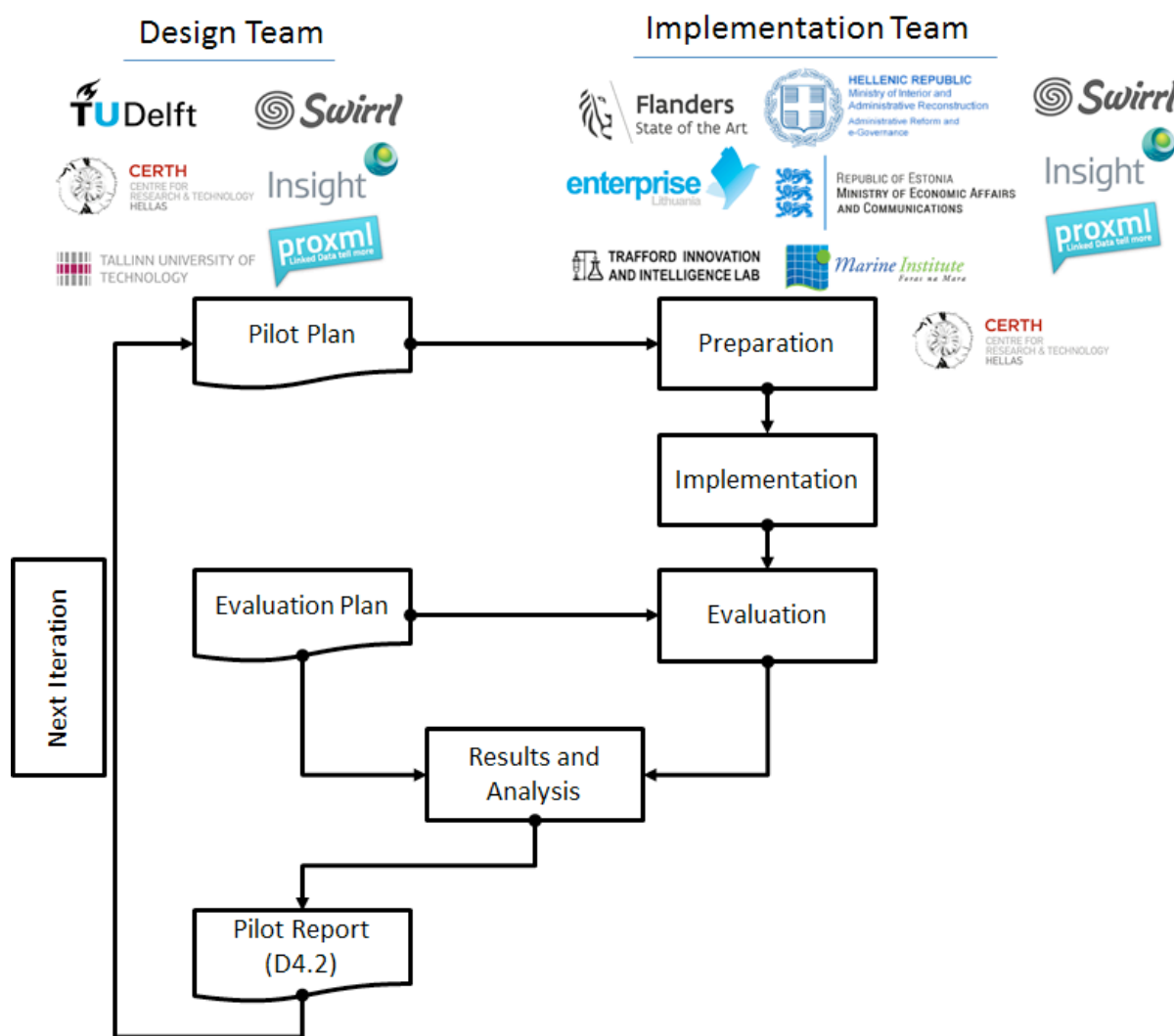


Figure 2 - High Level Processes of Pilot Plan

Figure 2 illustrates the tasks involved in planning for and conducting a pilot and shows the OGI phase during which each of these activities might occur. The timeframe is presented at Section 2.

The pilot design team is responsible to create the pilot implementation and evaluation plan (Deliverables 4.1, 4.3 and 4.5) as well as pilot report (Deliverables 4.2, 4.4 and 4.6). This team consists of the Research and Development (R&D) Partners in the OGI consortium.

The pilot implementation team is formed by the technical partners and, mainly, the people in charge of each of the six pilots. The Pilot implementation team is responsible to execute the pilot projects

based on the plan created by the pilot design team described in this report D4.2 and the previous version, D4.1. The pilot implementation will be divided in three main phases:

- 1) **Preparation:** the part that deals with collecting needed information from the pilots to fill the implementation template, presented at Section 3;
- 2) **Implementation:** the part that executes the implementation of the OGI toolkit and co-creation framework on the pilots by technical partners, presented at Section 3;
- 3) **Evaluation:** the part that measures the success of outputs and outcomes after implementation of the OGI toolkit and co-creation framework. The evaluation procedures will be presented at Section 3 and created by the OGI consortium.

The findings of the evaluation part of the third step will be analysed by the OGI Consortium. The result of this analysis will be used to create the pilot plan for the next iterative cycle. The objective is to identify challenges and needs to improve the implementation and evaluation of OGI toolkit and OGI innovation ecosystem framework at OGI pilots.

The pilot report will provide the processes of each pilot and evaluation on four evaluation dimensions for each pilot (described at Figure 5), and will be the source for the pilot plan of the next iteration, for example D4.2 (Evaluation results 1st round) will be the source for D4.3 (Pilot and Evaluation Plan 2nd release), influencing D4.4 (Evaluation results 2nd round) and so on.

2.2 Pilots' Stakeholders Analysis

Stakeholders can play different roles. In accordance with the OGI project approach there are three different roles in the OGI innovation ecosystem on public administration (PA):

- 1) Data Provider (DP);
- 2) Public Service Provider (PSP);
- 3) Public Service Consumer (PSC).

Figure 3 summarises the roles and the flow of public service delivery. The DPs were identified at the OGI project proposal. PSP are re-users of data and often aggregate data from various sources and process the data to make those available for users in an easy to use format. The PSPs and PSCs were identified at the OGI project proposal and specified in table 1 of Deliverable D5.1. Dissemination and Exploitation Plan as the targeted groups of dissemination.

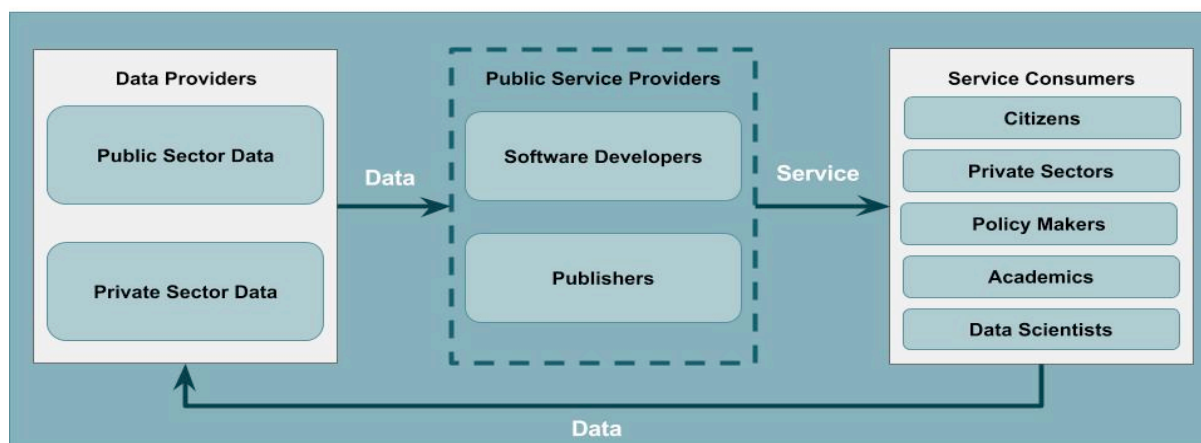


Figure 3 - Overview of main roles at OGI innovation ecosystem on Public Administration

The roles can be performed by different stakeholders and the same stakeholders can play multiple roles (Kambil and Short 1994, Kendall 1998). The notion of roles is intuitive; humans think and express themselves in terms of roles (Kristensen 1996). Public authorities, businesses and citizens could provide data (presented on the box "Data Providers" of the Figure 3) that would potentially support the development of public services delivered by any PSP (presented on the box "Public Service Providers of the Figure 3). The consumers have dual roles. They consume services and also might produce data. The latter is called prosumers. The specifications of them are presented at appendix 2 of Deliverable D6.1. Data Management Plan.

The Table 1 summarises the initial identified roles for DP, PSP and SC based on the OGI proposal project.

Table 1 - Roles and Stakeholders matrix of the OGI innovation ecosystem

Stakeholders	Data Provider role	Public Service Provider role	Service Consumer role
Public Administration	Provision of Open Government Data	Design and delivery of public services Provide public services	In policy making and/or internal decision making
Businesses	Business data (private) to be used in services	Co-design and/or co-delivery of public services	In business intelligence, decision making etc.
Citizens/ Not Governmental Organisation (NGO)	Citizen provided data	Co-design and/or co-delivery of public services	Information provision, transparency etc.

2.3 Pilots' Information Template

In order to compare the pilots and view the similarities and differences between them, a template for describing the pilots has been developed. Information needed to describe the pilots consists of the following main parts: General Information, Stakeholder Overview, Pilot Objectives, Expectations and Benefits, Datasets used, and Risks.

General information provides a description of the organisation and the key people involved in the pilots. They will help to conduct the implementation of the OGI toolkit, co-creation framework and the evaluation of outputs and outcomes of the pilots' implementation.

Pilot stakeholders describe the specific pilot's stakeholders and their roles. They will be used as the respondents of interviews, surveys, opinion mining and other evaluation methods described at Section 3.

The Pilot Objectives and Expectations using OGI toolkit and co-creation framework are collected to allow the comparison of usage before and after having used the OGI toolkit and co-creation framework implementation.

Data sets are an important part of resources and were selected because their maturity level. Their characteristics will influence the use of tools, the skills needed and the choice of strategies to deliver the expected pilots' results.

Risks was selected due the need to identify what are the challenges and risks on pilots that can have influence on the results of outputs and outcomes in a negative way. This can be used for risk management. The pilot description can be found in Deliverable D1.1 and D4.2.

2.4 OGI Pilots' Timeline

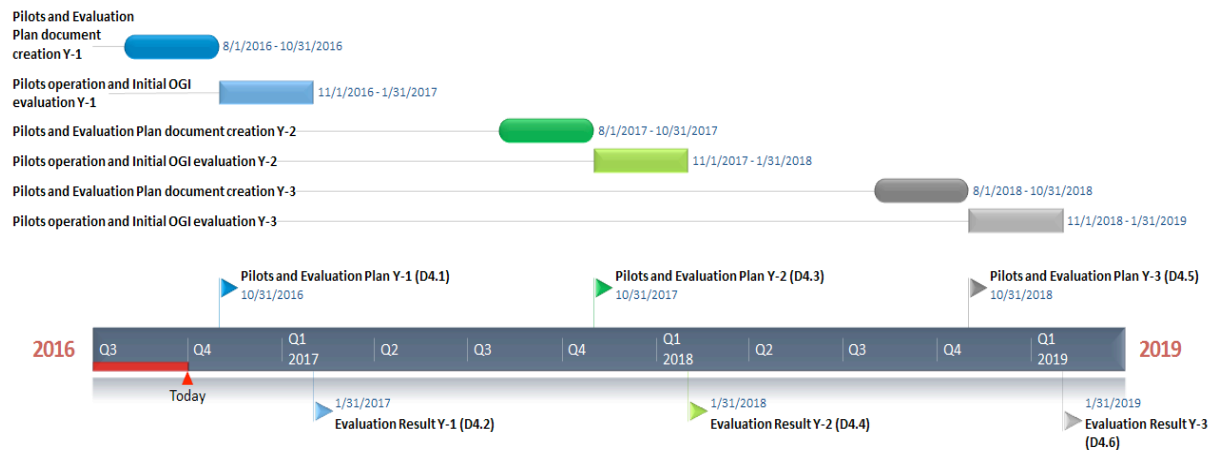


Figure 4- Pilots' Timeline

3 Evaluation Plan

3.1 Introduction

This section aims at presenting a comprehensive model for assessing the operational and usage potential of the OGI solution. There are numerous evaluation models available. Many researchers used these models without any changes, while others adapted them in accordance with their specific objectives and context. We use multiple evaluation methods to deal with the diversity of activities in our project and we opt for customizing the models for the problem at hand in our project. We base our approach at the insight gained from the Seventh Framework Programme (FP7) Engage (<http://www.engagedata.eu/>) and OpenCube (<http://www.opencube-project.eu/>).

In general, the evaluation measures for the OGI toolkit should focus on EU innovation priorities stated in EURO-6-2015:

- 1) Improving effectiveness and efficiency of PA;
 - Measured by the percentage of the OGI solution platform users in the pilots, which agree or disagree that the implementation of this solution improves the public service delivery of PAs.
- 2) Transforming public administrations processes;
 - Measured by the percentage of the OGI solution platform users in the pilots which agree or disagree that the implementation of this solution actually streamlines the business process of PAs.
- 3) Processes and ways in which new cultural and societal challenges are identified in public policies;
 - Measured by the amount the use of the OGI solution platform increases the participation of citizens and businesses in co-creation (co-initiative, co-design, co-implementation and co-evaluation with PAs in order to address societal problems)
- 4) Uptake and acceptability of the use of emerging technologies in the public sectors;
 - Measured by the intention of use and user satisfaction of the OGI solution platform.
- 5) Reducing the administrative burden of citizens and businesses;
 - Measured by the reduction on administrative burden of citizens and businesses by variables such as cost, time, easiness of procedure dealing with PAs, etc.
- 6) Offering inclusive public services;
 - Measured by the diverse users that use the OGI ICT Toolkit.

To reach these objectives, it is necessary to create a framework for the evaluation of the functional and nonfunctional characteristics of the OGI innovation ecosystem, which consists of the OGI solution platform and co-creation framework, the ICT toolkit and the targeted users in the pilot projects. The pilot evaluation plan will focus on the specification of an integrated evaluation framework scoping the intention to use, the quality of the solution platform and framework, and the overall impact defined per pilot, by setting measurable evaluation criteria and creating an evaluation procedure.

Considering this research is on/in the middle of applied social science (public administration) and hard science (information systems), it is natural to face a “battle” between quantitative *versus* qualitative data and methods. On the one hand, quantitative data is easier to handle and they are more accurate or less subjective in comparison with qualitative data. On the other hand, taking into

consideration the objectives and objects that are considered to be studied, a qualitative approach will also be necessary.

Due to those aspects we intend to utilise both quantitative and qualitative data for OGI evaluation. Figure 1 shows that objects like ICT toolkits will be evaluated by quantitative methods and objects like people and usage will be evaluated by qualitative methods. Section 3.4.2. has a detailed explanation of all methods for gathering the necessary data.

This section is structured as follows: the dimensions of evaluation are presented in the next section. Following that, measurable evaluation criteria for each dimension are defined. Then, the approach to collect data for evaluation is described and followed by a conclusion.

3.2 Dimensions of Evaluation

The evaluation of OGI innovation ecosystem on public administration is based on four main dimensions:

1. Co-Creation Framework;
2. Building Blocks of OGI ICT Toolkit and Cubes Design of OGI ICT Toolkit;
3. Acceptance of OGI innovation ecosystem; and,
4. Outcomes.

The first dimension "Co-creation Framework" will be evaluated focusing on how pilots and the framework itself can enhance co-creation e.g. the formulation and implementation of the pilots based on co-initiative, co-design and co-implementation. The evaluation methods and tools are described at section 3.3. At Figure 5, this part is represented by the frame colored in green on the right side. The target groups for this evaluation are Public Administrations partners, Citizens and Businesses.

The second dimension "OGI ICT Toolkit" evaluates two main parts. The first is the "Building blocks of the OGI ICT Toolkit". The objective of this evaluation is to identify what influences data quality, System and ICT tools (legacy and new ones) and Information Technology (IT) designers, including the implementers from the OGI consortium. The evaluation methods are described in depth at section 3.4. At Figure 5, this is represented on the lower frame colored in blue. The target groups for this evaluation are ICT technical partners and the IT department of PAs partners. The second part is the "Cubes Design of the OGI Toolkit" prompting an evaluation to the cubes design quality. The objective of this evaluation is to identify what are the factors influencing quality of cubes and in which manner data influences the system and vice-versa. The evaluation methods and tools are described in depth at Section 3. At Figure 5, this is represented on the upper frame colored in blue. The target groups for this evaluation are ICT technical partners and the IT department of PAs partners.

The third dimension "Acceptance of OGI innovation ecosystem" contains the evaluation considering the perspective of users. The objective is to understand what are the benefits and challenges that influence the pilot stakeholders presented at section 2. The evaluation methods and tools are described in detail at Section 3.5. At Figure 5, this is represented by the frame colored in yellow. The target groups for this evaluation are Public Administrations, Citizens and Businesses.

The fourth dimension "Outcomes" evaluates the challenges and issues that the OGI innovation ecosystem (OGI ICT toolkit and co-creation framework) can potentially reduce. The objective is to identify the administrative burdens existing on each pilot and measure the reduction of them. The deep description of evaluation methods and tools are described at Section 3.6. At Figure 5, this dimension is represented by the frame colored in yellow. The target groups for this evaluation are Public Administrations, Citizens and Businesses.

The Figure 5 summarises the relationship between the four dimensions.

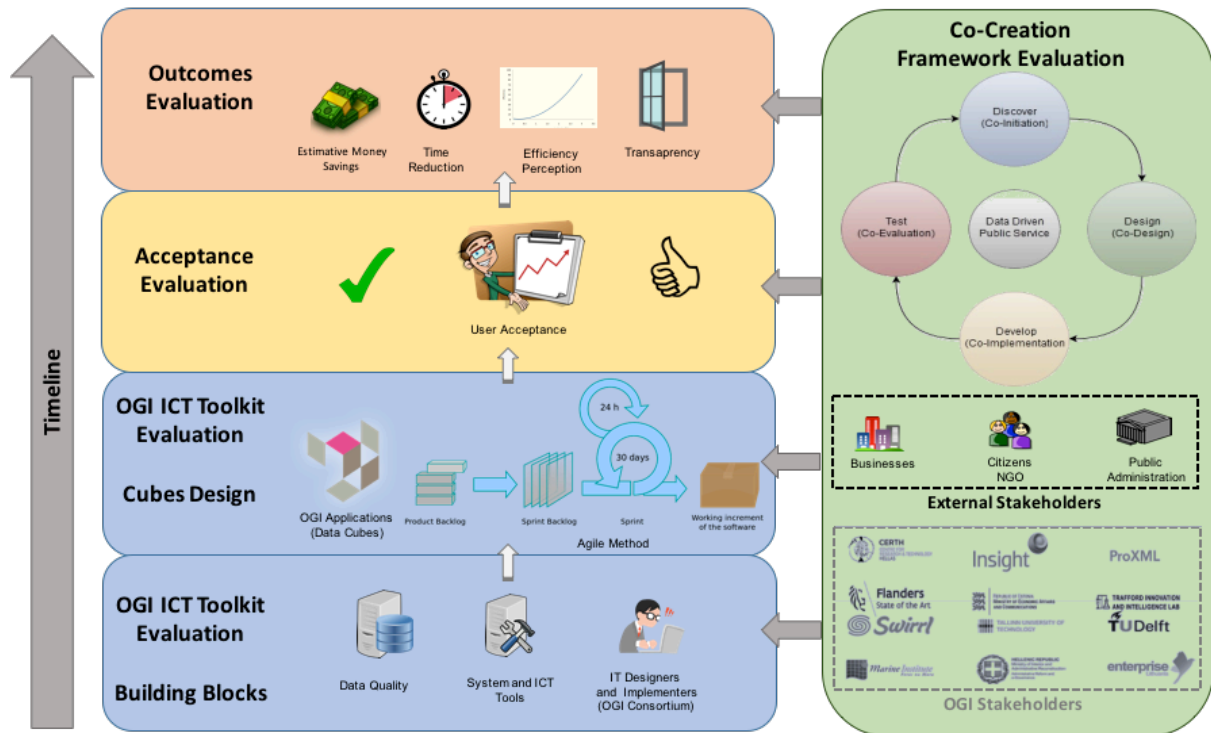


Figure 5 - Stakeholders and dimensions of Evaluation

3.3 Co-Creation Framework Evaluation

Taking into consideration the type of co-creation and participant contribution we could identify methods to collect data and also ICT tools that will treat and analyse the data and feedback of participants. This is explained at D2.1 OGI Framework from WP2 Framework Creation.

The objective of this section is to explain the methods to collect data and ICT tools used to evaluate the feedback, statistics, etc, from the identified types of co-creation and participant contributions.

Table 2 summarises the methods to collect data and ICT tools identified as useful to collect and analyse feedback from participants on the four different co-creation stages.

Table 2 - Co-Creation Framework Stages, Methods for Data Collection and Tools for Evaluation

Co-creation type	Participant role	Source to collect data	Methods and Tools for evaluation
Co-initiation	Problem & needs identification	<ul style="list-style-type: none"> • Social Media 	<ul style="list-style-type: none"> • R statistical analytics • TwitterR • Weka • Other social media analytics
	Idea generation for ways to solve problems (informed by data)	<ul style="list-style-type: none"> • User workshops • Public meetings • Social Media 	
Co-design	Input to service design	<ul style="list-style-type: none"> • User workshop • Continued participation • Focus groups • User Experience and User Interface testing 	<ul style="list-style-type: none"> • Survey (Questionnaire and interviews)
Co-implementation	Uploading user data	<ul style="list-style-type: none"> • Web and Phone Statistics (Number of access, download, tc.) 	<ul style="list-style-type: none"> • Web Analytics • Survey (Questionnaire and Interviews) • R statistical analysis • TwitterR • Weka • Other social media analytics
	Suggesting changes to data sets	<ul style="list-style-type: none"> • Portal's Feedback channels 	
	Data creation for a service	<ul style="list-style-type: none"> • Web and Phone Statistics (Number of access, download, tc.) 	
Co-evaluation	Providing feedback to service quality, usefulness, etc.	<ul style="list-style-type: none"> • Social Media • Portal's Feedback channels 	<ul style="list-style-type: none"> • R statistical analysis • TwitterR • Weka • Other social media analytics
	Reporting data on service operation	<ul style="list-style-type: none"> • Web and Phone Statistics (Number of access, download, tc.) 	

3.3.1 Sources to collect data for OGI Co-Creation Framework

The sections below explain the sources to collect data for the OGI Co-creation framework.

3.3.1.1 Social Media

After the widespread use of mobile devices (mobile phones, tablets, etc.) and the access of Internet (3G, 4G, wifi, etc.), social media boomed. Facebook, Twitter, Instagram, YouTube, LinkedIn and other social media became very popular. Statistics point out that the 10 biggest social media apps have 3 billion users (Kemp 2015).

Part of the usage of this social media apps is related to performance of public services. Collecting these data sets is possible to create opinion mining and check for example the sentiment analysis about any specific subject (against or pro changes, good or bad service delivery, etc.). Problems and needs can be easily identified without high volume of resources (time, people, surveys, etc.). Literature (Sobkowicz, Kaschesky et al. 2012) describes opinion mining using social media to model, simulate and forecast political opinion.

3.3.1.2 User workshop

A workshop is an activity that aims to introduce something (idea, skill, product, etc.) to potential interested people. Workshops range from short workshops (45 minutes or less) to one or more days. A critical aspect of the user workshop feedback process is the inclusion of end-users in the creation of the new data driven public services.

The overall structure of the user workshop planned to be conducted on the pilots is described at Table 3:

Table 3 - User Workshop for Co-Creation

#	Stage	Description
1	Introduction	This stage has the aim to describe the background to participants and clarify questions. A general objective is given to participants.
2	Silent Ideation	In this stage participants brainstorm to produce ideas. They can take notes and get prepared to share the ideas with other people in the workshop.
3	Group discussion	In this stage there is a group discussion by all the participants, presenting the ideas that they had during the silent ideation. It is allowed to participants to give commentaries or insert inputs from other participants ideas presentations (discussion).

The three stages can be repeated as many times and sessions as needed. This way it is possible to all individuals to provide valuable inputs on the design and structure of the new public service. The user workshop can be used on all the four stages of the Co-Creation framework.

The user workshops can produce, as example, the following outcomes:

- List of issues with the new service;
- List of potential solutions;
- Basic thoughts on the usability and functionality of the service;
- User stories;
- List of user personas of individuals who could use the service, and
- Any other information which may come out of the workshop organically.

After participating on the user workshop, a survey can be conducted to identify the participants' feedback. This survey is described at Table 3 on the Section 5.

3.3.1.3 Continued participation

Sometimes workshops need to happen several times due to some reasons (maturity of discussion, lack of resources, time, etc.). Continued participation is the method that monitors how many people participate in future workshops versus those who refused to participate (Joyce and Kraut 2006). This is related to the survey conducted to identify the participants' feedback, described at Table 3 on the Section 5.

3.3.1.4 Public Meetings

Public meetings are important tools for governance. Literature (Lowndes, Pratchett et al. 2001) defines public meetings as "the most readily identified form of public participation". The data collected on the public meetings will be used as input to generate ideas and solutions for the problems and issues identified previously by government or other stakeholders.

3.3.1.5 Focus group

Edmunds (2000) defines focus groups as "a form of qualitative research that on a loosely structured way obtains opinions related to a specific topic". It can be on a single group or a collective of groups with homogeneous profiles of participants to avoid bias. A moderator participates in the dynamics, reducing the probability of distortions in the group due to dominant profiles or loss of focus on the main objectives of discussion. The interference of this moderator can be greater or lesser depending on the focus group objective (Wilkinson 1998).

The given example is a discussion about a specific movie or book with predetermined questions to be answered. The answers are collected and analysed in accordance with the objective. An example of objective is the identification of their acceptance within a specific demographic group. Taking in consideration these features, the OGI co-creation framework will use focus groups as a tool to collect data to contribute on the design of public service delivery. (King, Feltey et al. 1998) described studies that focus groups were conducted to show how the input from people can be helpful in designing public policies.

Currently, focus group is a widespread and popular method in social sciences and there is a great number of structured dynamics (Wilkinson 1998). However, the OGI consortium decided to use (Edmunds 2000) focus group principles. Edmunds divided his guideline in six dimensions: describing focus groups, the client's roles, the moderator's role, the vendor's role, special situations and focus group evaluation. (Edmunds 2000) suggested four common uses for focus groups:

- Testing advertising copy or marketing promotions;
- Positioning products or services;
- Testing new concepts; and,
- Testing the usability of a product.

On the other hand, focus groups are not recommended when quantitative results are expected, personal topics are discussed, when decisions or data cannot be validated to be incorporated in the decision-making or you need statistical validity of data collected.

The client role, or in the OGI case the citizen role, is to give the answer expected by the vendor, or in the OGI case the public administration. If the questions are not clear or any bias influences the answers, this must be solved to collect useful data. Predefined questions and a screening of all the possible answers avoid surprises during the focus group dynamic. The last guideline for clients (citizens), is to let them closely be involved in designing the discussion guide to ensure that the focus group provides needed data to the vendors (public administration) (Edmunds 2000).

The vendor role (public administration) is based on typical responsibilities, some of them already aforementioned (Edmunds, 2000, pg 3):

- Development of the screening questionnaire(s);
- Recommendation of a sampling plan to have a potential list of people to recruit;
- Design the moderator's discussion guide and focus group dynamic;
- Arranging focus group facilities, like place, dynamic material (paper, presentations, TV, computers, etc) and audio recorder or camera recorder;
- Finding ways to give incentives to participants, such as co-op fees or another valuable item/service to participants (chocolate, discounts on products);
- Recruiting focus group participants (generally by telephone, e-mail, in person at street, etc.);
- Vendors can also moderate focus groups if being prepared;
- Debriefing sessions with the clients following each focus group or series of focus groups; and,
- Analysis and presentation of focus group results.

Edmunds (2000, pg 4) explains that sometimes exceptional situations can happen. For example, elderly, children, international groups with different cultures can be the participants. None of them are applicable to the OGI case, but if yes, we consider the guidelines described by Edmunds (2000).

Finally, evaluation of focus groups. Edmunds (2000, pg 5) suggests that the audio and video recording should be transcribed or carefully listened/watched. During the dynamic, the moderator can take notes or write responses on boards, aiming to summarise the discussion and to already identify consensus or dissensus, for example. Connecting these focus groups with questionnaires and surveys is a good strategy to have a qualitative and quantitative data collected at same time.

3.3.1.6 User Experience (UX) and User Interface (UI) testing

Hassenzahl and Tractinsky (2006) conceptualizes UX as *"a term associated with a wide variety of meanings ranging from traditional usability to beauty, hedonic, affective or experiential aspects of technology use"* (Forlizzi and Battarbee 2004). Garrett (2010) structures user experience as a project with five dimensions and two product layers (as functionality and as information), from the more abstract to the more concrete: strategy, scope, structure, skeleton and surface. This structure is presented at Figure 6.

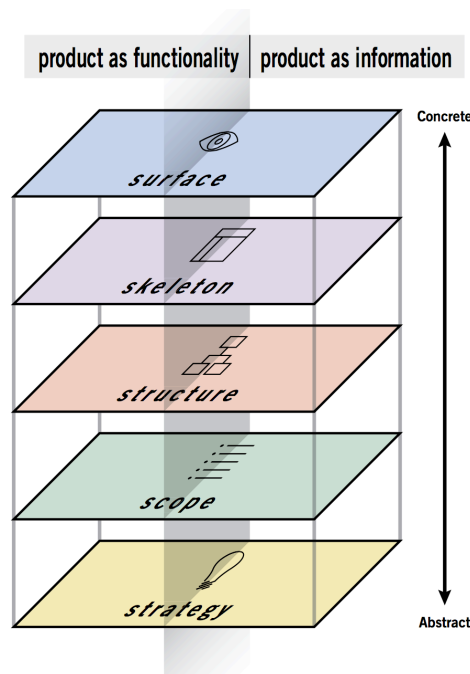


Figure 6 - UX Structure and layers of product and information

Source: (Garrett 2010)

To improve the usability of software and information systems, the paradigm of user-centered design, International Organization for Standardization (ISO) 13407, Human-centred design processes for interactive systems, is a standard that provides guidance for user-centered design (Jokela, livari et al. 2003).

The ISO 9241-210 substitutes the ISO 13407, which aimed to provide guidance on achieving quality in use by incorporating user centred design activities throughout the life cycle of interactive computer-based systems. ISO 9241-210 standard describes 6 key principles that will ensure your design is user centred (Travis 2011):

- The design is based upon an explicit understanding of users, tasks and environments.
- Users are involved throughout design and development.

- The design is driven and refined by user-centred evaluation.
- The process is iterative.
- The design addresses the whole user experience.
- The design team includes multidisciplinary skills and perspectives.

ISO 9241-210 recommends the use of "ripple effect". It means to plan in advance all the possibilities of tools and scenarios of usage before implementing. After implementation, scenario, tools, activities, goals, etc., can change, and influence the result. If the plan is well conceptualised, the plan is likely to succeed. The Figure 7 describe an example path taken due changes of plans made during the implementation.

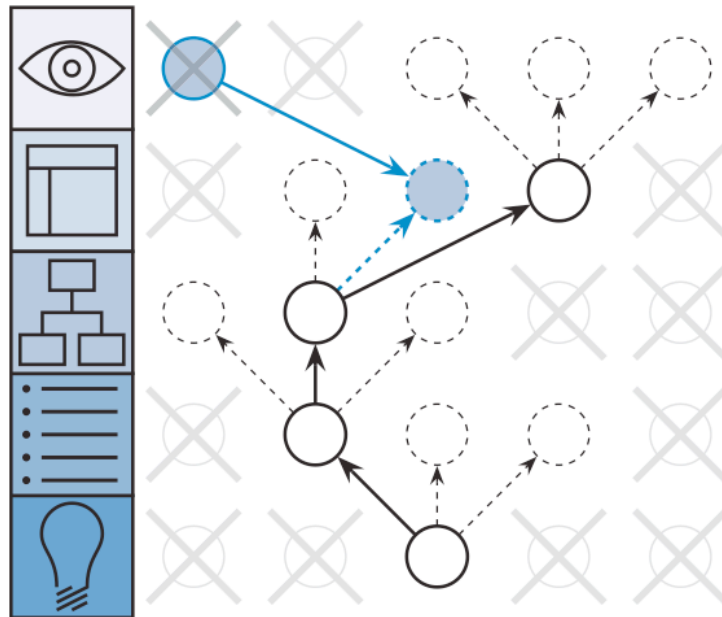


Figure 7 - The ripple effect

Source: (Garrett 2010)

Further the explanations given on ISO 9241-210 (ISO, 2011) and 13407 (ISO, 1999), on both standards, there are no clear guidelines of steps to implement UX. Checking this limitation, Jokela et al (1999) proposed a guideline to fill this blank comparing both standards. The guideline has 6 steps:

1. Identify need for human-centred design;
2. Understand and specify the context of use;
3. Specify the user and organisational requirements;
4. Produce design solutions;
5. Evaluate design against requirements (loop to step 1 if not reach desired requirement); and,
6. System satisfies specified user and organisational requirements.

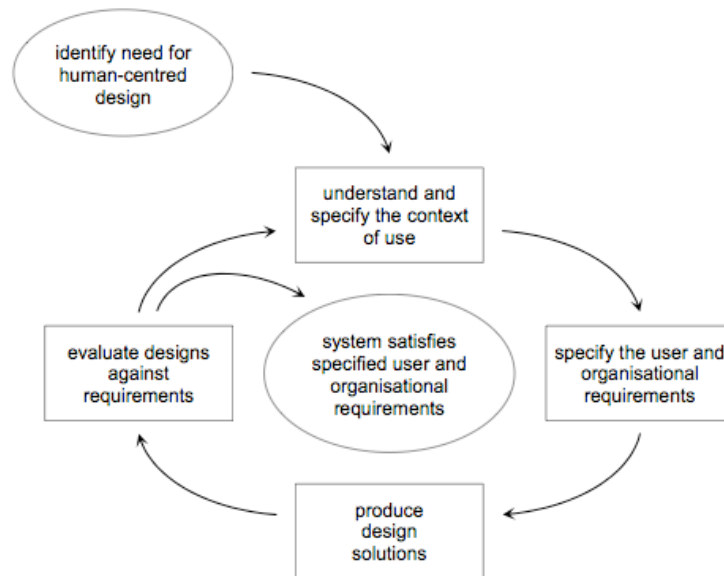


Figure 8 - UX implementation and evaluation steps

Source: (Jokela, Iivari et al. 2003)

Besides the steps to conduct the implementation of UX, it was also identified by Jakola et al. (1999) that measures are not created to identify efficiency of the product or any goal that should be reached. For this, we consider to use the ISO/IEC 25010:2011 (20510:2010 2010).

The ISO/IEC 25010:2011 has a parameter called "usability" where 6 measures define the degree of usability of a system. If the consortium identifies the need to improve this evaluation, the (Albert and Tullis 2013) evaluation method can be used as auxiliary. We consider that User Interface (UI) is a complementary aspect of UX associated with look, feel and interactivity of system. It is already measured by the UX standards and ISO 25010:2011, more specifically on the evaluation 'quality of use'.

3.3.1.7 Web and Phone Statistics

Web statistics are the statistics collected in the web sites and smartphone applications. As an example, the number of accesses (visits) in a determined web site or usage of an application in a smartphone. Web statistics has becoming more and more important due the massive presence of people and services on Internet. This use of ICT (web sites, Internet, etc.) by PA is normally called electronic government. Recently, the rush to create e-gov solutions brought to citizens and governments cost reduction and improvements in the public service delivery efficiency. Other part discovered that e-gov can be expensive and less efficient than previous public service delivery models (Bertot, Jaeger et al. 2010).

Since 1995 governmental departments and agencies have been using web statistics collection as method for evaluation. Xue (2004) describes how libraries in the United States started at the beginning of the World Wide Web to evaluate their web site usage. The factors considered for web statistics analysis found at Xue (2004) are:

1. Top pages on the Web site visited and top pages exited (comparison of visitors paths);
2. Length of visits;
3. Visitors and demographics;
4. Date and time of requests;
5. File transfer success;
6. Search terms which lead a visitor to the Web site;

7. Sites that refer visitors to the Web site (for example search engines Google, Yahoo, Bing);
8. Most downloaded files; and,
9. Search of phrases (opinion mining / sentiment analysis).

Xue (2004) found that successful web sites are based on a detailed classification of subject and an annotation of each link. Since users can find what they want in a easy way, it makes the best use of homepage and reach higher ranks pages, such as Google and Yahoo.

Jana and Chatterjee (2004) considered four dimensions and 19 factors to evaluate the "bibliometrics" and "cybermetrics" of a portal: hits, page views, visits and visitors. Collecting these type of data, it was possible to create to study the content of a specific Web site and quantify its degree of usability through user's' studies. This approach goes further than the quantitative analysis of access, downloads, length of visits, etc., seen at Xue (2004). Table 4 reveals the dimensions and factors.

Table 4- Organisational gaps, description and dimensions of evaluation related

Source: (Jana and Chatterjee 2004)

Data Dimension	Data extracted
Hits	<ol style="list-style-type: none"> 1. Entire site (successful) 2. Average per day 3. Home page
Page views	<ol style="list-style-type: none"> 4. Page views 5. Average per day 6. Average per unique visitor 7. Document views
Visits	<ol style="list-style-type: none"> 8. Visits 9. Average per day 10. Average visit length 11. Median visit length 12. International visits 13. Visits of unknown origin 14. Visits from United States (own country) 15. Visits referred by search engines 16. Visits from spiders
Visitors	<ol style="list-style-type: none"> 17. Unique visitors 18. Visitors who visited once 19. Visitors who visited more than once

3.3.1.8 Portal's Feedback channels

Participation is the fuel to create co-creation. However, without the ability to give any feedback, participation can be reduced due to a lack of trust in the process. This section aims to collect data from the feedback of citizens, enterprises, etc. about system and data quality or usefulness, as example. Bailey (2005) analysed how web portals deal with review and feedbacks from people. Currently, people have a *ad infinitum* access to data and this infinite accesses influences the process of review and feedback. Ubiquitous Internet access also changed the game. Participants want answers with detailed descriptions and argumentations and fast. Opinion leadership by some well-articulated participants also influences the opinion of people. These phenomenons can introduce bias in the data and must be avoided.

Furthermore, the studies of Bailey (2005), Goh, Chua et al. (2008) used three mechanisms, 13 dimensions and 6 sub-dimensions to create the Knowledge Access, Creation and Transfer (K-ACT) model to extend existing work in this area by proposing three mechanisms for knowledge management (KM) in web portals. The access means the mechanism through which users obtain access to the knowledge in the portal. The creation is understood as the process to acquire knowledge about the user and acquire knowledge from the user. The transfer means the support given user-to-user enabling flow of knowledge. The K-ACT dimensions and factors are summarised at Table 5.

Table 5 - The K-ACT Model

Mechanism	Dimension	Sub-Dimension
Access	1. Access to portal	-
	2. Search	Query Results Display
	3. Browse	-
	4. Personalisation	User-driven personalisation System-driven personalisation
	5. Accessibility	-
	6. Information presentation	-
Creation	7. User information acquisition	-
	8. Feedback	-
	9. Domain acquisition	-
Transfer	10. Online collaboration	Organisation to user collaboration User-to-user collaboration
	11. Information alerts	-
	12. User support	-
	13. Resource sharing	-

The scope of the K-ACT model is deliberately focused on features that promote KM practices in portals, it does not attempt to address the universe of KM or software engineering-related concerns or problems. However, design and usability issues are sufficiently addressed in the literature and known by developers. The recommendation is to use the K-ACT model in conjunction with established usability instruments and guidelines during portal implementation. OGI is combining different types of evaluation from K-CAT, UX, UI and system design to reach the best results and collect the maximum of data from users as possible.

3.3.1.9 Survey Research



Figure 9 - Exploratory and Explanatory approaches at Co-Creation Evaluation Surveys

A survey is a systematic poll of questions made to some group, or individually, in order to collect answers about some problem, observation, etc. Glasow (2005) considers two types of data collection methods:

1. Written (questionnaire); and,
2. Verbal (interviews).

Both types will be conducted with different objectives and within different periods of the co-creation evaluation.

Based on the co-creation evaluation, survey research will be used in all of the co-creation types. Interviews will be used to examine the co-initiation and co-evaluation, while questionnaires will be used during the co-design and co-implementation.

Interviews using open-ended questions are executed to seek understanding and interpretation in different situations. In the co-initiation stage, interviews are aimed at identifying problems and to generate ideas for problem solving. In the co-evaluation stage, interviews are aimed at understanding the questionnaire results as well as to seek in-depth information of the several issues found in the questionnaire. Normally, only a specific group of stakeholders is called to participate, taking in consideration there is a low degree of statistical validity due its low number and less broad profile of participants. Also there is a higher chance of bias on the answers in comparison to questionnaires.

Questionnaires are using closed-ended questions to gather highly standardised data. They will be conducted so that the target respondents can give more generic inputs on the design and implementation on/of the co-creation of public policies processes. Normally questionnaires are given to several people to reach substantial statistical validity of hypothesis, for example already observed on the qualitative approach of survey (interview).

Before conducting the survey (questionnaire or interview), Glasow (2005) suggests to create a model that identifies the expected relationships among the variables (independent and dependent). Variables are used to define the scope of study, however, cannot be explicitly controlled by the researcher. Then it is possible to test the model against observations of the phenomena analysing the data collected by interview or questionnaire.

3.3.1.9.1 The survey design

In designing the survey research, Levy and Ellis (2006) suggest two steps that are, a sampling strategy and the procedure to obtain the representativeness of the population, including ensuring reliability and validity. The nature of this evaluation process is in between exploratory and explanatory; and for this purpose, the mixed method, qualitative and quantitative will be used

during the whole process. The sampling strategy should follow these methods. The population for this survey research will include all stakeholders in each pilot, or in general, units of observation will be the Public Administration's employees, citizens and companies' employees which use the OGI innovation ecosystem. Participants of this co-creation survey should represent these units of observation.

The sampling techniques will be different for each co-creation type as Table 6 indicates. The co-initiation and co-design will use the non-probability sampling, and the co-implementation and co-evaluation will use the probability sampling. The non-probability sampling is used because in the two first types of co-creation, the respondents will be selected by the ones that actually use the OGI tools and framework to identify the problems and propose the improvement of the public services based on the LOSD from PAs, citizens and companies.

For co-implementation and co-evaluation, survey participants will be selected randomly, in order to reach stronger analysis to justify the use of OGI innovation ecosystem. The challenges of this technique will be to minimise sampling bias and achieve a good representativeness. To deal with these issues, each pilot partner need to really carefully acknowledge the stakeholders of the system, for example number of employees, the demography of users (citizens and businesses), the structure of the companies, etc. The list of questions aims to help partners addressing this issue. The summary with relationships between co-creation types, sampling techniques and survey techniques are in Table 6.

Table 6 - summarise co-creation types, sampling techniques and survey techniques

Co-Creation Type	Sampling technique	Survey technique
Co-Initiation	Non-Probability	Interviews
Co-Design	Non-Probability	Questionnaire
Co-Implementation	Probability	Questionnaire
Co-Evaluation	Probability	Interviews

3.3.2 Evaluation Methods and tools for OGI Co-Creation Framework

The sections below explain the evaluation methods and tools that will be used for the evaluation of OGI Co-creation Framework.

3.3.2.1 R Statistic Analysis, TwitterR, Weka and other social media analytics

One of the types of analysis is the opinion mining, or popularly described currently as sentiment analysis. Opinion mining grew using data available at opinion-rich resources such as online review sites, personal blogs, microblogs (Twitter) and social network (Facebook, Linkedin, etc.). Taking into consideration this opportunity, OGI consortium aims to use this type of social data to evaluate the co-initiation, co-implementation and co-evaluation processes on each pilot.

Apparently, the first appearance of "opinion mining" term happened in 2003. Dave, Lawrence et al. (2003, pg. 1) described opinion mining as "*process a set of search results for a given item, generating a list of product attributes (quality, features, etc.) and aggregating opinions about each of them (poor, mixed, good)*". Pang and Lee (2008, pg. 1) describes opinion mining as "use information technologies to seek out and understand the opinions of others, identifying opinion, sentiment and subjectivity in texts".

As an example, the content (data) in the Twitter alerts must have follow any lexical organisation, using the same approach being used to link the data in RDF format in the six OGI pilots. Koulompis (2011) believes that part-of-speech features may not be useful for sentiment analysis in the microblogging domain. To overcome this issue, the authors used hashtags (as example, #test), proven more useful as just text mining from social media due the lexical issues aforementioned. This recommendation can influence the design of research on public administration. As example, O'Connor et al. (2010) used tweets, from Twitter, to public polls from government (US president Obama approval rating), linking text sentiment to public opinion time series. Close research was made by Pak and Paroubek (2010), describing how useful can be people participation to co-creation of public policies in government.

To conduct the social media analysis of data collected some software were selected. This list is summarised at Table 7.

Table 7 - Social Media Libraries and software for data analysis

Tool Name	Description	URL
R Statistics	R is a free software environment for statistical computing and graphics.	https://www.r-project.org/
Rdataviz	Github material repository for data visualisation with R Statistics.	https://github.com/pablobarbera/Rdataviz
Rfacebook – CRAN	Package that provides a series of functions that allow R users to access Facebook's API to get information about users and posts, etc.	https://cran.r-project.org/web/packages/Rfacebook/index.html
TwitterR – CRAN	Package that provides R users to access Twitter API to get information from users, tweets, etc.	https://cran.r-project.org/web/packages/twitterR/index.html
Weka	Weka is a collection of machine learning algorithms for data mining tasks.	http://www.cs.waikato.ac.nz/ml/weka/

To use the software, tutorials were identified. Liu (2011) has a tutorial for opinion mining and sentiment analysis. Furthermore members of the technical OGI consortium already have knowledge and give classes on this subject, including R analysis, TwitterR CRAN package and Weka, as example.

3.3.2.2 Web Analytics

Web analytics defined as “the measurement, collection, analysis, and reporting of Internet data for the purposes of understanding and optimizing Web usage” (Jansen, Zhang et al. 2009, pg. 16). According to Jansen, Zhang et al. (2009), there are four stages in the web analytics:

1. Collect the data;
2. Report and analyse data;
3. Using 3) Proven methodologies, metrics or KPIs; and,
4. Follow up the results, e.g publications, improvement strategy etc.

Two most popular technical approaches for collecting data of web analytics are logfile analysis and page tagging.

Logfile analysis offers several advantages such as it does not require any changes to the Website or additional software, it provides a freedom to change the Web analytics tools, it does not require any extra bandwidth when loading a page, and it is possible to record both page request successes and failures. However, logfile also has several disadvantages such as the recorded data is limited to only transactions with the Web server, it is only available to those who own their Web servers, it requires additional efforts to record cookies and it cannot record independent data e.g physical location of the visitor (Jansen, Zhang et al. 2009).

The advantages of using page tagging are that it provides quick reports, it provides flexibility of recording data without involving requests to web servers, and it is available for any organization who doesn't own web servers. The disadvantages of page tagging are that it requires extra coding at the website which causes additional bandwidth, it has difficulties to modify the analytics tools and it only records page request (Jansen, Zhang et al. 2009).

3.4 Evaluation of OGI ICT toolkits

Evaluation of OGI ICT toolkits is divided in two categories. The first of building blocks and the second for evaluation of cubes design. The summary of data collection and methodology of evaluation is presented at Table 8.

Table 8 - Cube Design and Building blocks data collection and methodology methods of Evaluation

Category	Target groups	Data Collection Approach	Methodology of Evaluation
Product Quality	ICT Partners and IT Department of PAs	Questionnaire and Structured observation of application/website	ISO/IEC 25010
Quality in Use			
System's Data Quality			ISO/IEC 25012

From the beginning, criteria for evaluation the OGI toolkit need to be defined. Scientific literature review couldn't provide us an extensive list of standards and requirements organised and structured. On the other hand, ISO/IEC 25010:2011, the standard for Systems and Software Quality Requirements and Evaluation (ISO/IEC 20510:2010 2010), presents a structured list of requirements for building blocks and systems, which we considered for cubes design and after having the stable version of this cube being used in the pilots.

ISO 25010 is adopted as the evaluation method for OGI ICT toolkit. ISO 25010 is organised in 8 parameters which are divided into 30 measurement variables presented at Table 9.

Table 9 - OGI Toolkit Requirements for Evaluation

No	Parameter	Description	Measured by	Description
1	Functionality	the degree to which the OGI solution platform provides functions that meet stated and implied needs when used under specified conditions	Functional completeness	the set of functions covers all the specified tasks and user objectives
			Functional correctness	the correct results with the needed degree of precision
			Functional appropriateness	the accomplishment of specified tasks and objectives

2	Performance	the degree to which the OGI solution platform performs relative to the amount of resources used under stated conditions	Time behaviour	the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements.
			Resource Utilization	the amounts and types of resources used by a product or system, when performing its functions, meet requirements.
			Capacity	the maximum limits of a product or system parameter meet requirements.
3	Compatibility	the degree to which the OGI solution platform can exchange information with other products, systems or components, and/or perform its required functions, while sharing the same hardware or software environment.	Coexistence	perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product.
			Interoperability	exchange information and use the information that has been exchanged.
4	Usability	the degree to which the OGI solution platform can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use	Appropriateness recognizability	users can recognize whether a product or system is appropriate for their needs.
			Learnability	can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.
			Operability	has attributes that make it easy to operate and control.
			User error protection	protects users against making errors.
			User interface Aesthetics	user interface enables pleasing and satisfying interaction for the user.
			Accessibility	can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use.
5	Reliability	The degree to which the OGI solution platform performs specified functions under specified conditions for a specified period of time.	Maturity	meets needs for reliability under normal operation.
			Availability	operational and accessible when required for use.
			Fault tolerance	operates as intended despite the presence of hardware or software faults.
			Recoverability	recover the data directly affected and re-establish the desired state of the system.
6	Security	the degree to which the OGI	Confidentiality	ensures that data are accessible

		solution platform protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorization		only to those authorized to have access
			Integrity	prevents unauthorized access to, or modification of, computer programs or data
			Non-repudiation	proven to have taken place, so that the events or actions cannot be repudiated later
			Accountability	actions of an entity can be traced uniquely to the entity
			Authenticity	identity of a subject or resource can be proved to be the one claimed
7	Maintainability	the degree to which the OGI solution platform can be modified to improve it, correct it or adapt it to changes in environment, and in requirements	Modularity	composed of discrete components such that a change to one component has minimal impact on other components
			Reusability	an asset can be used in more than one system, or in building other assets
			Analysability	possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified
			Modifiability	effectively and efficiently modified without introducing defects or degrading existing product quality
8	Portability	the degree to which the OGI solution platform can be transferred from one hardware, software or other operational or usage environment to another	Adaptability	can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments
			Installability	can be successfully installed and/or uninstalled in a specified environment
			Replaceability	can replace another specified software product for the same purpose in the same environment

Source: ISO/IEC 20510:2010 (2010)

The quality in use relates to the impact or outcome of the product when used in a particular context and consists of 5 parameters which are divided into 11 measurement variables as shown in Table 10.

Table 10 - Criteria for Evaluation of Quality in Use

No	Parameter	Description	Measured by	Description
1	Effectiveness	accuracy and completeness with which users achieve specified goals	-	-
2	Efficiency	resources expended in relation to the accuracy and completeness with which users achieve goals	-	-
3	Satisfaction	the degree to which the user needs are satisfied when using the OGI solution platform in a specific context of use	Usefulness	degree to which a user is satisfied with their perceived achievement of pragmatic goals, including the results of use and the consequences of use
			Trust	degree to which a user or other stakeholder has confidence that a product or system will behave as intended
			Pleasure	degree to which a user obtains pleasure from fulfilling their personal needs
			Comfort	degree to which the user is satisfied with physical comfort
4	Freedom from Risk	the degree to which the OGI solution platform mitigates the potential risk of the usage	Economic Risk Mitigation	the potential risk to financial status, efficient operation, commercial property, reputation or other resources in the intended contexts of use
			Health and Safety Risk Mitigation	the potential risk to people in the intended contexts of use
			Environmental Risk Mitigation	the potential risk to property or the environment in the intended contexts of use
5	Context coverage	the degree to which the OGI solution platform can be used with effectiveness, efficiency, freedom from risk and satisfaction in both specified contexts of use and in contexts beyond those initially explicitly identified	Context Completeness	can be used with effectiveness, efficiency, freedom from risk and satisfaction in all the specified contexts of use
			Flexibility	can be used with effectiveness, efficiency, freedom from risk and satisfaction in contexts beyond those initially specified in the requirements

Source: ISO/IEC 20510:2010 (2010)

During the evaluation, each measurement variable will be assessed from the user perspective, such as public administration offices, citizens and businesses. Their input then will be used to improve the OGI solution platform by the consortium and the revision will be evaluated again during the next stage of the pilot.

3.5 Acceptance Evaluation of OGI ICT toolkit

The acceptance evaluation is aimed at evaluating the gap between perceived delivered services and expected services. This evaluation aims to identify the level of user satisfaction and the intention of use from the users' perspective. Target groups in this particular evaluation are PAs, citizens and businesses.

To derive an evaluation plan, theories and concepts of IT adoption from existing literature that are relevant in the context of the OGI Project were reviewed. In addition, related works on evaluation criteria, as well as methodical concepts for performing project evaluations were examined. These theories were later adapted in accordance with the objectives of the OGI project. From these theories, we collected the factors influencing the intention to use the OGI solution platform including the user satisfaction. The models also provide the mechanism or relation between each factor, the positive or negative impact whereof the direction of the relation.

3.5.1 IT Adoption Models from Literature

From several IT adoption models available from literature, the focus of this evaluation plan is on models that fit for individual use and in the variables should be in accordance with Delivery 1.1 - Needs and Challenges for Data Infrastructures.

3.5.1.1 Technology Acceptance Model (TAM), TAM2 and TAM3

TAM was developed by (Davis 1989) to explain two important factors influencing user decision in accepting technology, i.e., *perceived usefulness* and *perceived ease of use*. Partala and Saari (2015) explain that the original version of TAM, which is developed based on the theory of reasoned action by Ajzen and Fishbein (1973), emphasizes how the degree of personal impressions affect the adoption of a particular technology. One of the limitations of original version of TAM is the exclusion of *subjective norm* as the direct determinant in influencing individual behavior whereas the perceived norm might affect the degree of compliance in a particular system (Davis, Bagozzi et al. 1989). Moreover, this model pays more focus on initial adoption instead of continuous usage of a technology (Premkumar and Bhattacharjee 2008). In addition to that, TAM is mostly dealt with the voluntary adoption (Alamgir Hossain and Quaddus 2011) and does not take into account the qualitative, emotional, and cultural components as the influence factors of actual behavior (Ward 2013).

The original version of TAM was expanded by Venkatesh and Davis (2000), investigating *the external factors* in explaining the technology adoption decision. The new model (TAM 2) explains that the social influence processes and the cognitive instrumental processes produce significant impacts in technology adoption decision (Venkatesh and Davis 2000). Furthermore, TAM 2 was enhanced by Venkatesh and Bala (2008) in order to provide more comprehensive factors in explaining individual acceptance of technology. They explain *the importance of the intervention*, i.e., pre-implementation and post-implementation intervention, in an IT adoption process in the company. This new model (TAM3) has the main focus on how the intervention by the organization can help employees to make a better decision on technology adoption (Venkatesh and Bala 2008). The proper application of TAM3 is believed to be able to reduce the risk of implementation failure in a company (Venkatesh and Bala 2008).

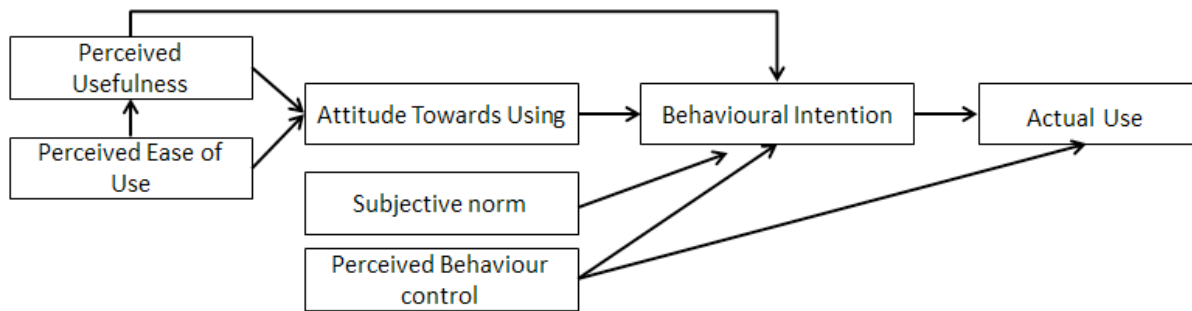


Figure 10 – The Framework of original TAM

Source: Davis (1989)

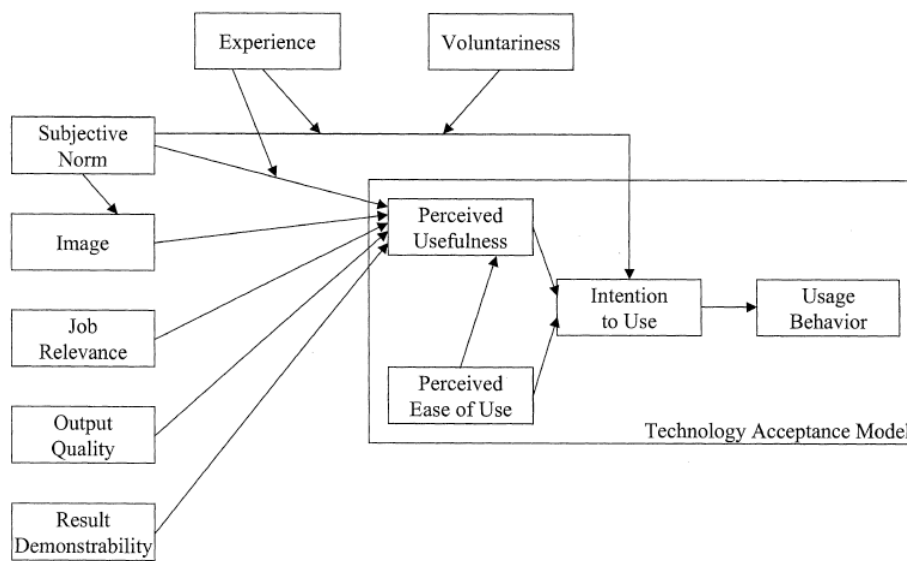


Figure 11 – The Framework of TAM2

Source: Venkatesh and Davis (2000)

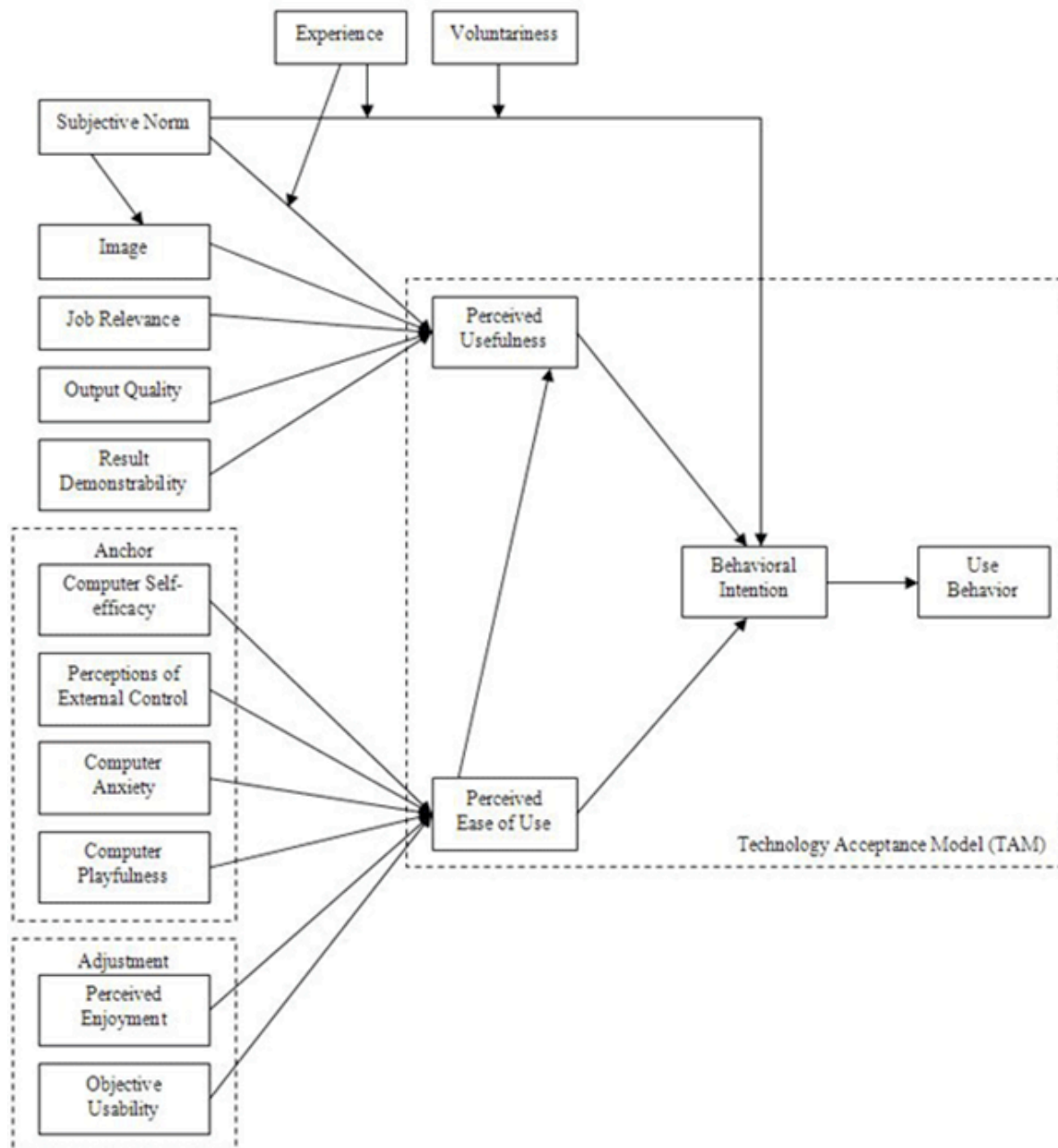


Figure 12 The Framework of TAM3

Source: Venkatesh and Bala (2008)

3.5.1.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh, Morris et al. (2003) developed a unified model, called the unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT has four core determinants (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions) of intention and usage and up to four moderators (i.e., age, gender, experience, and voluntariness of use) of key relationships. The UTAUT theory was developed through the review and integration of eight dominant theories and models (Venkatesh, Morris et al. 2003) presented below.

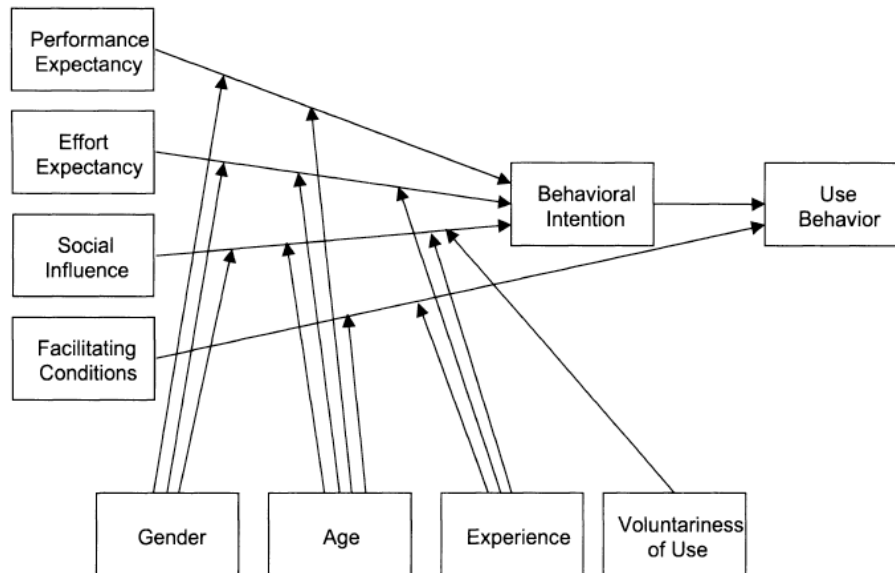


Figure 13 – The UTAUT Framework

Source: Venkatesh, Morris et al. (2003)

3.5.1.3 DeLone and Mclean IS Success Model

The DeLone and McLean (1992) Information System (IS) success theoretical model firstly introduced in 1992 to provide a general and comprehensive evaluation of IS success from different perspectives. This model proposes seven IS success measurements, and structured in three layers: 'information quality', 'system quality' and 'service quality' (at the first layer), which affect 'user satisfaction' and also the 'actual use' of the IS (at the second level). Then 'user satisfaction' and 'actual use' influence the 'individual impact' and the 'organizational impact' of the IS.

The 2003 model proposed a new specification, 'intention of use', at the second layer and combined 'individual and organizational impacts' into 'net benefit'

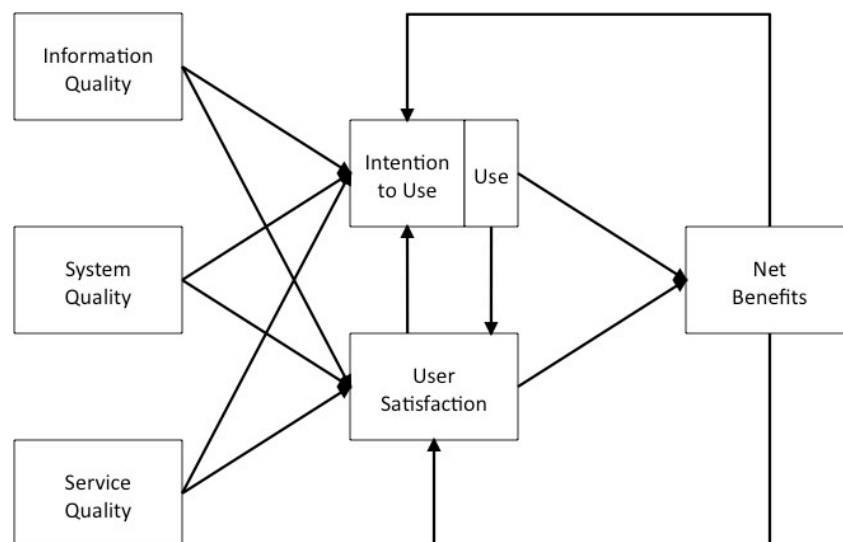


Figure 14 – The IS Success Framework

Source: DeLone and McLean (2003)

3.5.2 Acceptance Evaluation Framework for OGI

A combination of aforementioned theories above will be employed to create an evaluation of user acceptance and intention of use for OGI. Table 11 below presents variables and (general) measured items for the pilots evaluation. However, as each pilot has their own characteristics, e.g. objectives, target audiences, etc. the questionnaire created for the evaluation may be different to each pilot.

Table 11 - User Acceptance Evaluation for OGI

<i>Variable</i>	<i>Measured Items</i>	<i>Source</i>
Job Relevance (JR)	OGI toolkit makes mine and my colleagues job tasks easier to be accomplished. In my job, usage of the system is important. In my job, usage of the system is relevant	Venkatesh and Davis (2000)
Output Quality (OQ)	The quality of the output I get from the OGI toolkit is higher compare to previous system. I have no problem with the quality of the OGI toolkit's output.	Venkatesh and Davis (2000)
Result Demonstrability (RD)	I have no difficulty telling others about the results of using the OGI toolkit. I believe I could communicate to others the consequences of using the OGI toolkit. The results of using the OGI toolkit are apparent to me. I would have difficulty explaining why using the OGI toolkit may or may not be beneficial.	Venkatesh and Davis (2000)
Perceived Ease of Use (PEU)	My interaction with OGI toolkit is clear and understandable; OGI toolkit usage does not require a lot of skills; I find it easy to get the OGI toolkit to do what I want it to do. I find the OGI toolkit to be easy to use.	(Davis 1989)
Perceived Usefulness (PU)	Using OGI toolkit improves my performance in my job tasks; Using OGI toolkit enhances my effectiveness in my job tasks; Using OGI toolkit in my job increases my productivity. I find the OGI toolkit to be useful in my job.	(Davis 1989)
Intention to Use (IU)	If I have access, I would use OGI toolkit.	(Davis 1989)

3.6 Outcomes Evaluation

This section describes the methods selected to evaluate the long term outcomes of OGI. The use of the apps by users should result in the outcomes: engagement, participation, transparency, accountability, empowerment and administrative burden.

3.6.1 Transparency

Transparency has been used as a magic concept by government and public managers (Ward 2014). As an example, the transparency concept is used as synonymous with accountability (Bovens 2007), openness (Coglianese 2009), open government data (Frank and Oztoprak 2015). Due to not having a

clear definition and largely used by academics, this project takes in consideration transparency as a concept of an unilateral process of disclosure of data, information, actions that an organisation has been conducting (Peixoto 2013).

Transparency is a phenomenon that can lead to accountability, but does not guarantee any concrete result of justice or mobilisation, just public exposure to scrutiny (Fox 2007). In addition to the discussion of what is and what is not transparency, there are only a few models that try to explain and evaluate transparency. Matheus and Janssen (2013) proposed an evaluation model for transparency initiatives considering transparency as a multidimensional object based on many factors influencing two main dimensions: interpretation and accessibility. Facilitating conditions were added considering background and profile of users influencing transparency.

The OGI project will test if factors and facilitating conditions influence positively or negatively transparency dimensions.

3.6.1.1 Dimensions of Interpretation

Literature points out issues for data interpretation due to natural problems of human cognition (Evans 1972, Venkatesh, Morris et al. 2003, Sears and Jacko 2009). Interpretation requires information about how data was collected and what might be concluded from it (data context). As such on formal research methods (Silverman 2011), regular people carry out the same actions as scientists perform doing research. It means it is a natural process of human curiosity to discover and combine data and information on patterns. From this point of view, several propositions have been identified that can influence in a positive and/or negative way the interpretation of data. In this case, we consider the data to perform the public service delivery using the OGI innovation ecosystem. This will depend on the pilot public policy service delivery and users (inside public sector, or citizens, businesses, etc.).

- ***Proposition 1 (P1): Easier interpretation of data results in higher transparency.***

Easy data and information access/use leads to an easy interpretation by people. As an example, citizens are used to consume mass media format from newspapers and online news in web sites. Data should be published in a way to reduce the effort by citizens to interpret. The easier interpretation can result in higher transparency (Balkin 1999, Mahlke 2002).

- ***Proposition 2 (P2): The presence of examples on the website has significant positive influence on interpretation.***

Web sites navigation and usage can be confusing and can lead users (e.g. citizens) to leave the page before concluding your objective or distract them to conclude a defined task. If web sites examples can be easily demonstrated by videos, images or tutorials, it could have a positive influence on transparency for citizens because they become more familiar with the data and how to use the transparency tool (Ciborra 1999).

- ***Proposition 3 (P3): Simple language has significant positive influence on interpretation.***

Aiming to produce transparency for everyone, data and information must be in a language accessible to a majority of people, facing problems as lack of time, access to education and advanced technological equipment (Mendonça, Jefferson et al. 2007).

- ***Proposition 4 (P4): Higher information quality has a significant influence on interpretation.***

No matter for what or which, literature has been pointing out that data quality is an important subject for several managerial aspects, for example for disasters response (Bharosa, Lee et al. 2010), orchestrating information (Bharosa, Janssen et al. 2008) or for transparency of budget, public services, etc. (Janssen, Charalabidis et al. 2012, Matheus, Ribeiro et al. 2012, Peixoto 2013). On the other hand, ISO/IEC 25012 treats data quality from a technical perspective (ISO/IEC 2010). The next three propositions (a, b and c) are related to information quality influencing transparency.

- ***Proposition 4a: updatedness of information has a significant influence on data quality.***

Updating data is an important aspect for transparency. Latency of update can influence positively or negatively the usage of data. The more updated is the information, likely to be more useful it is for any stakeholder on any role that they are performing (Bharosa, Janssen et al. 2008, ISO/IEC 2010). If possible, data sets should be disclosed on different format of periods and aggregation. As example, regular data is monthly aggregated but can be disclosed daily disaggregated, because it is collected every day. The same for time, aggregated in day or disaggregated in hours.

- ***Proposition 4b: higher data completeness has a significant influence on data quality.***

Completeness can vary depending on stakeholders, role performed and objectives (Matheus and Janssen 2015). In this way, Linked Data solutions combined with Big and Open Linked Data can solve issues related to completeness due to its flexibility on visualising and accessing data sets (Janssen, Charalabidis et al. 2012, Peixoto 2013) (Peixoto, 2013, Zuiderwijk, 2012). If "a lot of data" (data overload - proposition 5b) is disclosed to stakeholders, it can influence transparency because it potentially can lead to confusion and misunderstanding.

- ***Proposition 4c: higher data accuracy has a significant influence on data quality.***

A basic principle of data is accuracy. It doesn't make any sense to have a database with wrong data sets. Spreadsheet errors due to misinterpretation when being compiled or misunderstanding while used can compromise quality of transparency and the results of usage for public policies formulation, implementation and evaluation (Bharosa, Janssen et al. 2008, Janssen, Charalabidis et al. 2012, Matheus, Ribeiro et al. 2012).

3.6.1.2 Dimension of Accessibility

Accessibility was identified as a dimension that can influence positively and negatively on the interpretation of data and websites (Venkatesh, Morris et al. 2003, Sears and Jacko 2009).

- ***Proposition 5: higher accessibility has a significant positive influence on transparency.***

There is no relationship between accessibility of a website and higher investments (Lazar, 2003). From this perspective, it is possible to suppose that the accessibility has a positive influence on transparency for citizens as websites' users (Perdue 2002). The next four propositions (a, b, c and d) are related to accessibility influencing transparency.

- ***Proposition 5a: Simple language has significant positive influence on accessibility.***

Citizens, businesses and civil servants are at same time similar and different, depending on which perspective we classify them. To create transparency to everyone of these stakeholders, data and information must be in a language accessible to the majority of people. Simple and direct language can contribute positively on transparency (Mendonça, Jefferson et al. 2007).

- ***Proposition 5b: data overload has a significant negative influence on accessibility.***

Sometimes data can be distributed on an overloaded format. It means that more data than the necessary to be used or in any kind of format can obligate users to (advanced) search or carry out new actions far from user normality. In the case of advanced search and new actions, they require specific knowledge to achieve simple objectives. Data overload can discourage people to continue on the website or cause using information wrongly (Loiacono, Watson et al. 2002, Mahlke 2002).

- ***Proposition 5c: Adhesion to standards has a significant positive influence on accessibility.***

New devices have been developed (tablets, smartphones, smart watches, etc.) and standards are necessary to be followed. Linked Data and Open Government Data are approaches to reduce lack of standards on data, as example (Janssen, Charalabidis et al. 2012). Audience is influenced by how accessible the websites are and by the minimum technology needed. Furthermore, there are

international recognized patterns and guidelines in this area for websites, including for people with disabilities, elderly, etc. (Kuzma 2010).

- ***Proposition 5d: Unified use of technology has positive influence on accessibility.***

While a majority of users is migrant to determined web browser or technology, developers can still code for not up-to-date or popular software. This can influence audience usage and accessibility (Petre, Minocha et al. 2006). Unified use of technologies can lead to a higher number of people using the technology instead of not mature (state-of-art) technologies (Helbig, Gil-García et al. 2009).

3.6.1.3 Facilitating conditions

In the UTAUT model age, experience and voluntariness of use are used (Venkatesh, Morris et al. 2003). For transparency, literature indicates that experience might be an important variable. Education level and income were included as conditions that influence positively or negatively on user experience.

1. Experience

Interpretation is likely to be dependent on the past experience of the persons with these type of data. An experienced users might need less time to understand what can be done with the data (Venkatesh and Davis 2000, Mahlke 2002, Venkatesh, Morris et al. 2003).

- ***Proposition 6a: the influence of interpretation on transparency will be moderated by experience.***
- ***Proposition 6b: the influence of accessibility on transparency will be moderated by experience.***

2. Age

Literature (Livingstone 2007, Holt, Shehata et al. 2013) pointed out that age is an important condition, being on whether in childhood, adolescence, adulthood and elderly. Depending on which age you are working for, you have to construct websites focusing that group and perceiving what are the group peculiarities.

- ***Proposition 7a: the influence of interpretation on transparency will be moderated by age.***

3. Level of education

According to literature (Ruiz 2012), the competencies required by 21st century workers at all levels within the global workforce include being digitally literate, possessing hard skills and soft skills, and having accessibility. It is known that level of education is highly related to level of education. Eurostat household statistics suggests that percentage of Internet access and experience (time of usage) of Internet and computers on high income households is higher than low income (Vicente and López 2011). Considering this, level of education influences positively or negatively transparency on both interpretation and accessibility dimensions.

- ***Proposition 8a: the influence of interpretation on transparency will be moderated by the level of education.***
- ***Proposition 8b: the influence of accessibility on transparency will be moderated by the level of education.***

Table 12 - Adapted Transparency Evaluation Method

Source: Matheus and Janssen (2013)

Dimension	Factor	P. #	Proposition
Interpretation	<i>Ibid</i>	P1	Easier interpretation of data results in higher transparency
	Examples of usage	P2	presence of examples of the website product, the higher has a positive influence on interpretation.
	Simple Language used	P3	Simple language has significant positive influence on transparency
	Data Quality	P4	higher information quality has a significant influence on interpretation
	Updatedness of Information	P4a	higher updated information has a significant influence on data quality.
	Completeness	P4b	higher data completeness has a significant influence on data quality
	Accuracy	P4c	higher data accuracy has a significant influence on data quality
Accessibility	<i>ibid</i>	P5	higher accessibility has a significant positive influence on transparency
	Simple Language	P5a	Simple language has significant positive influence on transparency
	Data Overload	P5b	data overload has a significant negative influence on accessibility
	Adhesion to Standards	P5c	Adhesion to standards has a significant positive influence on accessibility
	Unified Technology	P5d	Unified use of technology has positive influence on accessibility
Facilitating Conditions	Experience	6a	the influence of interpretation on transparency will be moderated by experience
		6b	<i>the influence of accessibility on transparency will be moderated by experience</i>
	Age	7a	the influence of interpretation on transparency will be moderated by age
		8a	the influence of interpretation on transparency will be moderated by the level of education
	Level of Education	8a	the influence of interpretation on transparency will be moderated by the level of education
		8b	the influence of accessibility on transparency will be moderated by the level of education

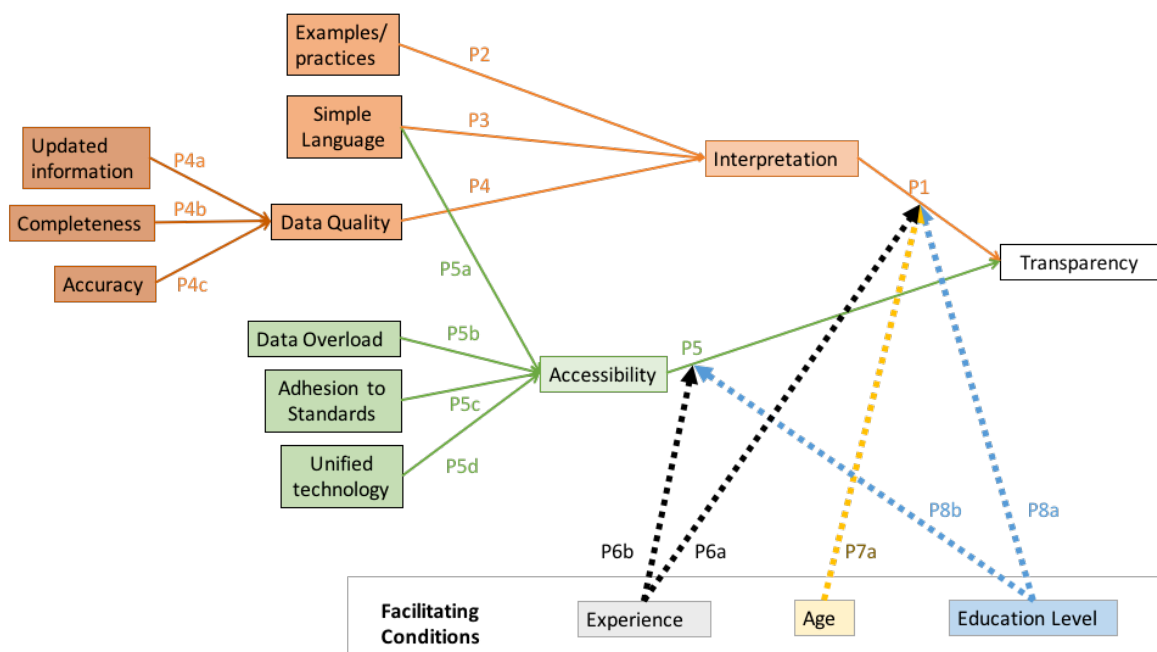


Figure 15 - Adapted Transparency Evaluation Method

Source: Matheus and Janssen (2013)

3.6.2 Administrative Burden

Governments are facing issues to deliver more public services with less financial resources, time and people. Due to these reasons, OGI will evaluate how the OGI innovation ecosystem influences the reduction of administrative burden. The evaluation methods are based on the Cost Benefit Assessment (CBA) approach, following the Study on eGovernment and the Reduction of Administrative Burden - SMART 2012/0061 (Gallo, Giove et al. 2014), a taxonomy of costs and benefits has been adapted.

The dimension considered for both Public Sector and Users was Benefits, divided in two categories: direct and indirect benefits. The reason to focus only on Benefits is because the OGI consortium is interested in the benefits that OGI innovation ecosystem can provide. It means that this section is focusing on the outcomes. Indeed the description of the pilots already describe a situation of losses and increasing cost without a conformable increase of efficiency on public service delivery. It means that any evolution, re-engineering of public service delivery will improve the current situation. If the OGI innovation ecosystem is not working properly, this will be evaluated on the OGI ICT toolkit, OGI co-creation framework and mainly at acceptance evaluation.

The figure below summarises the focal point between public sector and users outcomes.

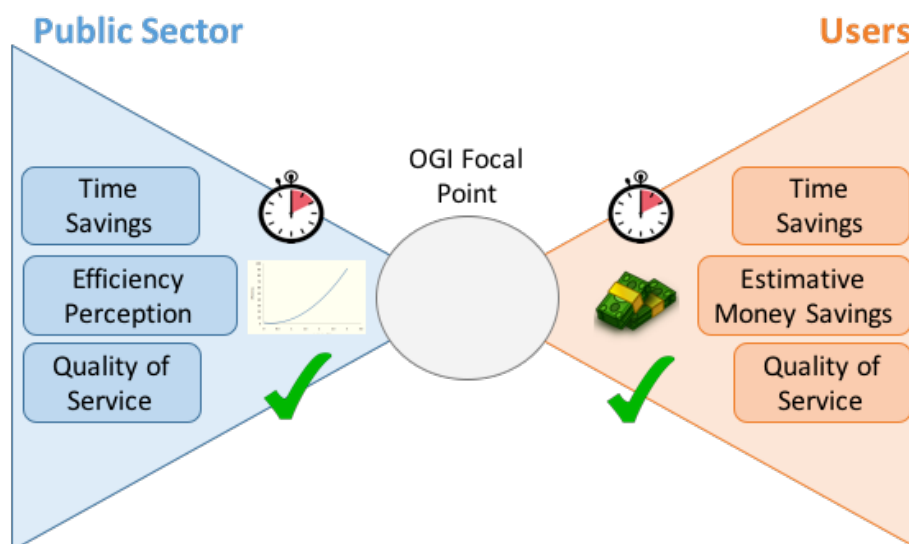


Figure 16- OGI Focal Point

The table below summarises the adapted taxonomy for Costs and Benefits of OGI innovation ecosystem for stakeholders. The questionnaire created for public sector and users are provided at section 5.4.

Table 13 - Taxonomy for Benefits for OGI innovation ecosystem stakeholders

Adapted from (Gallo, Giove et al. 2014)

Dimension	Categories	Sub-Categories	Description
Benefits for Public Sector	Direct Benefits	Time Savings	Includes all monetizable benefits arising from improvements on public service delivery, including time savings before/after OGI innovative ecosystem implementation.
	Indirect Benefits	Efficiency perception	Encompass non monetizable benefits related to a better service delivery and the enhancement of the decision-making process.
		Quality of service	
Benefits to Users (citizens, businesses)	Direct Benefits	Time Saving	Includes all monetizable benefits arising from improvements on public service delivery, including time savings before/after OGI innovative ecosystem implementation.
	Indirect Benefits	Estimative Money Saving	
		Quality of service	Encompass non monetizable benefits related to a better service delivery and the enhancement of the decision-making process.

3.6.2.1 Benefits for Public Sector and Users

There are two ways to understand "benefits for Public Sector". First as organisation, and second as people involved in the processes. Taking into consideration the OGI innovation ecosystem, we decided to take approaches depending on the characteristics of the respective pilots. Some pilots have a clear definition of Public Sector (organisation and people - civil servants, policy makers, etc.) and users (citizens, businesses, etc.). However, other pilots don't have a clear distinction between Public Sector and users, because the users are on the Public Sector (civil servants, policy makers, etc.).

The approach designed below is a guideline that can be changed taking in consideration pilot singularity. The summary of data collection methods is presented at Table 14 and the planned questions of questionnaires and interviews are at section 5.4.

1. Time savings

Time savings considers two potential scenarios. If the public service already existed, it is possible to measure how much time in days or hours a civil servant or citizen/business person performs the task or receives the public service delivery. The measure can be collected with log observation of delivery, researcher observation of the process (presential) or via survey (questionnaire and/or interview).

If the public service doesn't exist and a new one will be created, we will take in consideration the measures comparing similar processes or collect data from users (civil servants, citizens, business person, etc.) from a perception or expectation perspective. For this, a Likert scale from 1- very dissatisfied to 5-very satisfied will be used to measure the level of satisfaction with time spent on public service.

2. Efficiency Perception

Efficiency perception considers public sector data from people that use the OGI innovation ecosystem. It means no quantitative data from performance, for example, before OGI 10 minutes, after OGI 5 minutes, 50% of improvements. The objective is to identify if public sector users (civil servants, public managers, etc.) have the (subjective) perception that there is improved efficiency or not. To measure efficiency perception, a questionnaire will be conducted on public sectors. Questionnaire uses Likert scale for level of agreement (1 strongly disagree to 5- strongly agree) to identify efficiency perception.

3. Estimative Money Savings

Reducing costs is a trend around the world. Taking this in consideration, the approach uses a perception or expectation perspective for expenses made before/after implementation of OGI innovation ecosystem. A questionnaire will collect data based on a Likert scale of agreement (1 strongly disagree to 5- strongly agree) and open question asking to provide how much expenses were avoided, for example 10 euros. Further, can be asked what type of expenses (services, products, etc.) were avoided or diminished, for example, consultancy, ticket for public transportation, gasoline, etc.

4. Quality of Service

Quality of service considers two potential scenarios. If the public service already existed, it is possible to measure the level of quality using Likert scale (1-poor to 5- excellent) and comparison between past and current product/service (1- much worse to 5- much better). If any issue was identified on this questionnaire, further interviews will be conducted looking to identify and measure the issues.

If the public service doesn't exist and a new one will be created, we will take in consideration the measures comparing similar processes or collect data from users (civil servants, citizens, business person, etc.) from a perception or expectation perspective. Then a Likert scale based on level of satisfaction with quality of public service (1- very dissatisfied to 5-very satisfied).

Table 14 - Summary of Data Collection and Analysis methods

Stakeholder	Categories	Sub-Categories	Data Collection Method
Public Sector (Civil servant, policy-makers)	Direct Benefits	Time Savings	Web Statistics; Questionnaire; Interview.
	Indirect Benefits	Efficiency perception	Questionnaire; Interview.
		Quality of service	
Users (Citizens, businesses)	Direct Benefits	Time Savings	Web Statistics; Questionnaire; Interview.
	Indirect Benefits	Estimative Money Savings	Questionnaire; Interview.
		Quality of Service	

4 Conclusions

The OpenGovIntelligence (OGI) innovation ecosystem provides a framework and an architecture as well as an ICT toolkit for data-driven public service co-creation. Based on agile development with continuous and strong stakeholder participation, pilots will be implemented. There will be a design and an implementation team that will work closely together. The evaluation plan takes into account multiple stakeholders' perspectives. We will use multiple evaluation methods to deal with the diversity of activities in our project and we opt for customizing the models for the situation in our project.

The various methods that will be employed include surveys, interviews, web metrics and data from social media. The evaluation of OGI innovation ecosystem on public administration is based on four main aspects:

- 1) **Co-Creation Framework Evaluation.** How will this framework enable co-creation?
- 2) **OGI ICT Toolkit** (Building blocks and Cubes Design). Are the building blocks suitable for providing the functionality needed? How does the toolkit serve its purpose to support application development?
- 3) **Acceptance of OGI** innovation ecosystem. Will the users accept and work with the developed applications?
- 4) **Outcomes.** What is the result of pilot applications on elements like administrative burden and transparency?

Each of the aspects has its own evaluation methods and measures. The evaluation will demonstrate how the various elements of the project achieve the targeted impact. It is anticipated that in the long term the project outcomes will be important in the domains/areas of engagement, participation, transparency, accountability, empowerment and administrative burden of public services.

The table 15 summarises the methods for data collection and evaluation.

Table 15 - Overview of dimensions, methods to collect data and methods to Evaluate

<i>Dimension</i>	<i>Method to Collect Data</i>	<i>Method to Evaluate</i>
Co-Creation Framework Evaluation	<ul style="list-style-type: none"> • Social Media; • User Workshop; • Continued Participation; • Public Meetings; • Focus Groups; • User Experience and User Interface; • Web and Phone Statistics; • Portal's Feedback Channels • Surveys (Questionnaires and Interviews). 	<p>R Statistic Analysis (TwitterR), Weka and Others;</p> <p>Web Analytics based on (Xu, 2004; Jana and Chatterjee, 2004; Goh et al., 2008).</p>
OGI ICT Toolkit Evaluation (Building Blocks and Cubes Design)	Survey (Questionnaires).	ISO/IEC 25010; ISO/IEC 25012.
Acceptance Evaluation	Survey (Questionnaires).	Combination of TAM, TAM2, TAM3, UTAUT, Delone and McLean.
Outcomes Evaluation	<p>Survey (Questionnaires and interviews);</p> <p>Web Statistics.</p>	<p>Transparency Model adapted from UTAUT (Matheus and Janssen, 2013)</p> <p>Administrative Burden model adapted from Gallo et al. (2014)</p>

5 Annexes

5.1 Survey User Workshop Evaluation (Feedback)

Table 16 - Survey User Workshop Satisfaction (Feedback)

#	Question	Answer (Measure)
1	How satisfied were you with the user workshop?	1- Very Dissatisfied 2- Dissatisfied 3- Unsure 4-Satisfied 5- Very much
2	The user workshop was well organised?	1- Strongly Disagree 2- Disagree 3- Neither agree or disagree 4- Agree 5- Strongly Agree
3	How relevant was the content of this workshop to your current position?	1- Very irrelevant 2- Irrelevant 3- Neutral 4- Relevant 5- Very relevant
4	How was the moderation of the workshop?	1- Poor 2- Fair 3- Good 4- Very Good 5- Excellent
5	Do you believe that the workshop had an ideal range of participants?	1- Strongly Disagree 2- Disagree 3- Neither agree or disagree 4- Agree 5- Strongly Agree
6	What were your key take aways from this user workshop?	Open question
7	How satisfied were you with the session content? (Both presented and pre-read material)	1- Poor 2- Fair 3- Good 4- Very Good 5- Excellent
8	Any additional comments regarding the sessions or overall agenda?	Open question
9	Any overall feedback for the event?	Open question
10	What organisation do you represent?	Open question
11	Would you be willing to participate in future workshops?	YES / NO
12	Name	Optional (anonymous is possible)

5.2 Questionnaire for OGI ICT toolkit

Table 17 – Questionnaire for OGI ICT Toolkit – Building Blocks and Data Cubes

No	Parameter	Measured by	Statements/Questions
1	Functionality	Functional completeness	To what extend do you agree or disagree that the OGI toolkit provides all required functionalities? To what extend do you agree or disagree that all functions in the OGI toolkit work properly?
		Functional correctness	To what extend do you agree or disagree that all functions in the OGI toolkit provide correct results?
		Functional appropriateness	To what extend do you agree or disagree that all functions in the OGI toolkit help you analyze the statistical data?
2	Performance	Time behaviour	To what extend do you agree or disagree that the response and processing times of OGI toolkit when performing its functions, meet requirements?
		Resource Utilization	To what extend do you agree or disagree that the amounts and types of resources used by the OGI toolkit when performing its functions, meet requirements?
		Capacity	the maximum limits of a product or system parameter meet requirements.
3	Compatibility	Coexistence	To what extend do you agree or disagree that OGI toolkit perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product?
		Interoperability	To what extend do you agree or disagree that OGI toolkit can be used with your existing network?
4	Usability	Appropriateness recognizability	To what extend do you agree or disagree that OGI toolkit is appropriate for your work?
		Learnability	To what extend do you agree or disagree that OGI toolkit can enable the user to learn how to use it?
		Operability	To what extend do you agree or disagree that OGI toolkit has attributes that make it easy to operate and control.
		User error protection	To what extend do you agree or disagree that OGI toolkit protects the users against making errors?
		User interface Aesthetics	To what extend do you agree or disagree that OGI toolkit's user interface enables pleasing and satisfying interaction for the user?
		Accessability	To what extend do you agree or disagree that OGI toolkit can be used by wide range of users?
5	Reliability	Maturity	To what extend do you agree or disagree that OGI toolkit is reliable under normal operation.
		Availability	To what extend do you agree or disagree that OGI toolkit is accessible when required for use?
		Fault tolerance	To what extend do you agree or disagree that OGI toolkit still operates as intended despite the presence of hardware or software faults?
		Recoverability	To what extend do you agree or disagree that OGI toolkit can be restored quickly from a system failure and recovered to the point at which a failure occurred?

6	Security	Confidentiality	To what extend do you agree or disagree that OGI toolkit ensures that data are accessible only to those authorized to have access?
		Integrity	To what extend do you agree or disagree that OGI toolkit prevents unauthorized access to, or modification of, computer programs or data?
		Non-repudiation	To what extend do you agree or disagree that OGI toolkit proven to have taken place, so that the events or actions cannot be repudiated later
		Accountability	To what extend do you agree or disagree that OGI toolkit ensures that actions of an entity can be traced uniquely to the entity?
		Authenticity	To what extend do you agree or disagree that OGI toolkit provides identity of a subject or resource so it can be proved to be the one claimed?
7	Maintainability	Modularity	To what extend do you agree or disagree that OGI toolkit composed of discrete components so a change to one component has minimal impact on other components?
		Reusability	To what extend do you agree or disagree that data from OGI toolkit can be used in other systems, or in building other data?
		Analysability	To what extend do you agree or disagree that it is possible to assess the impact on OGI toolkit of an intended change to one or more of its parts, or to diagnose for deficiencies or causes of failures, or to identify parts to be modified?
		Modifiability	To what extend do you agree or disagree that OGI toolkit can effectively and efficiently modified without introducing defects or degrading existing product quality?
8	Portability	Adaptability	To what extend do you agree or disagree that OGI toolkit can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments?
		Installability	To what extend do you agree or disagree that OGI toolkit can be successfully installed and/or uninstalled in a specified environment?
		Replaceability	To what extend do you agree or disagree that OGI toolkit can replace another specified software product for the same purpose in the same environment?

Table 18 – Questionnaire for OGI Toolkit – Acceptance of OGI ICT Toolkit

No	Parameter	Measured by	Questions	
1	Effectiveness	Effectiveness	Within 1 to 5, how do you rate the OGI toolkit in term of accuracy and completeness to achieve your goals?	Level of Quality: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent
2	Efficiency	Efficiency	Within 1 to 5, how do you rate the OGI toolkit in term of the use of resource to achieve your goals?	
3	Satisfaction	Usefulness	Within 1 to 5, how do you rate your satisfaction in using OGI toolkit to achieve your goals?	
		Trust	Within 1 to 5, how do you rate the OGI toolkit in term of it will behave as intended?	
		Pleasure	Within 1 to 5, how do you rate the OGI toolkit in term of obtains pleasure from fulfilling your personal needs?	
		Comfort	Within 1 to 5, how do you rate the OGI toolkit in term of the OGI toolkit design?	
4	Freedom from Risk	Economic Risk Mitigation	Within 1 to 5, how do you rate the OGI toolkit in term of the potential risk to financial status, efficient operation, commercial property, reputation or other resources in the intended contexts of use?	
		Health and Safety Risk Mitigation	Within 1 to 5, how do you rate the OGI toolkit in term of the potential risk to people in the intended contexts of use?	
		Environmental Risk Mitigation	Within 1 to 5, how do you rate the OGI toolkit in term of the potential risk to property or the environment in the intended contexts of use?	
5	Context coverage	Context Completeness	Within 1 to 5, how do you rate the OGI toolkit in term of it can be used with effectiveness, efficiency, freedom from risk and satisfaction in all the specified contexts of use?	
		Flexibility	Within 1 to 5, how do you rate the OGI toolkit in term of it can be used with effectiveness, efficiency, freedom from risk and satisfaction in contexts beyond those initially specified in the requirements?	

5.3 Questionnaire for Acceptance Evaluation

Table 19 - Questionnaire for Acceptance evaluation of OGI Project

Variable	Statement	Answers
Job Relevance (JR)	OGI toolkit makes mine and my colleagues job tasks easier to be accomplished. In my job, usage of the system is important. In my job, usage of the system is relevant	
Output Quality (OQ)	The quality of the output I get from the OGI toolkit is higher compare to previous system. I have no problem with the quality of the OGI toolkit's output.	
Result Demonstrability (RD)	I have no difficulty telling others about the results of using the OGI toolkit. I believe I could communicate to others the consequences of using the OGI toolkit. The results of using the OGI toolkit are apparent to me. I would have difficulty explaining why using the OGI toolkit may or may not be beneficial.	5-Likert Scale: 1 = Very Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Very Agree
Perceived Ease of Use (PEU)	My interaction with OGI toolkit is clear and understandable; OGI toolkit usage does not require a lot of skills; I find it easy to get the OGI toolkit to do what I want it to do. I find the OGI toolkit to be easy to use.	
Perceived Usefulness (PU)	Using OGI toolkit improves my performance in my job tasks; Using OGI toolkit enhances my effectiveness in my job tasks; Using OGI toolkit in my job increases my productivity. I find the OGI toolkit to be useful in my job.	
Intention to Use (IU)	If I have access, I would use OGI toolkit.	1- Not probable 2- Somewhat improbable 3- Neutral 4- Somewhat probable 5- Very Probable

5.4 Questionnaires for Administrative Burden Evaluation

Table 20 - Questionnaire for Administrative Burden Evaluation - Public Sector

Measure	Questions for Public Sector	Answer
Personal information	1- What is your name?	Name (option for anonymous if asked)
	2- What is your role, position working with OGI ICT Toolkit?	Role or position at Public Sector
Frequency of Use	3- Which is your frequency of use	1- Never 2- Almost never 3- Sometimes 4- Almost every time 5- Every time
	4- For the next years, what is the probability to use?	1- Not probable 2- Somewhat improbable 3- Neutral 4- Somewhat probable 5- Very Probable
Time savings	5- Are You satisfied with time spent on this specific public service delivery?	1- Very dissatisfied 2- Dissatisfied 3- Unsure 4- Satisfied 5- Very satisfied
	6- If yes, how much of time are you saving now?	1- Reduction of 25% 2- Reduction of more than 50% 3- Reduction of more than 75% 4- Reduction of more than 100% (% can be replaced by time, for example 1 minute, to more than 5 minutes)
	7- If yes, how much of time are you spending more now?	1- More 25% 2- More than 50% 3- More than 75% 4- More than 100%
Efficiency Perception	8- Do you agree that OGI innovation ecosystem helps to improve efficiency?	1- Strongly Disagree 2- Disagree 3- Somewhat disagree 4- Neither agree or disagree 5- Somewhat agree 6- Agree 7- Strongly agree
	9-How do you classify the quality of service provided with OGI innovation ecosystem (or name of public service delivery) now?	1- Poor 2- Fair 3- Good 4- Very Good 5- Excellent
Quality of use	10- Comparing the OGI innovation ecosystem with past public service delivery, your feel about OGI is?	1- Much worse 2- Somewhat worse 3- About the same 4- Somewhat better 5- Much better
	11- Why do You feel OGI is better/worse?	Open question.

Table 21 - Questionnaire for Administrative Burden Evaluation - Users

Measure	Questions for Public Sector	Answer
Personal information	1- What is your name?	Name (option for anonymous if asked)
	2- Are You user of OGI ICT Toolkit?	Yes or no (filter question)
Frequency of Use	3- Which is your frequency of use	1- Never 2- Almost never 3- Sometimes 4- Almost every time 5- Every time
	4- For the next years, what is the probability to use?	1- Not probable 2- Somewhat improbable 3- Neutral 4- Somewhat probable 5- Very Probable
Time savings	5- Are You satisfied with time spent on this specific public service delivery?	1- Very dissatisfied 2- Dissatisfied 3- Unsure 4- Satisfied 5- Very satisfied
	6- If yes, how much of time are you saving now?	1- Reduction of 25% 2- Reduction of more than 50% 3- Reduction of more than 75% 4- Reduction of more than 100% (% can be replaced by time, for example 1 minute, to more than 5 minutes)
	7- If no, how much of time are you spending more now?	1- More 25% 2- More than 50% 3- More than 75% 4- More than 100%
Estimative Money Savings	8- Did You save any monetized (money, service, product, etc.) using OGI innovation ecosystem?	Yes or No (filter question)
	9- if yes, can you classify how much of money (etc.) are you saving now?	1- Reduction of 25% 2- Reduction of more than 50% 3- Reduction of more than 75% 4- Reduction of more than 100% (percentage can be substituted by money, for example 10 euros, to more than 50 euros)
	10- If no, how much of money (etc.) are you spending more now?	1- More 25% 2- More than 50% 3- More than 75% 4- More than 100%
Quality of use	11- How do you classify the quality of service provided with OGI innovation ecosystem (or name of public service delivery) now?	1- Poor 2- Fair 3- Good 4- Very Good 5- Excellent

	10- Comparing the OGI innovation ecosystem with past public service delivery, your feel about OGI is?	1- Much worse 2- Somewhat worse 3- About the same 4- Somewhat better 5- Much better
	11- Why do You feel OGI is better/worse?	Open question.

5.5 Interviews for Transparency Evaluation

This interview will be conducted on users of transparency portals (open data portals, etc.) and potential systems that will be created to delivery service to people, businesses and civil servants. The Table 22 contains questions and the literature source from where questions emerged.

Table 22 - Interview for Transparency Evaluation

Questions for Users	Literature Source
1- Name, role (public sector, citizen, business person, etc.), age and level of education.	-
2- Do you use transparency portal (Pilot OGI toolkit)? Explain your answer.	-
3- Do you think that the simpler is the language used, the more you could use transparency portals?	Mendonça, Jefferson et al. (2007)
4- Do you think that the higher is the quantity of information, the better can be your interpretation or data overload is an issue?	Loiacono, Watson et al. (2002), Mahlke (2002)
5- Do You think that updated information can provide to you better interpretation?	Bharosa, Janssen et al. (2008), ISO/IEC (2010)
6- Do You think data completeness is an important aspect for transparency (Pilot OGI toolkit)?	Janssen, Charalabidis et al. (2012), Peixoto (2013), Matheus and Janssen (2015)
7- Do you think data accuracy can influence on your understanding of data?	Bharosa, Janssen et al. (2008), Janssen, Charalabidis et al. (2012), Matheus, Ribeiro et al. (2012)
8- Do You think that your experience can help your interpretation of data and the website?	Bharosa, Janssen et al. (2008), Janssen, Charalabidis et al. (2012), Matheus, Ribeiro et al. (2012)
9- Do you think that your experience can overcome any problem of accessibility of transparency websites?	Bharosa, Janssen et al. (2008), Janssen, Charalabidis et al. (2012), Matheus, Ribeiro et al. (2012)
10- Do You think that your age can influence on interpretation? Why? Cite reasons.	Bharosa, Janssen et al. (2008), Janssen, Charalabidis et al. (2012), Matheus, Ribeiro et al. (2012)
11- Do You think that your age can influence on accessibility of the website? Why? Cite reasons.	Kuzma (2010)
12- Do You think that your level of education can influence on interpretation? Why? Cite reasons.	Bharosa, Janssen et al. (2008), Janssen, Charalabidis et al. (2012), Matheus, Ribeiro et al. (2012)
13- Do You think that your level of education can influence on accessibility of website? Why? Cite reasons.	Bharosa, Janssen et al. (2008), Janssen, Charalabidis et al. (2012), Matheus, Ribeiro et al. (2012)

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