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SONNETS

***S*Ocietal Needs aNalysis and Emerging Technologies
in the public Sector**

Deliverable D3.3

**Emerging ICTs and Innovation Potential for the
Public Sector – Final Version**

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Definitions, Acronyms and Abbreviations

Acronym	Title
CSR	Corporate Social Responsibility
ICT	Information and Communication Technologies
PS	Public Sector
SEC	SONNETS Experts Committee
WP	Work package

Table 1: Definitions, Acronyms and Abbreviations

Executive Summary

SONNETS project aims to fully exploit the benefits of ICTs to help the public sector meet emerging societal needs. With this objective in mind, SONNETS has designed a methodological framework that will accelerate the modernization of the public sector through the identification and analysis of emerging technologies that hold the potential to transform the public sector into a technology leader and innovation carrier, addressing, at the same time, the most pressing needs of the citizenship.

The “SONNETS Innovation Identification Framework for The Public Sector” consists of seven main steps:

- i) Needs Identification
- ii) Technology Identification
- iii) Technology Pre-selection and Analysis
- iv) Technology Assessment
- v) Innovation Potential Identification
- vi) Scenario Building
- vii) Results Validation

The “Needs Identification” step was conducted in D2.2 while “Technology Identification”, “Technology Pre-selection and Analysis” and “Technology Assessment” steps were analyzed in D3.2. In this document, D3.3, the activities of the last steps of the framework are described, namely “Innovation Potential Identification”, “Scenario Building” and finally, “Results Validation”.

The first part of the document describes the **innovation potential** of the technologies and trends identified in previous steps. For each one, the innovative actions they can bring are described, along with the societal needs that can be met by their application. The innovation potential of these technology solutions is assessed as the resultant of two basic components, namely impact and feasibility. The **Impact** that these technologies generate is analyzed from two different perspectives, for the **public sector modernisation** and for the public sector being an **innovation driver**. On the other hand, the **feasibility** component is evaluated against a number of criteria, such as: the existing ICT infrastructure and know-how, the status of the related legislative framework and regulation, the readiness of the stakeholders, their skills and their financial resources, as well as the maturity of the technology itself.

The assessment of the innovation potential was based on brainstorming activities, but also leverages insights from the materials collected through desk-based research, interviews with IT experts and focus groups/workshops. In fact, the feasibility assessment has not been carried out for all the technologies identified, but for the ones that scored highest in the validation activities (Big Data and Cloud Computing) and for the technologies each country representing the SONNETS consortium considers more relevant for its particular context, according to the interviews conducted.

After the identification of the technologies' innovation potential, the **scenario building** activity sets the scene for the application of the identified technologies and trends, and their respective solutions, into two hypothetical scenarios generated through a crowdsourcing approach that has involved the project partners and the SONNETS Experts Committee: the **probable** Public Sector (a gradually self-improving Public Sector building on the developments of today) and the **desirable** one (a revamped, semi-federated Public Sector, embracing Open Innovation).

Based on the analysis of the technologies and trends, we can conclude that the ones that best contribute towards the conditions of the probable scenario are digitalization, e-participation, open data and data analytics, whereas artificial intelligence, augmented reality or machine learning have proven less relevant. Open government, service personalization, social networking or e-identity, for their part, have resulted being more aligned with the desirable scenario, while gamification, natural language processing or virtual reality are seen to be less preeminent in this case.

Finally, in the last step of the methodological framework, SONNETS pursues the validation of its findings by coupling offline **validation** with online feedback, by means of the organisation of a physical workshop and an online consultation respectively. This step, although being the last one in the framework, has been horizontally performed along some of the previous activities.

Our intention, by means of the framework application, is to highlight the gaps between the identified societal and public sector needs and the identified technological opportunities (part of WP4). In further deliverables, and based on these results, SONNETS will produce a Roadmap that will put forward the different research and innovation directions that should be followed in order to reach the anticipated vision of reshaping and reforming the public sector into a technology leader and a key player in tackling societal challenges.

1 Introduction

1.1 Purpose and Scope

SONNETS is guided by the vision to provide the guidelines and a methodological process that will help to reshape and reform the public sector into a technology leader and innovation breeding carrier, playing a key role in technology development and showcasing. In this respect, the project targets the development of an ever-evolving methodological framework, backed up by an active community, driven forward by renowned experts and interested public sector officials and practitioners, for the rapid porting of emerging technologies into public sector services and into policy domains where innovation co-exists with increased effectiveness and efficiency. Thereby, a key component in the SONNETS work plan is the identification and analysis of emerging technologies and trends and the assessment of their innovation potential for the public sector. At this point, attention is drawn to the fact that in the context of the SONNETS project and the present deliverable, the terms “technologies” and trends refer exclusively to emerging ICTs and ICT trends respectively.

The present deliverable is released within the context of Work Package 3 “Identification of Emerging Technologies and Innovation Identification Framework” and is in particularly associated with Tasks

- T3.2 - “Identification of emerging technologies”
- T3.3 - “Potential applications and services for the public sector”, and
- T3.4 - “WP3 Stakeholder Validation Activities and Workshop”

Among the former, T3.2 deals with the sole identification and analysis of emerging technology trends and ICTs that make a difference today in other domains and sectors and that could potentially be considered for adoption by the public sector as well, whereas T3.3 attempts a more in-depth analysis of the impact, suitability and innovation potential of these technologies and trends for the public sector by means of the application of the SONNETS Innovation Identification Framework (generated through Task 3.1) on the results of Task 3.2 and the insights related to societal challenges and needs, acquired within WP2. T3.4 on the other side concerns the validation of the identified and produced knowledge within WP3 through the organisation of the appropriate activities, i.e. a validation workshop and a public consultation, engaging representatives from all stakeholder groups involved in public sector transformation.

The present deliverable builds upon the work conducted within the frame of D3.2, which documented the outcomes of both T3.2 and T3.3. In this respect, it updates and extends D3.2 contents in the directions foreseen by the SONNETS Innovation Identification Framework, whereas it also documents the results of the T3.4 validation activities. Further to that, it is associated with T3.1 – “SONNETS Innovation Identification Framework Definition” as it provides an updated and validated version of the SONNETS Innovation Identification Framework.

Assuming as well the philosophy of the preceding D3.2 deliverable, the present document acts as well as a handbook providing a structured recording of the identified technologies' and consequently the respective identified solutions' innovation potential. The contents of the deliverable are expected to support the public sector innovate and will be constantly updated during the course of the project though the establishment of an online infrastructure that will host the knowledge produced and will act as a "live" document.

1.2 Approach for the Work Package and Relation to Other Work Packages

Work package 3 concerns, as already explained in Section 1.1, the development of the Innovation Identification Framework, and the identification of emerging technologies. It is a component of the project, active from the start of SONNETS until M12 that enumerates four interdependent tasks and is intended to produce three deliverables, as illustrated in Figure 1.

Task 3.1 was the introductory task to WP3, and specified through deliverable D3.1 the activities to take place during the next tasks of the WP.

Tasks 3.2 and 3.3 have been concerned with the actual identification of emerging technologies and their analysis and impact assessment respectively, with their outcomes being compiled in deliverable D3.2, which has stood as the first version of the list of emerging technologies and applications that could prove useful for the public sector.

Finally, Task 3.4 pursues the validation and updating of these outcomes with the engagement of the targeted stakeholders, the results of this process being reported in deliverable D3.3 (document at hand).

Figure 1 below further illustrates Work Package 3 dependencies to the rest of SONNETS WPs. These include the use of deliverable D3.1, namely the Innovation Identification Framework as the means to couple WP2 and WP3 results both in the context of Task 3.3 on the identification of potential applications and services for the public sector and of their innovation potential for the latter, as well as within the frame of the gap analysis to be conducted in Task 4.2. They further include feeding Task 3.4 outputs, and thereby deliverable D3.3, to WP4 and its first task (Task 4.1) on the analysis of the most promising technologies.

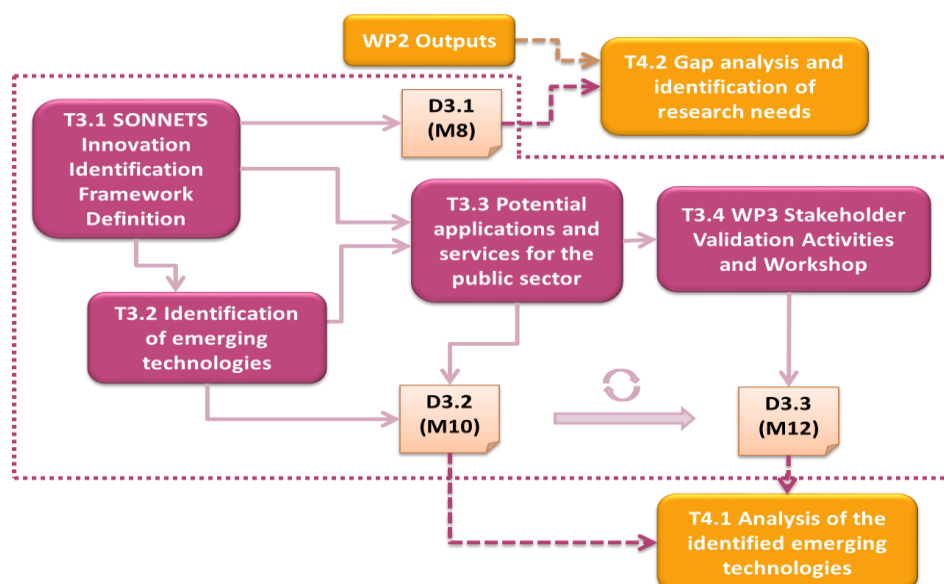


Figure 1: WP3 structure and dependencies with other WPs/tasks

1.3 Structure of the Document

The rest of the document at hand is structured as follows:

- Section 2 exposes the steps and activities performed so far, whereas it also provides the updated and validated SONNETS Innovation Identification Framework.
- Section 3 aggregates the results of the innovation identification analysis, while
- Section 4 places these results in context, through the development and presentation of representative scenarios.
- Section 5 then summarizes the outcomes of the SONNETS WP3 Validation Workshop and the respective ongoing public consultation.
- Finally, Section 6 summarises the contents of the deliverable and reports relevant conclusions.

2 SONNETS Innovation Identification Framework for the Public Sector

This section outlines the methodology employed for compiling the present deliverable, whereas it also places the activities undertaken in the wider context of the application of the SONNETS Innovation Identification Framework. It further provides the revised and updated version of the latter that incorporates any amendments performed during its application within the SONNETS project.

2.1 (D3.3) Methodology and Summary of WP3 Activities

The work presented in this deliverable complies with the guidelines set in the SONNETS Innovation Identification Framework for The Public Sector, originally presented in deliverable D3.1 and updated in this document. The former is an innovative methodological framework that targets to support and accelerate the transformation of the public sector into an innovation breeding carrier. In this respect, it emphasizes the role of Information and Communication Technology (ICT) as a key enabler for innovation and outlines the activities and steps required for coupling emerging ICTs and ICT trends with current societal and public sector needs. The Framework encompasses in particular six logical steps or phases as follows:

- i) the identification of societal needs, societal and public sector trends/challenges (*Needs Identification*)
- ii) the identification of emerging technologies and trends that make a difference today in other sectors (*Technology Identification*)
- iii) the selection of a subset of these technologies and trends, and the analysis of the latter in terms of their key characteristics and specificities (*Technology Selection and Analysis*)
- iv) the assessment of these technologies in the domains originally met and their correlation to the public sector needs and societal challenges on the basis of existing services and applications, as well as new innovation solutions that may benefit from these technologies (*Technology Assessment*)
- v) the evaluation of these services' and solutions' innovation potential in terms of both their impact and feasibility (*Innovation Potential Identification*)
- vi) the selection among the former, of those that make more sense to be ported to the public sector through the development of adequate scenarios (*Scenario Building*)
- vii) the evaluation and ratification of the overall findings (*Results Validation*)



Figure 2: SONNETS Innovation Identification Framework steps addressed by D3.3

The work presented in this deliverable builds upon and extends the findings displayed within D3.2. Provided that the “Needs’ Identification” (step (i)) outcomes were covered in deliverable D2.1 and D2.2, the latter summarized the outcomes of steps (ii) to (iv) of the Framework, namely those of the “Technology Identification”, “Technology Pre-selection and Analysis” and “Technology Assessment” activities. The present deliverable focuses on the rest of the activities foreseen by the SONNETS Innovation Identification Framework, namely the steps of “Innovation Potential Identification”, “Scenario Building” and “Results Validation”.

From a methodological point of view, “Innovation Potential Identification” (step (v)) took place by means of carefully analysing and reflecting on the SWOT analysis and the draft list of potential innovation solutions, generated through the “Technology Assessment” phase, as well as on the more generic materials collected through the activities of desk-based research, interviews with IT experts and focus groups/workshops. This process targeted to map the exploitation potential of the identified solutions, and thereby the respective technology against a number of innovation dimensions, related to both the public sector and the rest of policy domains, and resulted in the generation of a number of innovation potential records. The latter are presented in Section 3 of the present deliverable.

Scenario Building on the other hand, involved extensive brainstorming and discussions among the members of the consortium concerning both the directions against which the future of the public sector should be visualised and described, as well as the mapping of the identified technologies against the former directions, and consequently the selection of the technologies and trends that make sense to be ported into the public sector practices, based on the most desired but also most probable future scenario. The generated public sector future scenarios make up the content of Section 4 of this document.

Finally, the “Validation” process was carried out by means of both offline and online validation activities. More specifically, the consortium organised a validation workshop, which took place in The Cube, Athens, on 10th February 2017. The workshop, scheduled as a half-day session, aimed at presenting and validating both the SONNETS Innovation Identification Framework for the Public Sector, as well as the outcomes of its application in the context of the project. On the other side, the consortium is currently conducting an online consultation on the results of WP3, which will provide the necessary feedback to revise the current deliverable during the next months. This update will be provided through the project’s portal, where the most important assets produced by WP3 (e.g. the SONNETS Innovation Identification Framework, as well as the “taxonomy” of technologies and their assessment) will be posted and become open for revision and improvements by all interested stakeholders. The outcomes of the validation activities are discussed in the context of Section 5 of the present document.

The cumulative outcomes of the SONNETS Innovation Identification Framework application and the materials produced are intended to support the design and development of the SONNETS Roadmap for emerging research directions.

2.2 The Revised Framework

The SONNETS Innovation Identification Framework encompasses, as already mentioned in the previous paragraph six logical steps or phases. These steps are analysed in the following paragraphs.

2.2.1 Needs Identification

The identification of existing pressing or emerging societal needs, challenges and trends is a key component and prerequisite for delivering innovations that hold true value for the society; thereby, it constitutes the first step and starting point of the SONNETS Innovation Identification Framework Methodology. The latter targets more specifically to identify societal challenges and public sector needs and can be based, given the abstract and wide scope of the subject under study, on qualitative research: the latter should incorporate both a systematic literature review approach, taking into account all relevant research and scientific papers, policy documents, white papers and European Union reports, industry reports, as well as interviews and focus groups with representatives of the stakeholder groups (e.g. citizens, businesses, public sector officials and employees), the needs and requirements of which are to be determined.

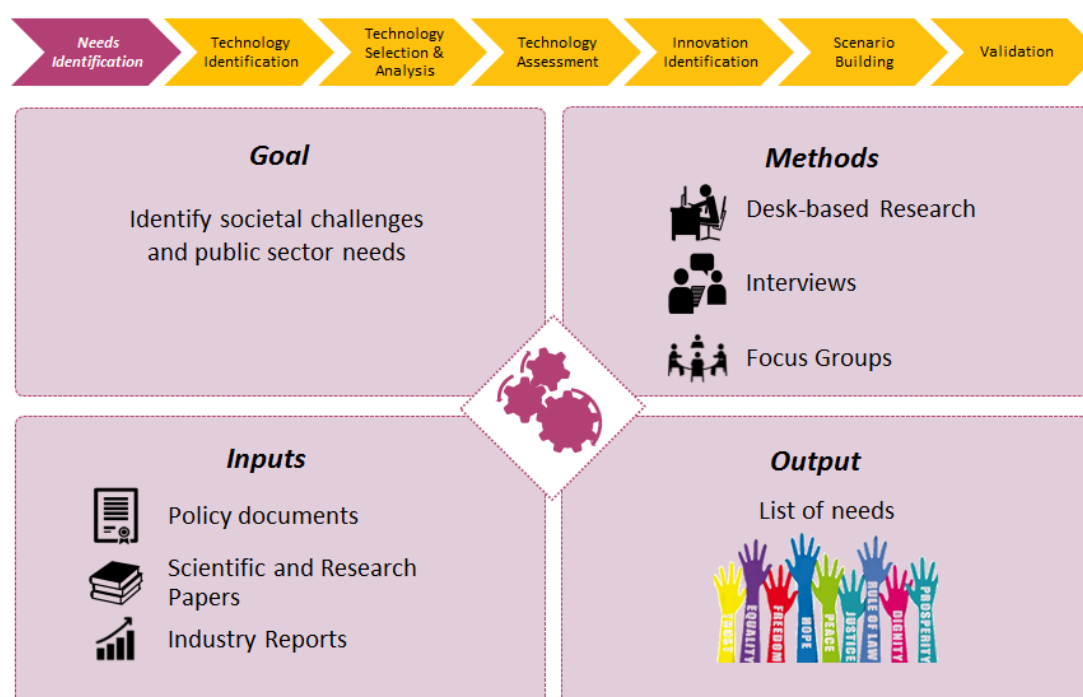


Figure 3: Needs Identification phase

These methods are intended to serve as the means to collect but also analyse, prioritize and validate targeted stakeholder needs, and thus generate a list of needs, that can be leveraged in the subsequent steps of the methodology to propose relevant innovation solutions and guide the selection of technologies. Provided that the SONNETS Innovation Framework aims at supporting ICT-driven innovation, attention is drawn to the fact that the latter pertain solely to the ICT domain; therefore the list of needs to be compiled is also to be restricted to needs that can be addressed through the adoption and use of ICT.

2.2.2 Technology Identification

The next step of the SONNETS Innovation Identification Framework Methodology is that of technology identification. This step pertains purely to the conduction of information collection activities, and thereby its nature is a preparatory one, whereas its goal is to provide a pool of emerging technologies and trends that make a difference today in other sectors.

From a methodological point of view, this step relies mainly on extensive desk-based research, and the examination thereby of a variety of information sources, including European Commission resources, research project documents and roadmaps, studies from consultancy firms and online tools, whereas it also encompasses the conduction of interviews with IT experts from the public sector and the business and research communities.

The output of this step, and thus of the aforementioned methods is a preliminary, list of technologies and technological trends, being referred to hereinafter as *SONNETS long list of technologies*, that is to be reviewed and refined during the subsequent steps of the methodology.

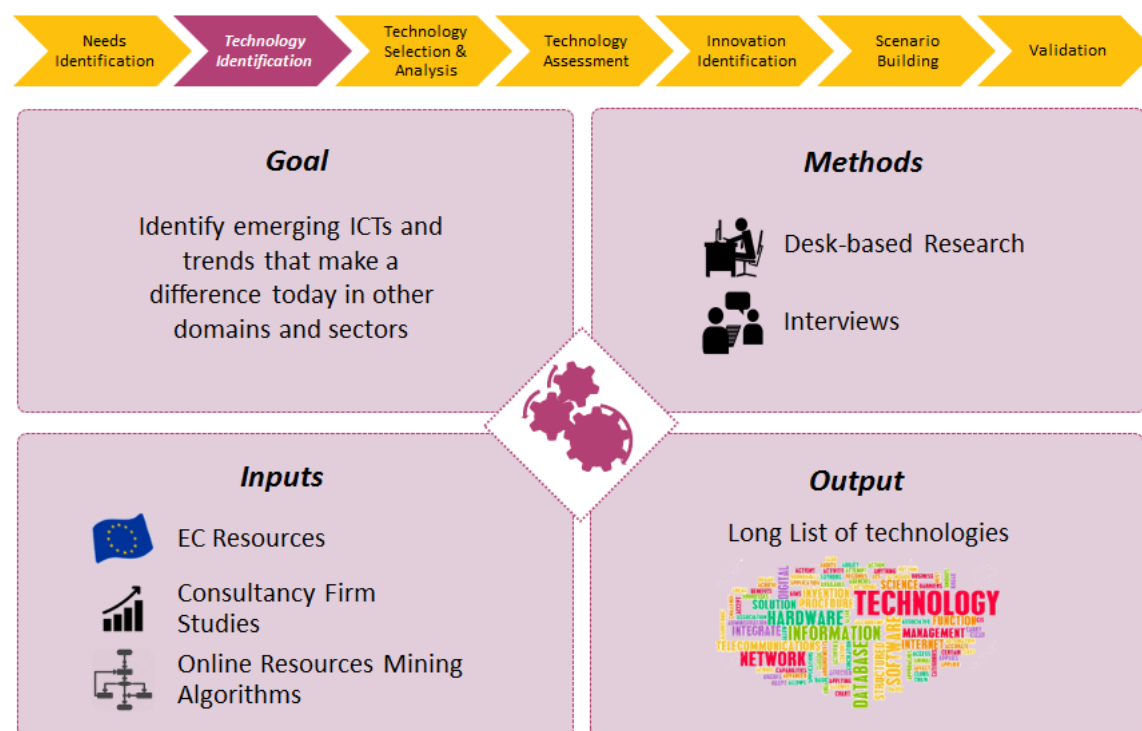


Figure 4: Technology Identification phase

2.2.3 Technology Selection and Analysis

The preliminary long list of technologies, generated in the technology identification phase, feeds into the next step of the framework methodology, entitled as technology selection and analysis. This step targets to refine the initial list of technologies and trends, based on their relevance for the public sector, and thereby their potential adequacy to fulfil the identified societal and public sector needs, and to go a little deeper with regard to the selected items, and therefore record basic information on them, in order to create a deeper understanding of

their characteristics and specificities. Such information needs to include a number of aspects as follows:

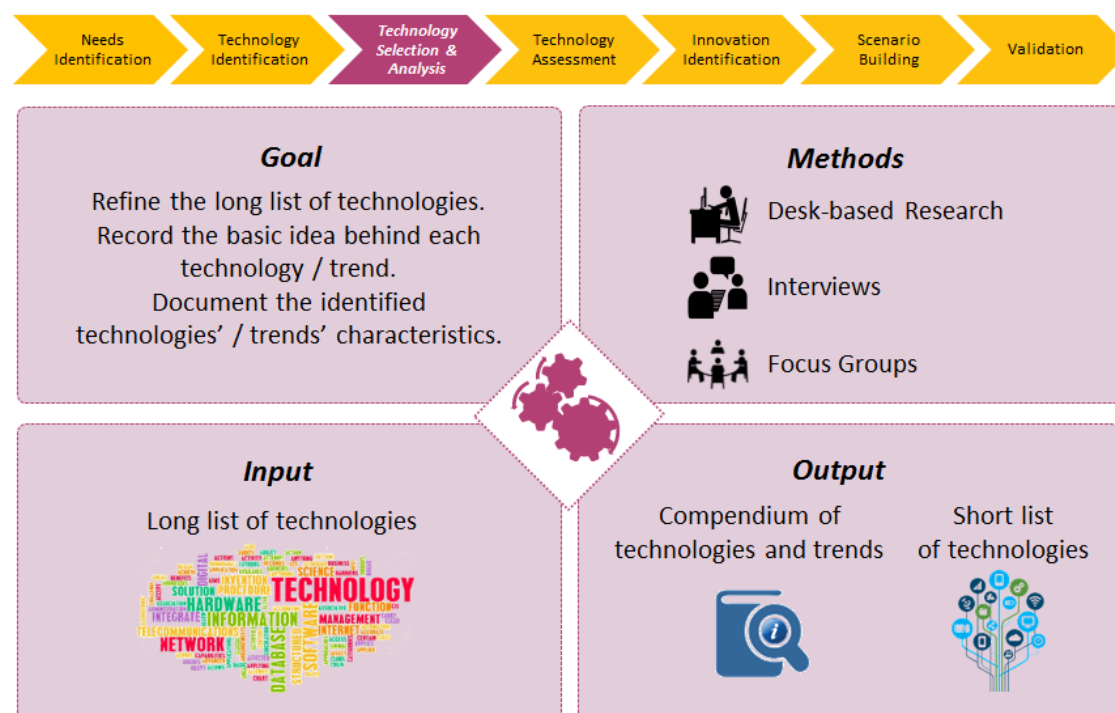


Figure 5: Technology Selection & Analysis phase

- Identifier: a unique identifier that determines the particular technology (TE#x) or technological trend (TT#x) addressed.
- Type: an indication of whether a technology or trend is a self-standing one or has resulted from the technological convergence of other fields and which these fields are.
- Description: a brief description of the scope, aims and usage of the technology / trend addressed.
- Mainstream Domains of Application: the application domains, in which a technology / trend is basically met.
- Related Market Potential / Forecasted Growth: quantitative (statistic) or qualitative information on the anticipated growth and spread of the technology / trend addressed or the potential and growth of the related market.
- Related Terms: a list of similar terms used to describe the particular technology / trend or to denote specific aspects of it, and that can be employed to collect further information.
- Source(s): a reference to the source(s) drawing attention to or pointing out the particular technology / trend as an important one for the years to come.

The methods employed in the technology selection and analysis phase include the conduction of desk-based research and interviews, as well as the organisation of focus groups, whereas its outcomes can be summarised in the compilation of a refined list of technologies and trends, hereinafter being referred to as SONNETS short list of technologies and a compendium of emerging technologies and trends, incorporating basic but quite enlightening information on the identified technologies and trends for future reference.

2.2.4 Technology Assessment

The fourth step of the SONNETS Innovation Identification Methodology maps to technology assessment. This step is intended to dive even deeper with regard to the analysis of the identified technologies and trends, targeting on the one side to assess the impact of the identified technologies and trends in the domains originally met, and to draw conclusions, on the other, with regard to their relevance for the public sector and the different policy domains. Technology assessment is intended more specifically to include a number of aspects as follows:

- Identifier: a unique identifier that determines the particular technology or technological trend addressed (same as in the technology analysis phase).
- SWOT Analysis: An adapted SWOT analysis, that will use the “Strengths” and “Weaknesses” components of the SWOT matrix to identify the impact, namely the benefits and weak points, of each identified technology / trend in the domain originally met, and the “Opportunities” and “Threats” blocks to draw high level correlations among the considered technologies and trends and the opportunities of their adoption, usage and promotion by the public sector as well as the imposed challenges and threats.
- Relevant Needs: a list of the societal needs that may be associated with the particular technology or trend.
- Potential Applications / Services: a list of existing or new services that may materialise the envisaged innovations.
- Existing solutions / products / services: a list of established solutions or best practices based on the specific technology or trend.

Based on the former aspects, the relevance of the identified technologies and trends to the public sector and other policy domains will take place along three levels, these of the SWOT analysis identifying opportunities and threats, the correlation with specific needs and the identification of existing or new services.

Apparently, this phase is meant to use as input both the long list and compendium of technologies as well as the confirmed and validated set of societal and public sector needs, whereas it will employ the same arsenal of methods, namely desk-based research, interviews and focus groups. On the other hand, as an outcome, it will deliver the technology SWOT analysis and a draft, preliminary list of potential innovation solutions.

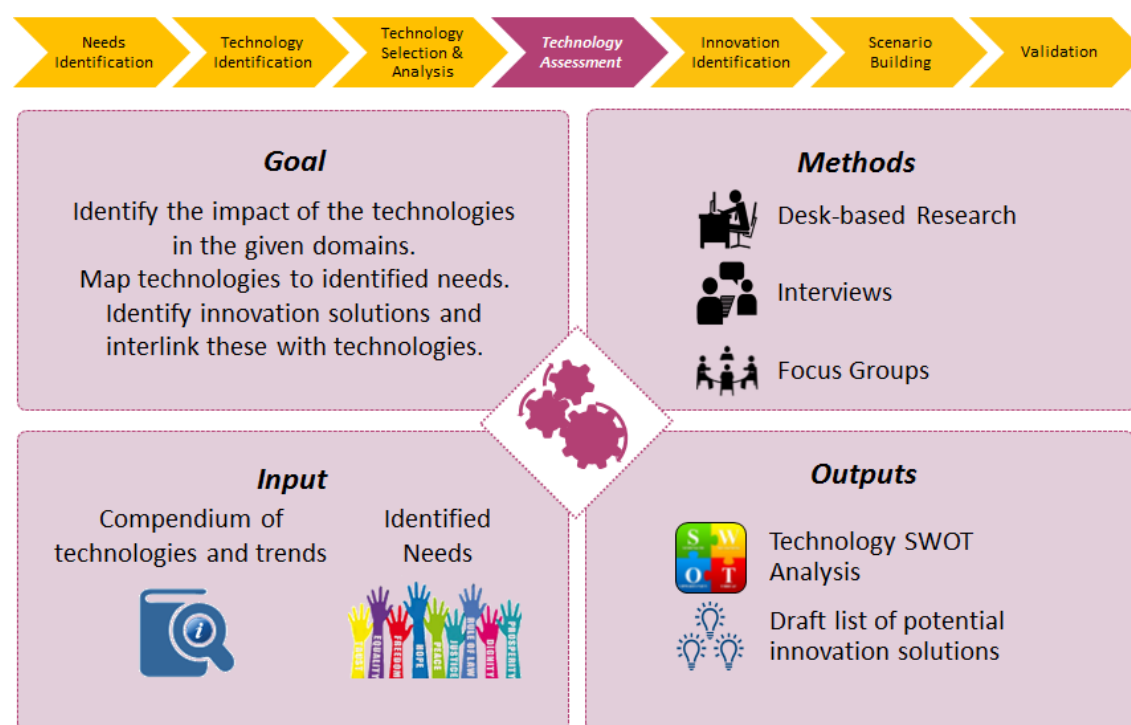


Figure 6: Technology Assessment phase

2.2.5 Innovation Identification

The fifth step of the Framework Methodology pertains to technology identification and constitutes a key task in the process of transforming the public sector into an innovation breeding carrier. The focus during this step transposes from the level of technologies to the level of the innovation solutions identified and the goal is to come up with a systematic way to record and assess the innovation potential of these solutions. The latter has to be evaluated in particular against the dimensions of both the impact and feasibility of the identified solutions, thus calling for the determination and consideration of appropriate assessment criteria. As far as the impact assessment component is concerned, such criteria need to capture the potential scope of application, the type and quality of influence of the identified solutions and technologies against a number of innovation dimensions, related to the public sector and other policy domains, whereas on the side of the feasibility assessment component, such criteria have to take into account aspects, such as the existing ICT infrastructure and know-how, the status of the related legislative framework and regulation, the readiness of the stakeholders involved, as well as the political will demonstrated in the specific application context.

The innovation identification step employs as well the methods of interviews and focus groups primarily and desk-based research secondarily in order to collect and analyse information on the innovation potential of the identified solutions, while as an output it produces a *set of appropriate records*.

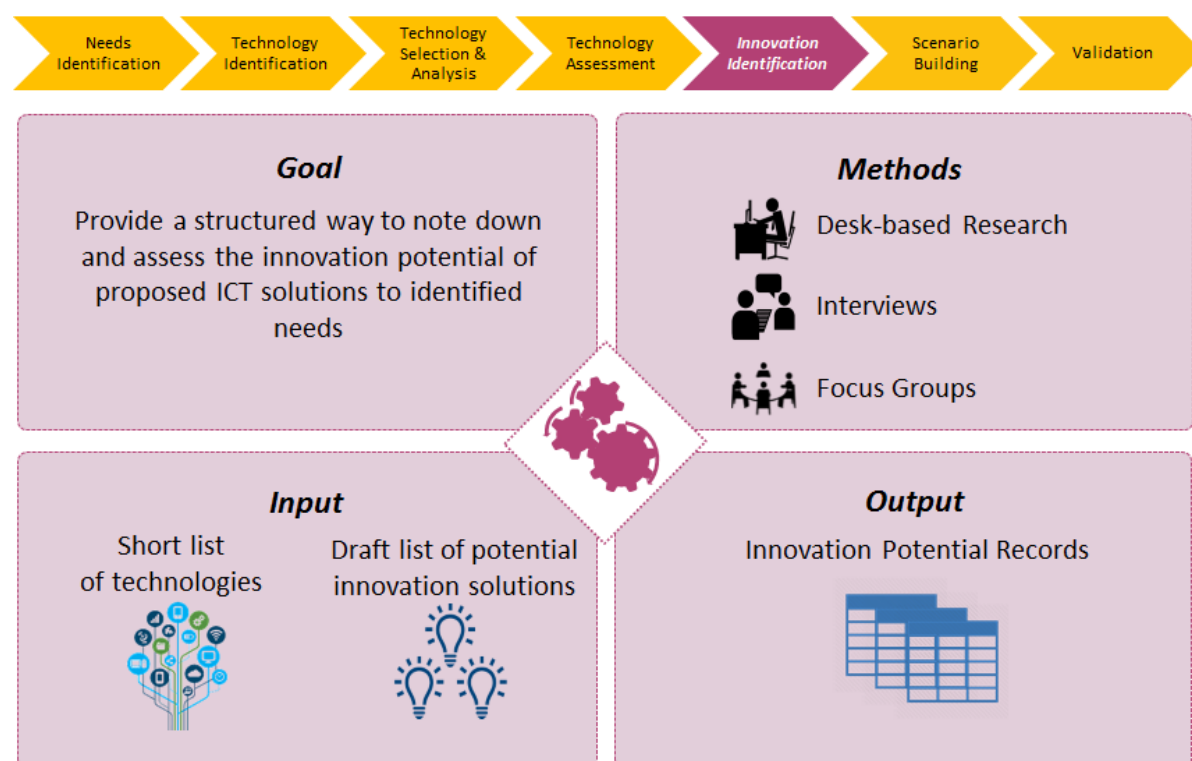


Figure 7: Innovation Identification phase

2.2.6 Scenario Building

A scenario is to be intended as a systematic vision of future possibilities¹. Conducting such a foresight research usually means both plausible possibilities as well as others that do not rely on too extreme wild cards. They are used as tools for political or strategic decision-making and to explore the impact of particular decisions or developments in the future². More specifically, Scenario Building aims to identify uncertain developments in the future and take those uncertainties as elements of the scenario narrative.

This step is anticipated to use as input the previously generated innovation potential records and to leverage brainstorming techniques in order to develop scenarios on the future of the public sector. The selection of the solutions and therefore the technologies that the public sector needs to adopt can then be based on the specification of the most desired and most probable public sector future scenarios.

¹ Janssen, M., Duin, P. van der, Wagenaar, R., Blicking, M., Wimmer, M. (2007) Scenario building for e-government in 2020, ACM Proceedings of the 8th annual international conference on Digital government research: bridging disciplines & domains, pp 296 – 297

² Nekkers, J. (2007) Wijzer in de toekomst: werken met toekomstscenario's. Business Contact.

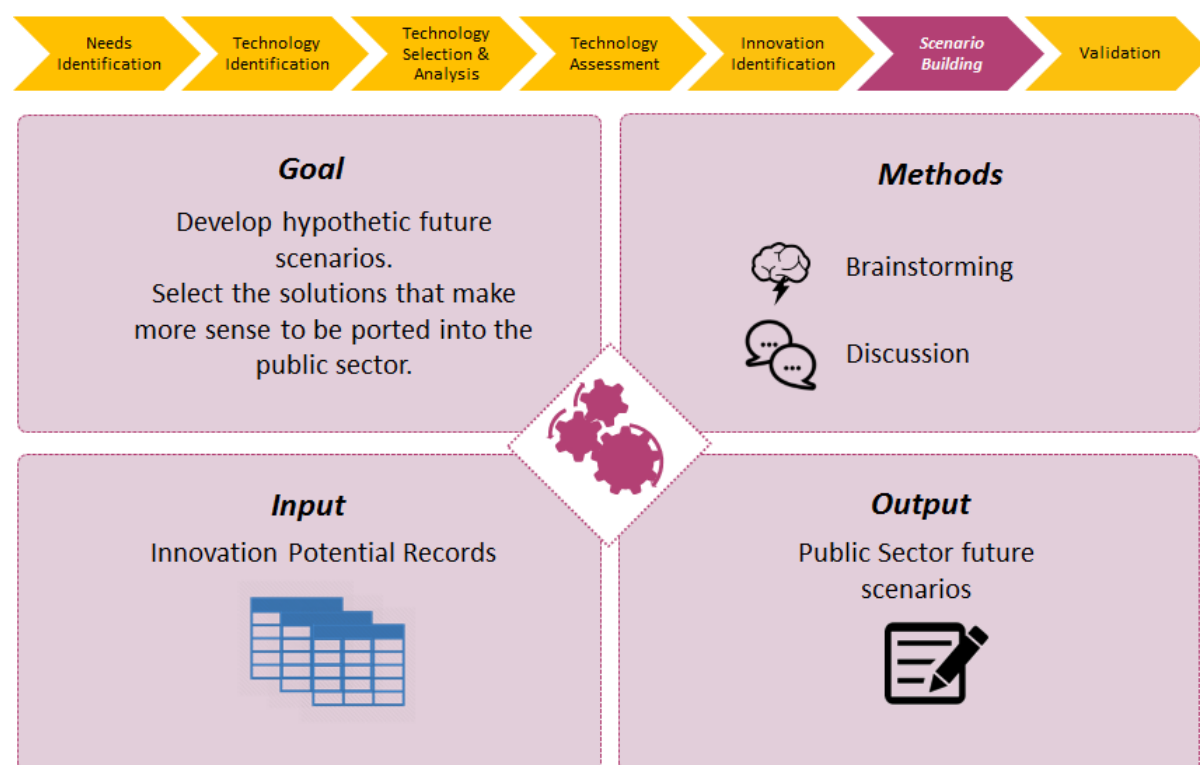


Figure 8: Scenario Building phase

Regarding the conceptual framework that aims to formulate the visionary scenario exercise, it has to be noted that foresight research comprises many different methods that can be categorised in several ways. According to the classification introduced by Popper³, one may distinguish between a methods' orientation (normative or exploratory), its nature (quantitative or qualitative) and its essence (expert-based, creativity-based, interaction-based or evidence-based) as shown in the following figure.

³ Popper, R. (2008) Foresight methodology. In Eds Georghiou, L, Cassingena, J., Keenan, M., Miles, I., Popper, R. The handbook of technology foresight. Edward Elgar Publishing

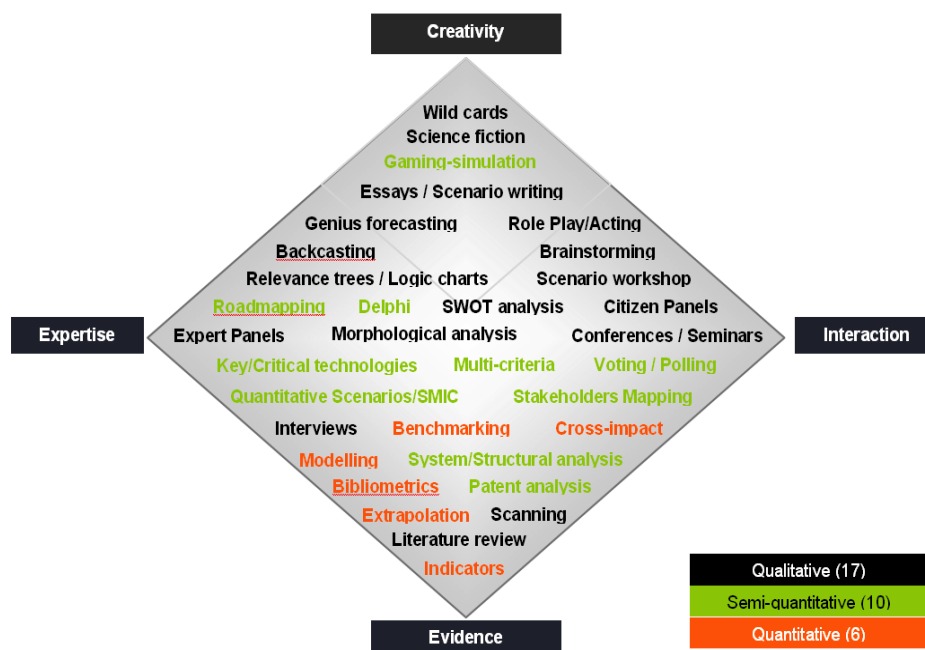


Figure 9: Foresight methods classified by their essence (source: Popper, 2008)

In general, the objectives of a foresight exercise and the degree of uncertainty and complexity involved, are the ones that usually guide the selection of methods for each exercise.

In the context of SONNETS, the aim of the scenario building activities is to explore different possible alternative futures regarding the role of the Public Sector in relation to Innovation and Societal Challenges tackling.

For the given topic, both the selected time horizon of this exercise and the interrelationships of different developments affecting it (like rapid ICT developments) make the future quite dynamic, complex and uncertain, with little available evidence that can be used to predict or forecast those futures. Given this lack of evidence and data, it is impossible to use quantitative and evidence-based methods. Courtney et al⁴ describe this amount and type of uncertainty as a 'level 3', at which a range of different possible futures can be identified, and point 3 types of foresight methods able to accommodate this level: scenario drafting, back casting and early warnings systems. As the latter two approaches are often incorporated into scenario drafting, the method of scenario design is being suggested for the SONNETS framework⁵.

The overall working method takes inspiration and is founded on past scenario building exercises of similar context, which were performed in the past in EC

⁴ Courtney, H., Kirkland, J., and Viguerie, P. (1997) Strategy under uncertainty, Harvard Business Review, 67–79.

⁵ Scenario writing is a method that is commonly used in research regarding public services and eGovernment (Duin, van der & Huijboom, 2008; Janssen et. al., 2007; Aicholzer, 2005)

cofounded projects such as FutureEnterprise⁶ and CROSSROAD⁷, and the overall methodological approach, that is presented in Figure 10: Extreme Points in a 3D Scenario Space, is as follows:

1. Analysis of the technologies and trends documented in the previous steps of the framework for determining the developments that can be considered key drivers for the future.
2. Selection of main Key Uncertainties whose realisation will drive the Public Sector to different futures.
3. Conduction of an open crowdsourcing exercise to get feedback regarding the Key Uncertainties with a view on what is probable to happen and on what is desirable to happen.
4. Elaboration of the different factors and of the role of the Public Sector in those scenarios through a dedicated brainstorming session.
5. Drafting the scenarios based on the results acquired from the previous step which denoted the different socioeconomic factors and business related aspects of the future.

Scenario building exercises focus in most of the cases on identifying extreme futures based on a limited set of uncertainty factors. Those are being documented in most of the cases as combinations of different Key Uncertainties, usually into groups of 2 (or in some rare case 3)) which can be graphically represented as vertical axes constructing a two-dimensional area (or a cube, forming a 3-dimensional space in the case of 3 Key Uncertainties).

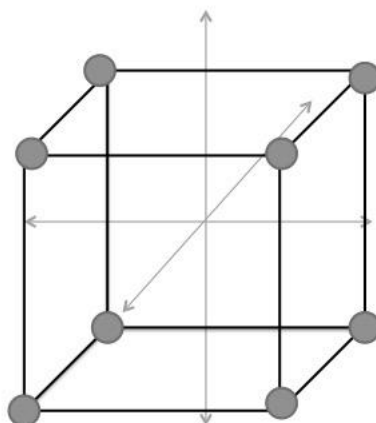


Figure 10: Extreme Points in a 3D Scenario Space

As such, scenario-building exercises aim to describe extreme future situations that may become a reality if the world follows the path towards these endpoints. The different extreme Scenarios are set on the edges of the defined space and they describe the conditions that will dominate in such a future (on each of the Key Uncertainties identified above).

Even though this approach is used extensively in various roadmapping exercises (of which the scenario building constitutes an interim step), there are two major

⁶ FutureEnterprise - Road mapping, Research Coordination and Policy activities supporting Future Internet-based Enterprise Innovation - http://cordis.europa.eu/project/rcn/110910_en.html

⁷ CROSSROAD - A Participative Roadmap for ICT Research in Electronic Governance and Policy Modelling - http://cordis.europa.eu/project/rcn/93842_en.html

weaknesses that have been criticised in the past that have to do a) with the number of key uncertainties as most exercises tend to overdo it, and b) with the overall approach of investigating these scenarios.

With regard to point a), the projects suggest to select various combinations of 2 or at maximum 3 uncertainties, both for reasons of processing, but also for reasons of comprehension, as more than 3 axes are very difficult to be displayed, processed and easily communicated to stakeholders. Such a proposal, is not only limiting the degree of complexity, but also the possibilities to generate unrealistic scenarios (which come as combination of extremes of different axes).

Furthermore, regarding point b), it is noted that the investigation of the extreme points does not offer the expected added value needed to carry on with the definition of the actions required to move forwards, as such extreme situations are highly unrealistic (or too futuristic) and have a relatively low realisation probability. Thus, describing such scenarios does not evidently lead to a set of gaps (which are then transformed into action lines in a roadmap) that stand between the as-is and the to-be situation. This is simply because the unanimously desirable future scenario is not placed on the table, due to the binary logic of these frameworks which focus only on extreme future situations.

SONNETS tries to differentiate itself from this complex approach by adopting a method that is able to take into consideration different Key Uncertainties and then limit down the analysis to the most realistic scenarios. As such, the methodology sequentially tries to investigate the different Probable and Desirable scenarios (coming through a crowdsourced exercise, and therefore not being polarised by experts' opinions). As such, not every possible combination of the selected Key Uncertainties is examined (as this would generate a huge number of scenarios) but focus is placed on what is most likely to happen (Probable Scenarios), and on what seems like an ideal future (Desirable Scenario).

Investigating those different sets (see Figure 11), helps to formulate more realistic propositions towards the domain's stakeholders. These will not only uncover future opportunities, but showcase also potential actions that need to be performed to cater for sustainable investments, identifying the shifts that will most likely (need to) happen in the quest of the world becoming a place which is more productive, sustainable and nice to live and work in. In this context, once these scenarios are defined, attention should be turned into the necessary actions that will bring the probable future as close as possible to the desirable one.

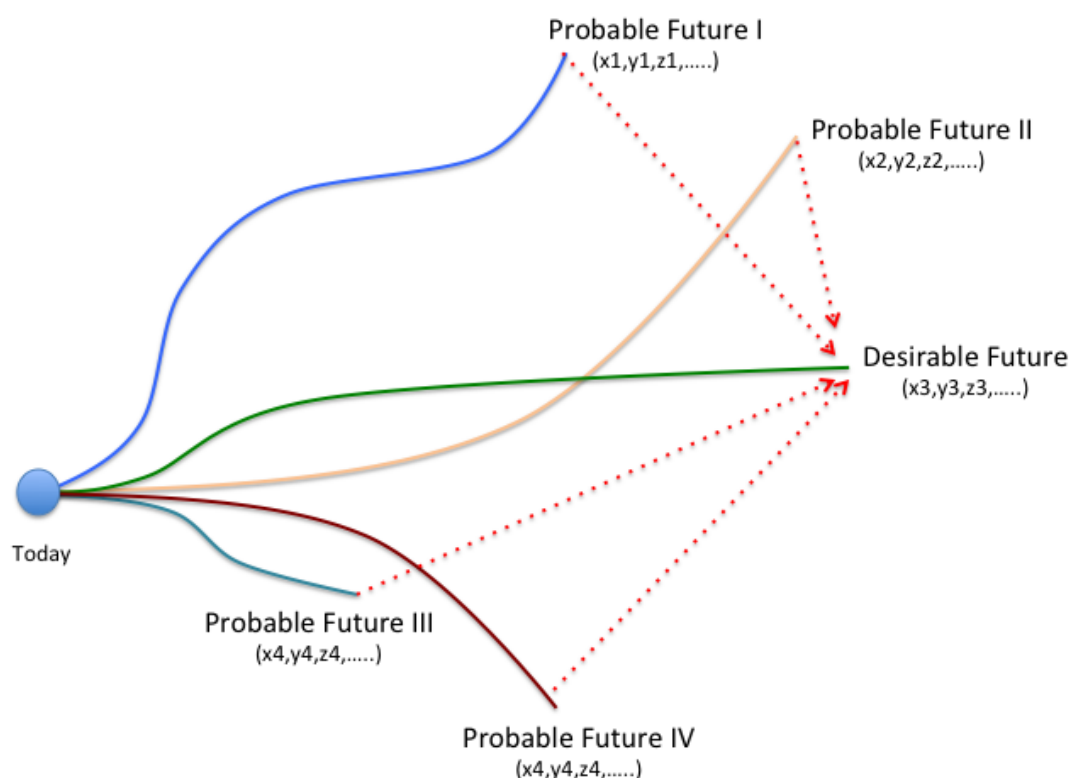


Figure 11: Probable Futures and the Desirable one

With regards to the SONNETS Innovation Identification Framework, four Key Uncertainties are proposed, which have been selected for building the different scenarios. These Key Uncertainties do not claim to cover the entire landscape of the future regarding the role of the Public Sector inside an ICT-powered society, but can be taken as a core material to base the main assumption of the different scenarios. As such, they can be complemented with other Key Uncertainties, replaced or disregarded, depending on the context of each application of the framework.

Public Sector Role	Urgency of Societal Needs	Degree of Power Concentration	Operations & Decision Making
Innovation Leader	Prosperity	Centralised Governance	Machine Intelligence
Open Innovation Evangelist	Stability	Hybrid Decision Structures	Knowledge based
Innovation Facilitator	Scarcity	Federated Decision Systems	Crowd Wisdom

Table 2: SONNETS Scenarios Key Uncertainties and Possible Values

The following lines presents very briefly the conditions that correspond to each value of the key uncertainties presented above.

- **Key Uncertainty I – Public Sector Role**

- Innovation Leader. The Public sector is fully modernized, assets are generally openly exposed, PPPs with third party stakeholders are established, big governmental labs push technology, selected population groups are testing novel techs and innovations, intense collaboration with industry, startups and entrepreneurs is taking place.
- Open Innovation Evangelist. There is a highly modernised Public Sector, novel technologies are adopted soon after they go mainstream, selected assets are openly provided to the public, close collaboration with industry and few enterprises takes place.
- Innovation Facilitator. Public sector is still a technology laggard, innovations are adopted after widespread adoption and there is a high demand pressure from the public.

- **Key Uncertainty II – Urgency of Societal Needs**

- Prosperity. Most Needs solved, Fast growth, Natural & human resources in abundance, high average per capita income, fair distribution of wealth, high life expectancy, highly educated societies, long peace.
- Stability. A 2-speed world with economic, socio-political and environmental sustainability, mix of social classes, average income distribution, micro-conflicts.
- Scarcity. Societal Needs are still not tackled, shortage of resources, high levels of inequality in income, education and health, polarised social classes, frequent signs of upheaval (riots, medium to high-intensity conflicts).

- **Key Uncertainty III - Degree of Power Concentration**

- Centralised Governance. Decisions are taken centrally, and management is performed centrally too, leaving no flexibility to grassroots movements and individual innovation.
- Hybrid Decision Structures. Collaboration between central and federated decision makers, knowhow transfer, leaving central and more strategic decisions to central authorities and implementation to smaller scale organisations, better openness.
- Federated Decision Systems. Local decisions, smaller scale impact, less openness, competition between federations, innovation silos.

- **Key Uncertainty IV - Operations & Decision Making**

- Machine Intelligence. Management, operational processes, supporting activities & external communication are based exclusively on machines (Artificial Intelligence and Automation).
- Knowledge based. Machine-intensive operational and supporting processes, controlled and managed by human intelligence.
- Crowd Wisdom. Decisions are taken through crowdsourcing and collaboration of community members, tradition plays an important role into making choices, and technology performs only transactional and heavy-duty operations.

2.2.7 Validation

The refined list of innovation solutions and respective technologies, as reflected through the appropriate developed scenarios will eventually provide input for the last step of the framework methodology, targeting the validation of the overall findings. The latter is intended to place these findings under evaluation in order to gather feedback, revise and validate the results. Evaluation and validation in this context are to be performed through specialized workshops, engaging representatives of public authorities, civil society organizations, research institutes and companies, and online public consultations, engaging the general public.

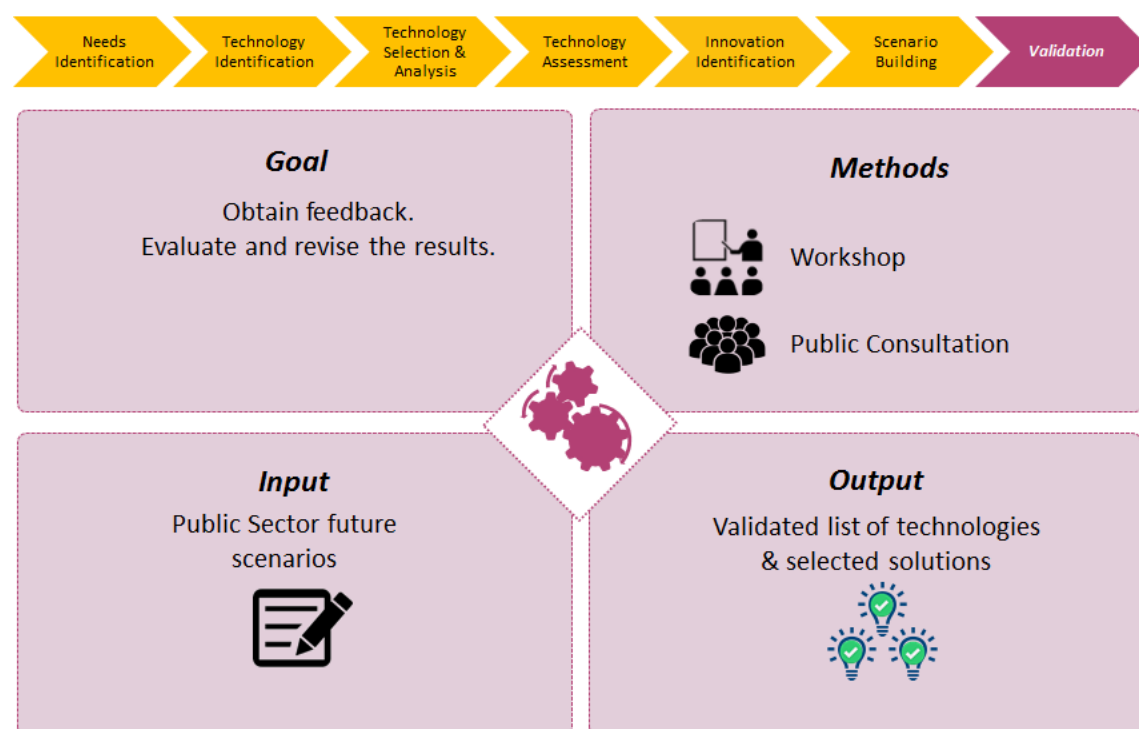


Figure 12: Validation phase

3 Innovation Potential Identification

This section presents the results of the analysis performed in the context of step iv (“Innovation Potential Identification”) of the SONNETS Innovation Identification Framework. The latter aims at supporting the transformation of the public sector into an innovation breeding carrier, by providing a structured and systematic way of recording and assessing the innovation potential of the identified technologies and trends, having in mind the specific applications and services that have been identified during the previous step of “Technology Impact Assessment”. In this respect, the innovation potential of the identified technologies and trends accrues as the resultant of two basic components, namely the impact and feasibility of the identified technology solutions. The latter are qualitatively assessed against a number of appropriate impact and feasibility assessment dimensions, which are detailed in the following section. The assessment performed is basically based on the consideration and assessment of the materials produced during the previous step of the Framework, namely the SWOT analysis and list of potential innovation solutions, whereas it also leverages insights from the materials collected through all desk-based research, interviews with IT experts and focus groups/workshops. The outcome of this step makes up a set of “innovation records”, appropriate for future reference.

3.1 Components of Innovation Identification & Dimensions of Analysis

The innovation potential of the identified technologies and trends accrues, as already explained, as the resultant of two basic components, i.e. the impact and feasibility of the identified technology solutions. Each of these components is qualitatively evaluated against a number of criteria as follows.

Component I - Impact Assessment

As far as the impact component is concerned, a number of vertical dimensions are recognised. These pertain in the case of public sector modernization to the institutional or capacity development and political domains (see Figure 13. “Public Sector Modernization” Impact Assessment Areas), whereas as far as the goal of transforming the public sector into an innovation driver is concerned, these enumerate key policy domains, i.e. the economic, social, infrastructural/transport and environmental domains (as shown in Figure 14. “Public Sector as an Innovation Driver” Impact Assessment Areas). Each of these domains is further being analysed accordingly in a number of lesser aspects, which map to the specific directions where the impact of the identified ICT solutions can be located. The selection of these aspects is justified in the following paragraphs.

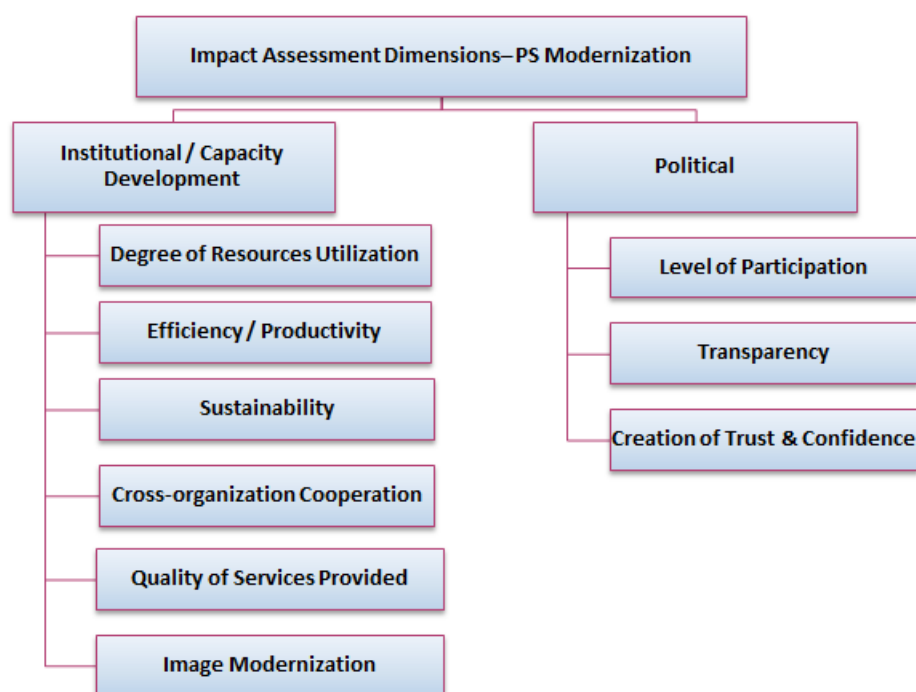


Figure 13. “Public Sector Modernization” Impact Assessment Areas

(I) PS Modernization

➤ Institutional/ Capacity Development

- Degree of Resources (Capital, Personnel, Infrastructure) Utilization: ICTs can be used to reduce or optimize the use of another resource by a process. Such resource may be labour, capital or a natural resource (e.g. energy), i.e. some material resource. Thereby, the use of ICTs in the public sector to improve the former’s operation and processes, and in this respect ICT-driven process optimization, can be seen as substituting technological knowhow (immaterial resource) and/or infrastructure (material resource) for other material resources, thus reducing the amount of resources required and/or intensifying their use.
- Efficiency / Productivity: ICTs play indisputably a major role in the improvement of public sector efficiency and productivity, as they are qualified as general purpose technologies, i.e. technologies that are pervasive and can thus be applied to several production sectors⁸. As a result, their impact on the former dimensions has to be taken into account, though it may be difficult to be determined, due to the nature of the public sector operation, which is process-based, the nature of the outcomes produced (services, intangibles, often unpriced or collectively consumed), their heterogeneity, as well as due to

⁸ Federico Biagi (2013). ICT and Productivity: A Review of the Literature – JRC Technical Reports. Available from <http://ftp.jrc.es/EURdoc/JRC84470.pdf>

the multiple levels of focus (e.g. government wide level, sectoral level, individual organization level) to be potentially considered.

- Sustainability: Sustainability is a direct outcome of the operation of the public sector in a way that guarantees proper fulfilment of both present and future needs. As such it is indirectly influenced by the introduction and usage of modern ICTs in view of achieving efficiency and productivity gains, ensuring optimization of the resources available and providing high quality services, as well as by the necessary provisions for their maintenance and updating.
- Cross-organization Cooperation: The purpose of implementing e-Governance (which stands for the application of ICTs in government processes), is to improve governance processes and outcomes with the view to improving the delivery of public services. Thereby, the quality of services offered to citizens and businesses is an important dimension of the technology impact assessment analysis. Improvements in the quality of public services as a result of the introduction of ICTs may take several forms, including the reduction of personal interface of citizens and businesses with public service providers or the increase in the speed of response, and the generation thus of time savings, the reduction of bureaucratic red tape and the corresponding simplification of relevant processes, the increase in the availability of public services, as well as their delivery through additional channels.
- Quality of Services Provided: In order to be effective and efficient but also to deliver citizens and businesses quality public services, public sector authorities cannot operate today isolated but need to establish cooperation among each other. ICT is a necessary condition for such cooperation, which concerns both the different levels of public administration, e.g. local, regional, national etc. as well as diverse policy domains of the same administrative level. Such cooperation further applies at the European level with the view of providing cross-border public services, supporting the rights of citizens to live and work anywhere in the Union and of businesses to offer services across the EU single market.
- Image Modernization: The image and public standing of an organization plays inevitably a major role in target audience preferences and thereby in the outcomes of the technology impact assessment analysis. Attention has to be drawn to the fact that the image of an institution is a rather elusive topic, as there is virtually no comparative research as to the level of the institution's public standing. On the other hand, the institutional quality control processes differ immensely across public sector organizations and offer no guarantee of raising public standing.

As this is nevertheless a vital aspect of institutional development, it has to be considered as a facet of impact assessment.

➤ Political

- Level of Participation: Information and communication technologies can facilitate democratic processes and increase the participation of citizens in these. Such impacts may occur as a result of greater communication and information dissemination offered by ICTs, through the use of social networking sites, e-mail and mobile phones. They are also frequently enabled by electronic information and services offered by government (e-government). Of particular interest is additionally how e-government can improve democratic processes and encourage citizen participation in decision-making and how e-participation in specific can change the dynamics between government and citizens⁹.
- Transparency: ICT constitutes the main lever of e-government, which contributes in turn to enhancing accountability and promoting good governance in the public sector, which are thus taken as an assessment dimension under the aspect of Transparency.
- Creation of Trust & Confidence: Trust is a complex interpersonal and organizational construct¹⁰. In political terms, trust means that citizens appraise the government and its institutions, policy-making in general and/or the individual political leaders as promise-keeping, efficient, fair and honest¹¹. Political trust, in other words, is the "judgment of the citizenry that the system and the political incumbents are responsive, and will do what is right even in the absence of constant scrutiny"¹². Citizens' trust and confidence in government is influenced by several factors, including citizens' satisfaction and expectations, transparency, accountability, digital transformation of government and performance of the government¹³, all either directly or indirectly affected notably by the introduction and usage of ICTs.

⁹ UNCTAD (2011). Measuring the Impacts of Information and Communication Technology for Development. UNCTAD Current Studies on Science, Technology and Innovation. N ° 3 Available from http://unctad.org/en/Docs/dt1stict2011d1_en.pdf

¹⁰ Duck, S. The Handbook of Personal Relationships: Theory, Research and Interventions. New York: Wiley, 1997.

¹¹ Blind, P.K. (2006). Building Trust in Government in the twenty-first century: Review of Literature and Emerging Issues, UNDESA.

¹² Miller, A. H. and O. Listhaug. "Political Parties and Confidence in Government: A Comparison of Norway, Sweden and the United States," British Journal of Political Science 20, 3 (July 1990): 357-386.

¹³ Mohamed, M. (2016). Enhancing Citizens' Trust and Confidence in Government through Digital Transformation, in IJEGR, 12(1), IGI Global.

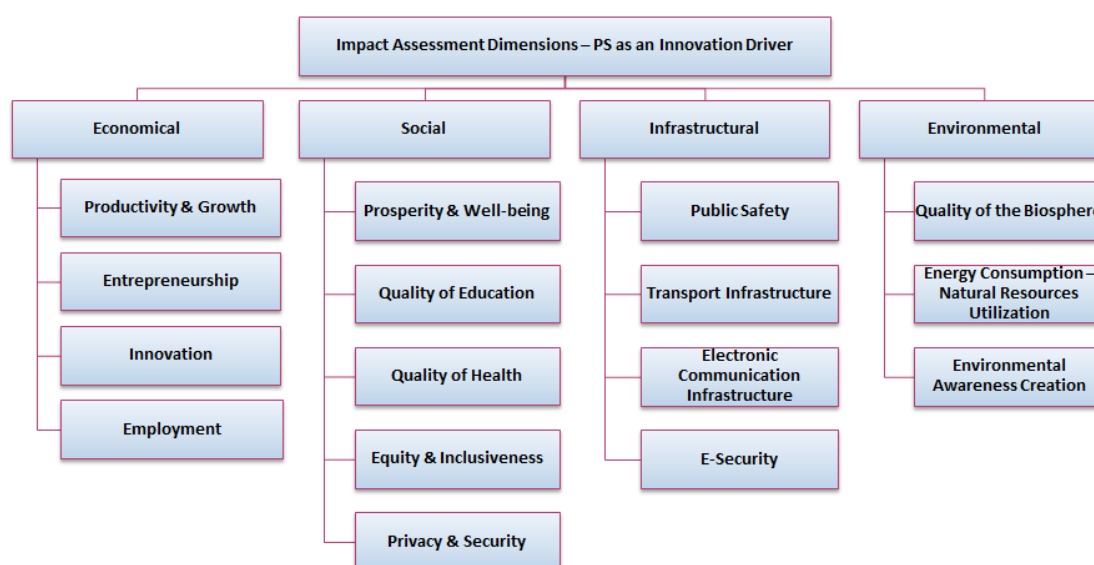


Figure 14. “Public Sector as an Innovation Driver” Impact Assessment Areas

(II) PS as an Innovation Driver

➤ Economical

- Productivity (Labour / Capital / Resource) & Growth: The impact of ICT on economic growth and productivity can be considered at the macro, sectoral and firm levels. At the microeconomic level, positive impacts of ICT can be attributed to i. the increase in the size and productivity of the ICT sector, and associated effects such as growth in industries that provide inputs to ICT production, ii. ICT investment across the economy, which contributes to capital deepening and leads to a rise in labour productivity, iii. multifactor productivity growth across the economy, which arises from the role of ICT in helping firms innovate and improve their overall efficiency^{14, 15}. Macro-level research has generally shown a positive link between ICT investment and growth in GDP¹⁶. A growing ICT sector (ICT services and ICT manufacturing industries) can contribute to aggregate increases in productivity, GDP and trade. Opportunities for economic growth arise also for businesses retailing ICT goods. Enterprises in other sectors as well may benefit from the use of more sophisticated ICT applications (such as web-based e-commerce and other e-business applications). There may also be spillover benefits. For instance, ICT investment in a larger enterprise may benefit a whole sector, whereas there may furthermore be gains from ICT diffusion along the supply chain. At the firm level use of computers, the Internet and broadband have a positive

¹⁴ OECD (2004). The Economic Impact of ICT, Measurement, Evidence and Implications. Available from <http://www.oecd.org/bookshop?pub=922004051P1>

¹⁵ OECD (2008). The Contribution of the ICT Sectors to Economic Growth in OECD Countries: Backward and Forward Linkages. DSTI/ICCP/IIS(2008)2.

¹⁶ UNCTAD (2011). Measuring the Impacts of Information and Communication Technology for Development. UNCTAD Current Studies on Science, Technology and Innovation. N ° 3 Available from http://unctad.org/en/Docs/dtlstict2011d1_en.pdf

relationship with productivity. However, this varies among individual businesses according to other factors, such as skills and innovation. A particular challenge of firm level studies is measuring the effect of intangibles, such as good management and marketing¹⁷. A number of studies have found that ICT has most impact when accompanied by complementary investments and changes, for example, in human capital, organizational change and other forms of innovation¹⁸.

There is further some evidence that the development of a strong ICT sector can lead to poverty alleviation, although there are few targeted studies on this¹⁹. The concept of poverty though extends beyond the economic dimension and can be considered along its social dimension under the aspect of well-being and prosperity. Negative economic impacts associated with ICT diffusion have received relatively little attention from statisticians. A possible indirect negative impact is a productivity trap resulting from updating ICT too frequently to enable efficiency gains.

- Entrepreneurship: The value of ICT extends far beyond direct economic benefits. ICT is a driving force in the acceleration of entrepreneurship, making it easier to identify and develop good ideas, and create and disseminate new products and services. Some of the ways in which ICT supports entrepreneurship include increasing interconnectedness and collaboration, allowing smaller, entrepreneurship companies to compete in global markets, lowering the cost of entry for new entrepreneurs, facilitating research diversification and interdisciplinary approaches, enhancing the ability of entrepreneurs to develop new business models, products, services and processes, shortening product development cycles, providing new tools to create, organize, store and transmit information, supporting disruptive business models that transform industries and enabling faster access to regional and international markets²⁰.
- Innovation: Innovation is a broad concept, defined by the Oslo Manual²¹ as “the implementation of a new or significantly improved product (good or service), or process, a new

¹⁷ UNCTAD (2007). Information Economy Report 2007–2008: Science and Technology for Development, the New Paradigm of ICT. United Nations. New York and Geneva. Available from http://unctad.org/en/docs/sdteecb20071_en.pdf

¹⁸ OECD (2004). The Economic Impact of ICT, Measurement, Evidence and Implications. Available from <http://www.oecd.org/bookshop?pub=922004051P1>

¹⁹ UNCTAD (2010). Information Economy Report 2010: ICTs, Enterprises and Poverty Alleviation. United Nations. New York and Geneva. Available from <http://www.unctad.org/ier2010>

²⁰ Intel (2011). The Path to Growth: Accelerating Entrepreneurship and Innovation Through ICT. Available at: <http://www.intel.com/content/dam/www/public/us/en/documents/white-papers/world-ahead-accelerating-entrepreneurship-paper.pdf>

²¹ OECD and Eurostat (2005). Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data. Third Edition. Available from <http://www.oecd-ilibrary.org/docserver/download/9205111e.pdf?expires=1472036902&id=id&accname=guest&checksum=595B614F50153D1656E1EA1160FE6E58>

marketing method, or a new organizational method in business practices, workplace organization or external relations”. Innovation can occur in all sectors of the economy, including government and higher education, and involves all forms of research and experimental development, as defined by the Frascati Manual²². ICT is widely recognized as a major enabler of innovation: according to a study by OECD, higher ICT use, as measured by the number of web facilities, generally increases the probability of innovation²³. Thereby innovation is an important impact assessment dimension.

- Employment: ICTs have undoubtedly a role in the creation of employment and self-employment opportunities²⁴. Impacts of ICTs’ and related trends’ adoption can be direct through growth of the ICT sector and ICT-using industries and indirect through multiplier effects. In economies dependent on ICT, individuals can benefit by having requisite ICT skills, thereby enhancing their opportunities for employment. Arguably, ICT can also lead to loss of employment as a result of task automation.

➤ Social

- Prosperity & Well-being: The consideration of prosperity and well-being as a dimension of impact assessment can be justified by the ICT impacts identified in the fields of poverty alleviation and employment under the economical domain and the field of healthcare quality under the social domain.
- Quality of Education: ICTs may deliver significant educational benefits by providing tools for improving the teaching and learning process. Other possible impacts of ICT in education are improved attitudes to learning, development of teachers’ technology skills and increased access of the community to adult education and literacy^{25, 26}, which all potentially raise the quality level of education.

²² OECD (2002). Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development. Available from <http://www.oecd-ilibrary.org/docserver/download/9202081e.pdf?expires=1472037200&id=id&accname=quest&checksum=062653253D1CC67C0DEA522B04BA02AA>

²³ OECD (2010) Are ICT Users More Innovative? An Analysis of ICT-enabled Innovation in OECD Firms. Available from http://www.oecd-ilibrary.org/economics/are-ict-users-more-innovative_eco_studies-2011-5kg2d2hkn6vg?crawler=true

²⁴ UNCTAD (2011). Measuring the Impacts of Information and Communication Technology for Development. UNCTAD Current Studies on Science, Technology and Innovation. N ° 3 Available from http://unctad.org/en/Docs/dtlstict2011d1_en.pdf

²⁵ OECD (2010). Are the New Millennium Learners Making the Grade? Technology Use and Educational Performance in PISA. Available from <http://www.oecd.org/edu/ceri/45053490.pdf>

²⁶ Kozma RB (2005). Monitoring and Evaluation of ICT for Education Impact: A Review. In: Wagner DA et al., eds. Monitoring and Evaluation of ICT in Education Projects: A Handbook for Developing Countries. infoDev. Available from https://www.infodev.org/infodev-files/resource/InfodevDocuments_284.pdf

- Quality of Health: Quality of Health is also brought forward as an area, where ICT is expected to bring major benefits. According to the World Health Organization²⁷, e-health, broadly defined as “the use of information and communication technologies (ICT) for health”, targets to “improve health by enhancing patient services and health systems”. According to ITU²⁸, e-health applications include electronic health records, e-telemedicine, m-health (the use of mobile devices such as mobile phones for health purposes), decision-support systems, e-learning and e-journals. OECD²⁹ also cites the use of ICT as enabling complex and networked equipment. The application of ICT in health holds major benefits for provider organizations, patients and medical staff, and thus enhances the quality of healthcare provision. On the other hand, there is no doubt that ICT can also have negative effects on health, for instance, occupational overuse injuries associated with computer use.
- Equity & Inclusiveness: The ease and immediacy of communicating, finding information and accessing services, offered by ICTs, creates particularly beneficial impacts for minority groups and those who are socially disadvantaged³⁰, thus catering for improved equity and inclusiveness within the social domain.
- Privacy & Security: The effects of ICTs on the privacy and security of individuals and organizations are positive only to the point that the solutions adopted are invulnerable to malicious physical or cyberspace attacks. From that point on, there is a number of adverse impacts, such as commercial losses from denial of service attacks, data loss through theft or corruption and disclosure of confidential data. Far more serious potential negative impacts may arise because of the increasing reliance of critical infrastructure on ICT and the serious consequences of failure³¹. Hence, privacy and security is a significant dimension of impact assessment.

➤ Infrastructural

²⁷ WHO (2009). Global Observatory for eHealth 2009 Survey. Available from http://www.who.int/goe/data/global_e-health_survey_2009_en.pdf

²⁸ ITU (2010). World Telecommunication/ICT Development Report 2010: Monitoring the WSIS Target – A mid-term review. Available from http://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-WTDR-2010-PDF-E.pdf

²⁹ OECD (2007). Measuring the Impacts of ICT Using Official Statistics. Working Party on Indicators for the Information Society. DSTI/ICCP/IIS(2007)1/FINAL. Available from <http://www.oecd.org/dataoecd/43/25/39869939.pdf>

³⁰ UNCTAD (2011). Measuring the Impacts of Information and Communication Technology for Development. UNCTAD Current Studies on Science, Technology and Innovation. N° 3 Available from http://unctad.org/en/Docs/dt1stict2011d1_en.pdf

³¹ OECD (2008). Shaping Policies for the Future of the Internet Economy. OECD Ministerial Meeting on the Future of the Internet Economy, Seoul, 2008. Available from <http://www.oecd.org/internet/ieconomy/40821707.pdf>

- Public Safety: Public safety involves “the prevention of and protection from events that could endanger the safety of the general public by means of significant danger, injury/harm, or property damage, such as crimes or disasters (natural or human-made”³². Information and Communication Technologies (ICT) have always played an important role in the public safety domain, providing support in all phases of disaster management, e.g. in preparation, mitigation, response or recovery. The impacts of the use of ICTs on public safety have more specifically to be sought in the directions of enabling effective management of rescue operations, improving the coordination of human and technical resources, reducing the speed of reactions, supporting the mobility of public safety officers and first responders and providing an accurate view of the circumstances.
 - Transport Infrastructure: Information and Communication Technology is rapidly evolving and taking centre stage in every domain of everyday life. The same applies for the transport domain, where ICT is greatly influencing mobility and travel choices, as well as travel experience, attempting to provide safer, smarter and greener transport options, improve transport services and design better transport policies.
 - ICT Infrastructure: The ICT infrastructure of the public sector is apparently an aspect that is directly influenced by the introduction and adoption of new technologies. Every investment performed by the public sector enhances its ICT infrastructure and potentially creates the conditions for the development of more powerful applications and enhanced services.
 - e-Security: While there are countless benefits associated with the introduction and use of Information and Communication Technologies, there is a down side too. The task of protection of the data and information stored in computers and travelling across the internet has never been so challenging. E-security therefore constitutes a specialized area within the technology impact assessment analysis, which points out that it is not sufficient to adopt and deploy new technologies, but effort has to be placed as well into making the relevant services reliable and secure.
- Environmental
- Quality of the Biosphere: The identification of the impacts of ICT on the environment and the quality of the biosphere in

³² Wikipedia – Public safety organizations, https://en.wikipedia.org/wiki/Public_safety_organizations

particular is a relatively new topic. According to OECD³³ positive impacts enumerate the facilitation of dematerialization, whereas negative ones account for greenhouse gas emissions arising from the ICT use, the manufacturing and transport of ICT products and pollution from disposal of e-waste.

- Energy Consumption – Natural Resources Utilization: Relevant to the impact of ICT on the quality of the biosphere are also its effects on energy consumption and the utilization of natural resources. Positive effects in this case include the potential to improve the efficiency of a range of energy-using processes and equipment, whereas on the contrary negative ones account for an increased dependence on electrical and other forms of energy.
- Environmental Awareness Creation: The role of ICT on the creation of environmental awareness can only be positive and includes ICT's contribution in climate change monitoring and modelling, the dissemination of information, as well as the administration of carbon-pollution-reduction schemes.

These make up, as already explained, a number of vertical dimensions and are further complemented, as shown in Figure 15 by a set of horizontal impact assessment dimensions, referring to the extent of application of the identified technology solutions, therefore to whether the former can be applied at the individual, local, regional, national or international level, and to their anticipated influence, the latter being characterised by its type (direct, indirect or non-existent) and its (positive or negative) quality.

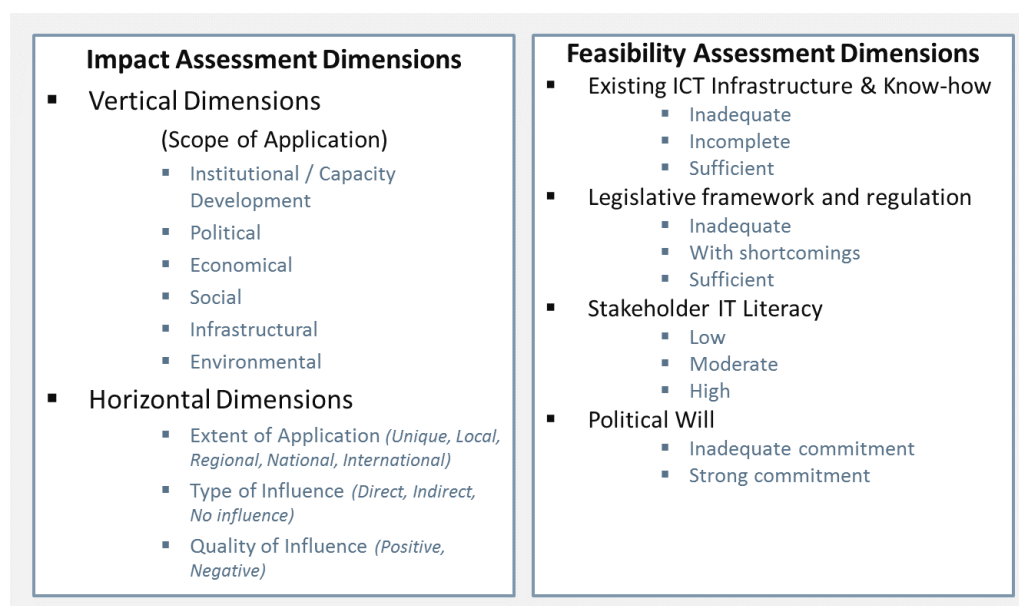


Figure 15. Overview of Impact and Feasibility Assessment Dimensions

³³ OECD (2009). Measuring the Relationship between ICT and the Environment. Available at: <http://www.oecd.org/internet/ieconomy/43539507.pdf>

Component II - Feasibility Assessment

On the side of the feasibility, the assessment analysis takes into account aspects such as the existing ICT infrastructure and know-how, the status of the related legislative framework and regulation, the readiness of the stakeholders involved, as well as the political will demonstrated in the specific application **context**. This assessment tries to evaluate the identified solutions against these aspects on an appropriate qualitative scale, as follows:

- Existing Infrastructure
 - Inadequate
 - Sufficient
 - Complete
- Legislative framework and regulation
 - Inadequate
 - With Shortcomings
 - Sufficient
- Stakeholder IT literacy
 - Low
 - Moderate
 - High
- Political Will
 - Inadequate commitment
 - Strong commitment

Attention is drawn to the fact that the conduction of the feasibility assessment analysis as prescribed above, presupposes having a thorough knowledge of the context (local, regional, national or international), in which the application of the identified technology solutions is meant to take place, in order to generate meaningful results. Thereby, in the context of this deliverable and for the sake of completeness, the feasibility assessment is performed as an academic exercise for selected innovation solutions, each evaluated against the country context (Germany, Greece, Italy, Spain) represented by each of the SONNETS partners. These solutions are Big Data and Cloud Computing (evaluated for all four countries), e-Participation and Social Networking (assessed for Germany), Open Data and e-Identities (evaluated for Greece), Artificial Intelligence and Internet of Things (assessed for Italy), and Internet of Things and Wearables (evaluated for Spain).

3.2 Trends' Analysis

3.2.1 API Economy

Component I - Impact Assessment

Innovation Actions Description			Central point of access for service portals; Access to open data from the municipalities.				
Type of Innovation			Service/service delivery innovation, administrative and organizational innovation, systemic innovation.				
Needs Addressed			<p>Individuals' needs:</p> <ul style="list-style-type: none"> Connected and integrated Europe <p>Businesses' needs:</p> <ul style="list-style-type: none"> Streamlined and reliable administrative procedures in the public sector Easy access to public sector information (open data) Access to a unified European market Technology implementation <p>Governments' needs:</p> <ul style="list-style-type: none"> Resource optimization Digitization Accessible public sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Assessment Dimensions - Vertical	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	All levels	Indirect	Positive
			Efficiency / Productivity	√	All levels	Indirect	Positive
			Sustainability	√	Local, Regional, National, International	Direct	Positive
			Cross-organization Cooperation	√	Local, Regional, National, International	Direct	Positive

			Quality of Services Provided	✓	Local, Regional, National, International	Direct	Positive
			Image Modernization	✓	Local, Regional, National, International	Indirect	Positive
		Political	Level of Participation	-	-	-	-
			Transparency	✓	Local, Regional, National, International	Direct	Positive
			Creation of Trust & Confidence	✓	Local, Regional, National, International	Direct	Positive
		PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-
	Entrepreneurship			✓	All levels	Indirect	Positive
	Innovation			✓	All levels	Direct	Positive
	Employment			-	-	-	-
	Social		Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
	Infrastructural		Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	✓	All levels	Direct	Positive
			e-Security	✓	All levels	Direct	Negative
	Environmental		Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
		Environmental Awareness Creation	-	-	-	-	

3.2.2 Crowdsourcing

Component I - Impact Assessment

Innovation Actions Description			Collaborative policy making; Production of public services; Urban and transit planning.				
Type of Innovation			Conceptual innovation, policy innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Political participation Education and training Businesses' needs: <ul style="list-style-type: none"> Business Expansion (Access to funds) Governments' needs: <ul style="list-style-type: none"> Civil servants as a community of change 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	-	-	-	-
			Sustainability	√	Local, Regional, National, International	Indirect	Positive
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Indirect	Positive
			Image Modernization	-	-	-	-

		Political	Level of Participation	✓	<i>Local, Regional, National, International</i>	<i>Direct</i>	<i>Positive</i>
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Privacy & Security	✓	<i>Individual</i>	<i>Direct</i>	<i>Negative</i>
			Public Safety	-	-	-	-
		Infrastructural	Transport Infrastructure	✓	<i>Local, Regional, National, International</i>	<i>Indirect</i>	<i>Positive</i>
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.2.3 Digitalization

Component I - Impact Assessment

Innovation Actions Description			Online citizens accounts – common source database of relevant citizens’ documents (applications, certificates, IDs, etc.); Full scale eGovernment; Make available state archives in a linked open data format.				
Type of Innovation			Service/service delivery innovation, administrative and organizational innovation, systemic innovation.				
Needs Addressed			<p>Individuals’ needs:</p> <ul style="list-style-type: none"> • Transparent and participative access to public sector services • Connected and integrated Europe <p>Businesses’ needs:</p> <ul style="list-style-type: none"> • Ease of doing business • Easy access to public sector information (open data) • Access to a unified European market <p>Governments’ needs:</p> <ul style="list-style-type: none"> • Digitization • Accessible public sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization		-	-	-
			Efficiency / Productivity		√	All levels	Direct
			Sustainability		√	Local, Regional, National, International	Direct
			Cross-organization Cooperation		√	Local, Regional, National, International	Indirect
			Quality of Services Provided		√	Local, Regional, National, International	Direct
			Image Modernization		√	Local,	Indirect

					<i>Regional, National, International</i>		
		Political	Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
PS as an Innovation Driver (II)	Economical		Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Employment	-	-	-	-
	Social		Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
	Infrastructural		Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive/ Negative</i>
	Environmental		Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.2.4 eParticipation

Component I - Impact Assessment

Innovation Actions Description			Cross Border/National/Regional/Local Community resolutions; Active dialogue, e-Democracy; e-Consultations; e-voting; e-Petitioning; Participatory Budgeting.				
Type of Innovation			Service/service delivery innovation, policy innovation.				
Needs Addressed			<p>Individuals' needs:</p> <ul style="list-style-type: none"> • Transparent and participative access to public sector services • Connected and integrated Europe <p>Businesses' needs:</p> <ul style="list-style-type: none"> • Agile and participative public sector • Stimulate an entrepreneurial culture <p>Governments' needs:</p> <ul style="list-style-type: none"> • Participative democracy • Civil servants as a community of change 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	-	-	-	-
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	-	-	-	-
			Image Modernization	√	Local, Regional, National, International	Indirect	Positive
		Political	Level of Participation	√	Local, Regional, National, International	Direct	Positive
			Transparency	√	Local, Regional,	Direct	Positive

					<i>National, International</i>		
			Creation of Trust & Confidence	✓	<i>Local, Regional, National, International</i>	<i>Indirect</i>	<i>Positive</i>
PS as an Innovation Driver (II)		Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

Component II – Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Germany		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>According to a survey in Nordrhein-Westfalen in 2016 around 1/3 of the municipalities in this Bundesland use e-participation. In big cities the percentage is even higher – around ¾³⁴.</i>
Legislative framework and regulation	<i>Sufficient</i>	<i>E-participation is part of the national e-government strategy from 2010³⁵. There are also regulations and info documents regarding e-participation for municipalities³⁶.</i>
IT literacy (PS employees, citizens, businesses)	<i>Moderate</i>	<i>According to STATISTA in 2014 around 50% of all citizens were principally willing to use e-participation tools³⁷.</i>
Political Will	<i>Strong commitment</i>	<i>In 2008 Germany established a first platform for political online consultations and also a catalogue of measurements³⁸.</i>

³⁴ https://diid.hhu.de/wp-content/uploads/2016/11/DIID-Precis_Monitor-Online-Partizipation-2.pdf

³⁵ http://www.cio.bund.de/SharedDocs/Publikationen/DE/Aktuelles/nationale_e_government_strategie_beschluss_20100924_download.pdf?__blob=publicationFile

³⁶ http://www.kommune21.de/meldung_22471_Leitfaden+f%C3%BCr+Kommunen.html

³⁷ <https://de.statista.com/statistik/daten/studie/467165/umfrage/interesse-an-e-partizipation-in-deutschland/>

³⁸ http://www.cio.bund.de/cae/servlet/contentblob/1150586/publicationFile/91259/broschuere_e_government_download.pdf

3.2.5 Gamification

Component I - Impact Assessment

Innovation Actions Description			Services supporting collaboration among teams – Provision of work incentives; Awareness on and adoption of e-government systems; Education and awareness raising.				
Type of Innovation			Service innovation, administrative and organizational innovation, conceptual innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> • Experiential education and training Businesses' needs: <ul style="list-style-type: none"> • Agile and participative public sector Governments' needs: <ul style="list-style-type: none"> • Participative democracy • Appropriate remuneration and incentives • Employee empowerment and recognition • Civil servants as a community of change 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	√	All levels	Indirect	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	-	-	-	-
			Image Modernization	√	Local, Regional, National, International	Indirect	Positive
		Political	Level of Participation	√	Local, Regional, National, International	Direct	Positive
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-

	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	✓	All levels	Indirect	Positive
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	✓	All levels	Direct	Positive
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	✓	All levels	Direct	Positive

3.2.6 Mobile Devices

Component I - Impact Assessment

Innovation Actions Description			M-learning; Mobile services; Booking and payment of health services/ Reservation of doctor appointment in mobile; Transport-related services (traffic updates, footprint monitoring).					
Type of Innovation			Service / service delivery innovation.					
Needs Addressed			Individuals’ needs: <ul style="list-style-type: none">Modern workplaces Businesses’ needs: <ul style="list-style-type: none">Technology implementation Governments’ needs: <ul style="list-style-type: none">Digitization					
			Impact Assessment -Horizontal Dimensions					
			Individual Directions Addressed (√)		Extent of Application	Influence		
						Type	Quality	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization		-	-	-	-
			Efficiency / Productivity		✓	All levels	Direct	Positive
			Sustainability		-	-	-	-
			Cross-organization Cooperation		-	-	-	-
			Quality of Services Provided		✓	Local, Regional, National, International	Direct	Positive
			Image Modernization		✓	Local, Regional, National, International	Indirect	Positive
	Innovation	Political	Level of Participation		-	-	-	-
			Transparency		-	-	-	-
			Creation of Trust & Confidence		-	-	-	-
		Economical	Productivity (Labor / Capital / Resource) & Growth		-	-	-	-
			Entrepreneurship		-	-	-	-
			Innovation		✓	All levels	Indirect	Positive

			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Negative</i>
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	✓	<i>Local, Regional, National</i>	<i>Direct</i>	<i>Positive</i>
			ICT Infrastructure	-	-	-	-
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Negative</i>
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>

3.2.7 Open Data

Component I - Impact Assessment

Innovation Actions Description			Open data portals; Open Health Records; Public Transport Data; Geospatial data and services; Financial Data Services.				
Type of Innovation			Service innovation, conceptual innovation, policy innovation, systemic innovation.				
Needs Addressed			<p>Individuals' needs:</p> <ul style="list-style-type: none"> • Transparent and participative access to public sector services • Environmental amicability <p>Businesses' needs:</p> <ul style="list-style-type: none"> • Stimulate entrepreneurial and start-up culture • Easy access to public sector information <p>Governments' needs:</p> <ul style="list-style-type: none"> • Lean bureaucracy • Digitization • Rework the trust deficit • Participative democracy • Accessible public sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	√	Local, Regional, National,	Direct	Positive

					<i>International</i>		
			Quality of Services Provided	-	-	-	-
	Political		Image Modernization	-	-	-	-
			Level of Participation	✓	<i>Local, Regional, National, International</i>	<i>Direct</i>	<i>Positive</i>
			Transparency	✓	<i>Local, Regional, National, International</i>	<i>Direct</i>	<i>Positive</i>
			Creation of Trust & Confidence	✓	<i>Local, Regional, National, International</i>	<i>Direct</i>	<i>Positive</i>
	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Innovation	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Quality of Health	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

Component II - Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Greece		
	Assessment	Justification
Existing Infrastructure	Sufficient	<p>Existing infrastructure and knowhow are sufficient for the time being as indicated by the existence of open data related portals, such as the following:</p> <ul style="list-style-type: none"> • http://www.data.gov.gr/ • Open Data Index, http://openindex.gr/ • Open Data Hub, http://opendatahub.gr/ • GeoData.gov.gr, http://geodata.gov.gr/content/about-en/ <p>However, further developments and transformations in terms of ensuring interoperability are needed, in order to further promote their exploitation.</p>
Legislative framework and regulation	Sufficient	<p>Open Data is governed by the Reuse of Public Sector Information Legislative Framework. The latter comprises of a set of laws implementing EU Directives aiming at the reuse of different types of public sector information and increasing transparency in the activities of the public sector authorities, as follows:</p> <ul style="list-style-type: none"> • Law 2690/1999 (access to public documents) • Law 3422/2005 (access and reuse of environmental information) – ratifying the Aarhus Convention • Law 3448/2006 (reuse of public sector information) – Implementing the Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information • Law 3861/2010 (transparency law) • Law 3882/2010 (reuse of geospatial information) – Implementing the Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing

		<i>an Infrastructure for Spatial Information in the European Community (INSPIRE)</i> <ul style="list-style-type: none">• <i>Law 3979/2011 (e-government law)</i>³⁹
IT literacy (PS employees, citizens, businesses)	<i>Moderate</i>	<i>Data science and therefore trends such as Open Data are not yet mainstream in the Greek public sector context, and most people are not acquainted to them.</i>
Political Will	<i>Inadequate commitment</i>	<i>Although a series of first steps have been implemented and a sufficient legislative framework is in place, there is limited data availability with regard to public sector operations.</i>

³⁹ <http://www.greeklawdigest.gr/component/k2/item/80-access-to-and-reuse-of-public-sector-information-legislative-framework>

3.2.8 Open Government

Component I - Impact Assessment

Innovation Actions Description			Access to procurement and financial data; Cross country data analysis; Fiscal management; Transport and Traffic data; Cultural and Education Services; Smart City Applications				
Type of Innovation			Service innovation, conceptual innovation, systemic innovation.				
Needs Addressed			Businesses' needs: <ul style="list-style-type: none"> • Easy access to Public Sector information (open data) Governments' needs: <ul style="list-style-type: none"> • Civil servants as a community of change 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	-	-	-	-
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
		Political	Quality of Services Provided	√	Local, Regional, National, International	Direct	Positive
			Image Modernization	√	Local, Regional, National, International	Indirect	Positive
			Level of Participation	√	Local, Regional, National, International	Direct	Positive
			Transparency	√	Local, Regional, National, International	Direct	Positive
			Creation of Trust & Confidence	√	Local,	Direct	Positive

					<i>Regional, National, International</i>		
PS as an Innovation Driver (II)	Economic	Economic	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	✓	All levels	Direct	Positive
			Innovation	✓	All levels	Direct	Positive
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	All levels	Indirect	Negative
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.2.9 (Service) Personalization

Component I - Impact Assessment

Innovation Actions Description			Personalized / more targeted services for citizens; Personalized education (provide an education experience adapted to personal necessities, preferences or context information); Recommendation mechanisms to assist citizens in identifying the proper applications/services for addressing a specific need; Geolocation and personalization settings to provide the desired public service according to location and previous user behaviour; Recommending user related public services according to user profile, occupation, marital and financial status, involving news feeds, notifications and alerts, reminders in user calendars with regard to deadlines on their obligations and rights as individual citizens and business owners; Single sign-on access to cross-organizational services in a personalized fashion; Consolidation of citizen data, cadastral information, etc.				
Type of Innovation			Service innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Inclusive well-being and health Businesses' needs <ul style="list-style-type: none"> Lessen complexity Stimulate entrepreneurial & start-up culture Technology implementation Agile and participative public sector 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Indirect	Positive
			Efficiency / Productivity	√	Local, Regional, National, International	Indirect	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Direct	Positive

		Political	Image Modernization	-	-	-	-
			Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness/	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Privacy & Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Negative</i>
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.2.10 Policy Making 2.0

Component I - Impact Assessment

Innovation Actions Description			Online platforms to gather feedback on citizens' experience as users of public services; "Citizens for the citizens" platforms; Governmental blogs, wikis, etc; Open Simulation platforms.				
Type of Innovation			Service innovation, policy innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> • Transparent and participative access to Public Sector services • Environmental Amicability Governments' needs: <ul style="list-style-type: none"> • Rework the trust deficit 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	Value to	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	-	-	-	-
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	-	-	-	-
			Image Modernization	-	-	-	-
		Political	Level of Participation	√	Local, Regional, National, International	Direct	Positive
			Transparency	√	Local, Regional, National, International	Direct	Positive
			Creation of Trust & Confidence	√	Local, Regional, National, International	Direct	Positive
		Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-

			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.2.11 Sentiment Analysis

Component I - Impact Assessment

Innovation Actions Description			Election results prediction (identifying political sentiment in blogging, microblogging and social media posts); Establish a taxonomy of critical keywords and combine it with organisations' structures data, so as to allow departments to better formulate outgoing messages, target specific audiences for those messages and agilely respond to citizens' complaints; Combine social media posts and geo-tagged information to reveal patterns of malpractice or corruption.				
Type of Innovation			Conceptual innovation, policy innovation.				
Needs Addressed			Governments' needs: <ul style="list-style-type: none"> • Rework the trust deficit • Participative democracy • Civil servants as a community of change 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	√	Local, Regional, National, International	Indirect	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Indirect	Positive
			Image Modernization	-	-	-	-
	Political		Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
	Innovation Driver	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	√	All levels	Indirect	Positive
			Employment	-	-	-	-

		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Negative</i>
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.2.12 Smart Workplace

Component I - Impact Assessment

Innovation Actions Description			Silo-busters (tools transcending organizational boundaries to enable teams to solve problems and generate ideas across work silos); Police-messenger similar to WhatsApp to enhance communication, data protection and privacy among police officers.				
Type of Innovation			Service innovation, administrative and organizational innovation, conceptual innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> • Modern workplaces • Equal employment opportunities Businesses' needs <ul style="list-style-type: none"> • Talent acquisitions and retention 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (1)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	√	All levels	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Indirect	Positive
			Image Modernization	√	Local, Regional, National, International	Indirect	Positive
	Political		Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
	Economical		Productivity (Labor / Capital / Resource) & Growth	√	All levels	Direct	Positive
			Entrepreneurship	-	-	-	-
			Innovation	√	All levels	Indirect	Positive
			Employment	-	-	-	-

		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	✓	<i>Local, Regional, National</i>	<i>Direct</i>	<i>Positive</i>
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.2.13 Social Networking

Component I - Impact Assessment

Innovation Actions Description			Usage of social media to represent the public sector – Social media as vehicles for increased transparency of an agency's actions, e.g. use of the micro-blogging service Twitter to inform journalists and professional groups and direct them to longer updates on a government's website; Social media enhanced idea exchange platforms for local issues; Social-media enhanced platforms enabling governments to consult citizens on policy issues; Consultation platforms for government employees/Private networks for government employees enabling the exchange of ideas and experiences.				
Type of Innovation			Service delivery innovation, policy innovation, systemic innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> • Transparent and participative access to Public Sector services • Environmental Amicability Governments' needs: <ul style="list-style-type: none"> • Rework the trust deficit 				
Impact Assessment Dimensions - Vertical Dimensions PS Modernization (I) Institutional / Capacity Development			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
			Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	-	-	-	-
			Sustainability	-	-	-	-
			Cross-organization Cooperation	√	Local, Regional, National	Direct	Positive
			Quality of Services Provided	√	Local, Regional, National, International	Indirect	Positive
			Image Modernization	√	Local, Regional, National, International	Indirect	Positive

		Political	Level of Participation	✓	Local, Regional, National, International	Direct	Positive
			Transparency	✓	Local, Regional, National, International	Direct	Positive
			Creation of Trust & Confidence	-	-	-	-
	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	✓	All levels	Direct	Positive/Negative
			Privacy & Security	✓	All levels	Direct	Negative
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	✓	All levels	Direct	Positive

Component I - Impact Assessment

Feasibility Assessment Dimensions		
Assessment for Germany		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>According to a CASSINI survey in 2013 54% of the municipalities use social media⁴⁰.</i>
Legislative framework and regulation	<i>With Shortcomings</i>	<i>According to the CASSINI survey only 20% of the municipalities have a written social media strategy. Other municipalities have included their social media strategy in a general e-government or communication strategy. Many participants have the feeling that there are open legal and security issues⁴⁰.</i>
IT literacy (PS employees, citizens, businesses)	<i>Moderate</i>	<i>In a study in Hamburg 49% of the participants (of the public sector in Hamburg) stated that they don't use social media, which is quite high, as in the general public only 35% of the citizens don't use social media⁴¹.</i>
Political Will	<i>Inadequate commitment</i>	<i>45% of the participants of the CASSINI survey stated that they don't think that they work with social media is supported by the general politics⁴⁰.</i>

⁴⁰ http://public.cassini.de/fileadmin/public/Downloads/Social_Media_Kommunen.pdf

⁴¹ http://www.isprat.net/fileadmin/downloads/projekte/2011/Verwaltung%202.0.%20Organisationale%20und%20individuelle%20Social%20Media%20Readiness%20am%20Beispiel%20der%20Freien%20und%20Hansestadt%20Hamburg/ISPRAT_Abschlussbericht_Projekt_Social_Media_Readiness_in_der_Verwaltung_UniSG.pdf

3.3 Technologies' Analysis

3.3.1 Artificial Intelligence

Component I - Impact Assessment

Innovation Actions Description			Bots to answer simple citizen questions / automated online assistants instead of call centers with humans to provide a first point of contact; Smart personal advisors to control and support proper dietary habits; Citizen personal agents taking action on the behalf of citizens (alerting citizens with regard to their obligations toward the Public Administration, retrieving information for them, filling out forms for them, etc.; Buyer agents/shopping bots, retrieving information about goods and services; Data mining agents finding trends and patterns in the interaction of citizens with public organisations; Ambient Assisted Living.				
Type of Innovation			Service/service delivery innovation, administrative and organizational innovation.				
Needs Addressed			<p>Individuals' needs:</p> <ul style="list-style-type: none"> Transparent and participative access to Public Sector services <p>Businesses' needs</p> <ul style="list-style-type: none"> Easy access to Public Sector information (open data) <p>Governments' needs:</p> <ul style="list-style-type: none"> Resource Optimization Accessible Public Sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local,	Direct	Positive

					<i>Regional, National, International</i>		
			Image Modernization	✓	<i>Local, Regional, National, International</i>	<i>Indirect</i>	<i>Positive</i>
		Political	Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	✓	<i>All levels</i>	<i>Direct</i>	<i>Negative</i>
		Social	Prosperity & Well-being	✓	<i>Individual</i>	<i>Indirect</i>	<i>Positive</i>
			Quality of Education	-	-	-	-
			Quality of Health	✓	<i>Individual</i>	<i>Direct</i>	<i>Positive</i>
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

Component II - Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Existing Infrastructure	<i>Inadequate</i>	<i>Still lacking the skill set, the vision about how make the most of it and how a widespread adoption is going to impact on society.</i>
Legislative framework and regulation	<i>Inadequate</i>	<i>AI has not yet generated a widespread social needs justifying a policy action. Nevertheless some deep preliminary reflections should be conducted on the impact on employment, taxation and welfare.</i>
IT literacy (PS employees, citizens, businesses)	<i>Low</i>	<i>Only a limited number of insiders possess the skills and are actually working on it.</i>
Political Will	<i>Inadequate commitment</i>	<i>Not in the agenda yet.</i>

3.3.2 Augmented Reality

Component I - Impact Assessment

Innovation Actions Description			AR-enhanced learning applications; Virtual tours on Museums; Transportation checking points with people consenting to be scanned digitally; Customs and border protection; Augmented emergency management (enhancing search and rescue through geospatial AR application); Contact lens displays or systems for augmenting tactile information (still in development); Future developments will include the improvement of the collection of gestic data from the user e. g. with time-of-flight cameras, ultrasonic- and acceleration sensors, magnetometers or GPS navigation devices.				
Type of Innovation			Service innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Inclusive well-being and health Governments' needs: <ul style="list-style-type: none"> Recruitment, training 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization Driver (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	√	All levels	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	-	-	-	-
			Image Modernization	-	-	-	-
	PS as an Innovation Driver (II)	Political	Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
		Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
	PS as an Innovation Driver (II)	Social	Employment	-	-	-	-
			Prosperity & Well-being	-	-	-	-
			Quality of Education	√	All levels	Direct	Positive
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	√	Individual	Indirect	Positive
			Privacy & Security	√	Individual	Indirect	Negative

		Infrastructural	Public Safety	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Transport Infrastructure	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.3 Big Data

Component I - Impact Assessment

Innovation Actions Description			Public opinion mining during elections (sentiment analysis); Statistics generation to help understand local, regional and global patterns and trends; Predictive Analytics (pattern analysis to predict future developments or behaviour (e.g. of consumer)); Complex event processing; Social Network Analysis (using data from social networks); Network Attack Monitoring; Error! Bookmark not defined.Tailored healthcare services; Early detection of pandemics; Crime control; Counterterrorism.				
Type of Innovation			Conceptual innovation, systemic innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Inclusive well-being and health Connected and integrated Europe Businesses' needs: <ul style="list-style-type: none"> Easy access to public sector information (open data) Governments' needs: <ul style="list-style-type: none"> Accessible public sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	-	-	-	-
			Sustainability	√	Local, Regional, National, International	Indirect	Positive
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Indirect	Positive
			Image Modernization	-	-	-	-
		Political	Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-

	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	✓	Local, Regional, National International	Indirect	Positive
			Quality of Education	-	-	-	-
			Quality of Health	✓	Local, Regional, National International	Indirect	Positive
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	Individual	Direct	Negative
		Infrastructural	Public Safety	✓	Local, Regional, National International	Indirect	Positive
			Transport Infrastructure	✓	Local, Regional, National International	Indirect	Positive
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

Component II - Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Germany		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>According to a survey using telephone interviews of KPMG among 102 representatives of the public sector in spring 2016 97% of these public service representatives use easy data analysis technologies like Excel or Access (level 1), 53% use business intelligence or data warehouse systems (level 2), 28% use self-service business intelligence systems (level 3) and only 17% use new big-data type technologies like in-memory databases or distributed systems⁴².</i>
Legislative framework and regulation	<i>With Shortcomings</i>	<i>There is a need for a clear legal framework or a strategy and practical guidelines like in Australia („Public Service Big Data Strategy" and „Practice Guide")⁴³.</i>
IT literacy (PS employees, citizens, businesses)	<i>Moderate</i>	<i>Around 1/3 of the public sector representatives of the KPMG survey said that a lack of resources (budget, expertise of personnel), missing technical know-how or insufficient IT equipment is the reason for not using big data in their institution. The lack of data analysts is one of the main reasons, why many public sector institutions do not use big data technologies⁴⁴.</i>

⁴² Michael Plazek, Big Data: Große Chancen für den öffentlichen Sektor?, 2016, PUBLIC GOVERNANCE, https://publicgovernance.de/docs/PG_Herbst2016_Schwerpunkt_BigData.pdf.

⁴³ Michael Plazek, Big Data: Große Chancen für den öffentlichen Sektor?, 2016, PUBLIC GOVERNANCE, https://publicgovernance.de/docs/PG_Herbst2016_Schwerpunkt_BigData.pdf.

⁴⁴ Michael Plazek, Big Data: Große Chancen für den öffentlichen Sektor?, 2016, PUBLIC GOVERNANCE, https://publicgovernance.de/docs/PG_Herbst2016_Schwerpunkt_BigData.pdf.

Political Will	<i>Inadequate commitment</i>	<i>A strong political will is not visible. A legal framework – especially regarding data protection – and practical guidelines are missing⁴⁵.</i>
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Feasibility Assessment Dimensions		
Assessment for Greece		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>Limited and fragmented efforts for developing the necessary infrastructure. Limited big data platforms available, mostly through experimental research infrastructures coming from academia and research centres, e.g. Okeanos-orika (https://okeanos.grnet.gr/platforms/).</i>
Legislative framework and regulation	<i>Sufficient</i>	<i>Use of Big Data is subject to restrictions with regard to privacy of personal data. Legal Framework on data privacy is relatively mature.</i>
IT literacy (PS employees, citizens, businesses)	<i>Low</i>	<i>Data science and especially novel technologies such as Big Data are not yet mainstream in the Greek public sector context, and most people are not acquainted to them.</i>
Political Will	<i>Inadequate commitment</i>	<i>Limited data availability with regard to public sector operations, witnessed also in other data related fields such as open and linked data, where availability is low and political decision does not actively encourage their growth.</i>

⁴⁵ Michael Plazek, Big Data: Große Chancen für den öffentlichen Sektor?, 2016, PUBLIC GOVERNANCE, https://publicgovernance.de/docs/PG_Herbst2016_Schwerpunkt_BigData.pdf.

Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Existing Infrastructure	<i>Inadequate</i>	<i>Lack of trained workforce (hard to find qualified Data Scientists for Big Data applications), TLC infrastructure (Italy is still lagging behind in terms of broadband quality), delayed adoption by big players in key industries (banking & insurance), lack of top global ICT players such as Facebook, Google, etc.</i>
Legislative framework and regulation	<i>Inadequate</i>	<i>Usually regulatory activities follow widespread adoption and this is not the case for Italy yet. On this topic Italy is mainly following what is decided in Brussels.</i>
IT literacy (PS employees, citizens, businesses)	<i>Low</i>	<i>Big data related courses are starting to appear in undergraduate courses, it will take some time to see their impact on the workforce.</i>
Political Will	<i>Inadequate commitment</i>	<i>Politician speak to Industry 4.0 and big data revolutions, whether useful laws will be passed in the future is yet to be seen.</i>

Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>The three technologies which have primarily driven the birth of Big Data are mobile devices with Internet access, e-commerce and social networking. Spain is ranked 15th worldwide among the countries with more mobile devices</i>

		<i>penetration with a 55.4%. The exponential increase in data generated by companies on social networks has led to a large growth in images, texts, videos and audios uploaded and shared by every company, regardless of its size. So, in Spain, infrastructure and software are no longer bottlenecks or barriers to entry; only human talent is still the weakest component related to big data⁴⁶.</i>
Legislative framework and regulation	<i>With Shortcomings</i>	<p><i>One of the most relevant risks associated to big data is privacy risk and data protection, since the profiles that can be drawn about people by using big data technology can have a huge impact not only in people's privacy but also in relation to the free development of their personality.</i></p> <p><i>Spanish law collects the fundamental right to the protection of personal data: people have the power to control the use that is being made of their data. The LOPD forces all people, companies and agencies, both private and public, that are managing data of personal character, to meet a series of requirements and to apply certain measures of security depending on the type of data they have, its origin, characteristics of the treatment, type of facilities and support in which data is stored, etc^{47, 48}.</i></p>
IT literacy (PS employees, citizens, businesses)	<i>Low</i>	<i>Businesses are the most prepared for the challenges big data poses. There are a high number of associations that gather qualified professionals with legal and technical expertise to support any kind of big data related projects⁴⁹.</i>
Political Will	<i>Strong commitment</i>	<i>Spain has a strategy for developing the digital economy and society bringing the benefits offered by new technologies to the people, business and public administration services⁵⁰.</i>

⁴⁶ <http://www.obs-edu.com/es/noticias/estudio-obs/el-volumen-de-datos-generado-por-smartphones-crecera-un-63-los-proximos-cuatro-anos>

⁴⁷ https://www.agpd.es/portalwebAGPD/revista_prensa/revista_prensa/2015/notas_prensa/news/2015_01_28-ides-idphp.php

⁴⁸ <http://www.iic.uam.es/innovacion/seguridad-big-data/>

⁴⁹ <http://www.aepes/quienes-somos/>

⁵⁰ <http://www.agendadigital.gob.es/digital-agenda/Paginas/digital-agenda-spain.aspx>

3.3.4 Biometrics

Component I - Impact Assessment

Innovation Actions Description			Physical access control; Computer log-in; Welfare disbursement; International border crossing / Border management / Speed mobility in borders; National ID cards; Passports; Airport kiosks for checking passports; Driver's license; Facial recognition to speed up processes and manage queues; Instructions to get to the specific room to impaired people entering a hospital through their smartphone or trough panels; Identify criminals on the fly; Avoid fraud on competitive examinations; Life identification against watch lists (terrorism).				
Type of Innovation			Service innovation, administrative and organizational innovation, systemic innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Transparent and participative access to public sector services 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	√	Local, Regional, National, International	Indirect	Positive
			Cross-organization Cooperation	√	Local, Regional, National, International	Direct	Positive
			Quality of Services Provided	√	Local, Regional, National, International	Direct	Positive
		Political	Image Modernization	-	-	-	-
			Level of Participation	-	-	-	-
			Transparency	√	All levels	Indirect	Positive
		Economic	Creation of Trust & Confidence	√	All levels	Direct	Negative
			Productivity (Labor / Capital / Resource) & Growth	-	-	-	-

			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	✓	<i>Individual</i>	<i>Indirect</i>	<i>Negative</i>
			Privacy & Security	✓	<i>Individual</i>	<i>Direct</i>	<i>Negative</i>
		Infrastructural	Public Safety	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Transport Infrastructure	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			ICT Infrastructure	-	-	-	-
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.5 Blockchain

Component I - Impact Assessment

Innovation Actions Description			Storing citizens' identities - personal details/data; Electronic medical records; Property/Land record registry; Vehicle registries; Benefits disbursement; Voting records (Electronic voting); Decentralised crowdfunding; Smart contracts (contracts with self-executing contractual states); Accessing public service providers based on performance rather area of residence; Decentralized management of information and data related to citizens and enterprises; Monitoring/regulating transactions (e.g. with regard to property titles) among citizens and enterprises; Connecting smart consumer electronics (e.g. cars, bicycles) with a mini-computer to a blockchain system to use them as part of the sharing economy.				
Type of Innovation			Service/ service delivery innovation, systemic innovation.				
Needs Addressed			Individuals' Needs: <ul style="list-style-type: none"> Transparent and participative access to public sector services 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Direct	Positive
			Image Modernization	√	Local, Regional, National, International	Indirect	Positive
		Political	Level of Participation	-	-	-	-
			Transparency	√	Local, Regional, National,	Direct	Positive

	PS as an Innovation Driver (II)		Creation of Trust & Confidence	✓	<i>International</i> <i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Productivity (Labor / Capital / Resource) & Growth	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
		Economical	Entrepreneurship	-	-	-	-
			Innovation	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
		Infrastructural	Public Safety	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	✓	<i>National/ International</i>	<i>Direct</i>	<i>Negative</i>
			Environmental Awareness Creation	-	-	-	-

3.3.6 Bots

Component I - Impact Assessment

Innovation Actions Description			Bots to answer simple citizen questions / automated online assistants instead of call centers with humans to provide a first point of contact; Buyer agents/shopping bots, retrieving information about goods and services; Votebots; Smart Agents in citizens' offices, e.g. in Resident Registration offices or call centers. If someone would like to register himself in a new city, then the software robot could answer the call and direct the citizen to the different systems (e.g. registration at school, kindergarten).				
Type of Innovation			Service/service delivery innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Transparent and participative access to Public Sector services Governments' needs: <ul style="list-style-type: none"> Resource optimization Accessible Public Sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization		Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity		Local, Regional, National, International	Direct	Positive
			Sustainability		-	-	-
			Cross-organization Cooperation		-	-	-
			Quality of Services Provided		Local, Regional, National, International	Direct	Positive
		Political	Image Modernization		-	-	-
			Level of Participation		-	-	-
			Transparency		-	-	-

	PS as an Innovation Driver (II)	Economical	Creation of Trust & Confidence	-	-	-	-
			Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	✓	All levels	Indirect	Positive
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	Individual	Direct	Negative
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	✓	All levels	Direct	Negative
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.7 Cloud Computing

Component I - Impact Assessment

Innovation Actions Description			Share ICT resources among multiple agencies; Collaboration applications (e-mail, web conferencing); Cloud bursting for increased availability at peak seasons (gsis, final exams' results, etc.).				
Type of Innovation			Service/service delivery innovation, systemic innovation.				
Needs Addressed			<p>Individuals' needs:</p> <ul style="list-style-type: none"> Transparent and participative access to public sector services <p>Businesses' needs:</p> <ul style="list-style-type: none"> Easy access to public sector information (open data). <p>Governments' needs:</p> <ul style="list-style-type: none"> Resource optimization Accessible public sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (1)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	√	Local, Regional, National, International	Direct	Positive
			Cross-organization Cooperation	√	Local, Regional, National, International	Direct	Positive
			Quality of Services Provided	√	Local, Regional	Direct	Positive

		Political			<i>National, International</i>		
			Image Modernization	-	-	-	-
			Level of Participation	-	-	-	-
			Transparency	✓	<i>Local, Regional National, International</i>	<i>Indirect</i>	<i>Positive</i>
			Creation of Trust & Confidence	-	-	-	-
	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	✓	<i>Individual</i>	<i>Indirect</i>	<i>Positive</i>
			Entrepreneurship	-	-	-	-
			Innovation	✓	<i>All levels</i>	<i>Indirect</i>	<i>Positive</i>
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	✓	<i>Local, Regional, National, International</i>	<i>Direct</i>	<i>Positive</i>
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive/Negative</i>
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	✓	<i>Local, Regional, National, International</i>	<i>Direct</i>	<i>Positive</i>
			Environmental Awareness Creation	-			

Component II - Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Germany		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<p>According to a survey of PriceWaterHouseCoopers in 2013 50% of the providers of cloud services mention that also public service institutions are using their services⁵¹.</p> <p>According to another survey in 2015 7% of the public sector institutions use cloud services⁵².</p> <p>The project goBerlin is creating a cloud platform for public services⁵³.</p> <p>There is also a police cloud for the police forces in Rheinland-Pfalz⁵⁴.</p> <p>Another cloud for municipalities is the GovCloud created by the Vitako12 in 2013⁵⁵.</p>
Legislative framework and regulation	<i>With Shortcomings</i>	<p>There is still a need for a clear legal framework. But on the level of the Bundesländer some regulations exist (e.g. in Nordrhein-Westfalen)⁵⁶.</p>
IT literacy (PS employees, citizens, businesses)	<i>Moderate</i>	<p>In a survey of BearingPoint in 2014, 33% of the participants (of the public sector) expressed their interest to use cloud services. 37% of the participants said that they have the technical know-how regarding cloud services, 30% have knowledge of cloud</p>

⁵¹ PwC, Cloud Computing – Evolution in der Wolke, 2013, https://www.pwc.at/publikationen/studien/pwc_studie_evolution_in_der_wolke.pdf

⁵² http://www.databund.de/images/dokumente_upl/Handelsblatt_CeBIT_2016.pdf

⁵³ Projekt goBerlin, www.goberlin-projekt.de

⁵⁴ Police Cloud Rheinland Pfalz, http://ldi.rlp.de/fileadmin/ldi/Downloads/Nachrichten/Hintergrundinfos_Cloud.pdf

⁵⁵ GovCloud, <http://www.govcloud.de/>

⁵⁶ http://toolbox.bearingpoint.com/ecomaXL/files/DN-5011_BEDE15_0968_WP_DE_Cloud_Computing_final.pdf

		<i>security and 20% of IT processes. 25-40% plan to do training in security, strategy and processes regarding cloud services⁵⁷.</i>
Political Will	<i>Inadequate commitment</i>	<i>Experts state that in Germany the political will is lacking. Other countries have taken more steps to implement cloud services in the public sector⁵².</i>

Feasibility Assessment Dimensions		
Assessment for Greece		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>Cloud Computing is in place for public organizations, by utilizing both cloud infrastructure coming from large vendors, but also through the recent introduction of the Greek Governmental Cloud (G-Cloud) project that will offer cloud computing infrastructures to the whole public sector.</i>
Legislative framework and regulation	<i>Inadequate</i>	<i>Absence of legislative framework about cloud services and their SLAs, as well as about data security and privacy issues on the cloud.</i>
IT literacy (PS employees, citizens, businesses)	<i>High</i>	<i>Most employees and citizens utilize cloud computing services for their everyday work or in their personal life. However, high literacy levels are mostly recorded in the upper layers of cloud computing (SaaS and PaaS) and not in the IaaS layer, where more technical knowledge is necessary.</i>
Political Will	<i>Strong commitment</i>	<i>Witnessing the economic and performance benefits of cloud computing, the government and the other public organizations pursue deployment of services on the cloud, either through a centralized strategy that related to G-Cloud, or individually.</i>

⁵⁷ <http://web.fhnw.ch/projekte/cloud-days/govclouddays/2-govcloud-day-2015/presentationen-govcloud-2015/referat-2-pascal-faerber-bearingpoint>

Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>Cloud computing in my view is no longer an emerging technology. Some issues may still be available in terms of TLC infrastructure capacity especially in rural areas.</i>
Legislative framework and regulation	<i>Sufficient</i>	<i>Overall I believe the current legislation is not generating major hurdles for adoption.</i>
IT literacy (PS employees, citizens, businesses)	<i>High</i>	<i>From the end user point of view cloud computing is somehow transparent, although requires some internal changes in the way certain processes are managed. From the service provider point of view there is a skill burden to be shouldered, nevertheless it involves a more restricted number of stakeholders.</i>
Political Will	<i>Strong commitment</i>	<i>Both at national and a local level a number of actions have been taken to promote the diffusion of cloud computing.</i>

Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>Spanish market is well aware of the advantages of working in the cloud, beyond cost savings. Currently, the majority of companies, public administrations and a great part of citizens use services in the cloud. Since 2012, the financial crisis and the budget restrictions forced governments at all levels (national, regional, local) to find new ways of being more efficient.</i>

		According to Red.es, one in three regional governments has opted to start working in the cloud. CloudGobex in Extremadura is an example of this ⁵⁸ .
Legislative framework and regulation	With Shortcomings	<p>In parallel with increased use of cloud provided services, different attempts of standardization and systematization of these services have been emerging: from certification schemes to codes of good practice and the establishment of regulatory frameworks by different regulators.</p> <p>Perhaps the most relevant standard, since we are talking about storage and processing of data (in the majority of cases, of personal character) could be the organic law 15/1999, of 13 December, protection of data of personal nature. Also of influence is law 34 / 2002, of society of the information services and electronic trade (LSSI), law 32 / 2003 General of telecommunications, penal code for crimes of fraud through these means, intellectual property^{59, 60}.</p> <p>In light of the clauses and guarantees of the contracts with the cloud providers, SMEs are unprotected in case of failure to observe security measures. Economic compensations are totally insufficient to cover the damage, and, on the other hand, contracts are subject to foreign courts and legislation, which involves high court costs⁶¹.</p>
IT literacy (PS employees, citizens, businesses)	Moderate	<p>According to Penteo (http://www.penteo.com), the penetration of cloud computing in the enterprise is rather high. In 2016, more than 50% of the companies used storage and services in the cloud, representing an increase of 16.5% from 2015⁶².</p> <p>In Spain, there are many electronic administration solutions made available to the public administrations to respond to common needs, so this is becoming a mainstream⁶³.</p>

⁵⁸ <http://www.red.es/redes/es>

⁵⁹ <https://www.mylabogados.es/aspectos-legales-en-cloud-computing/>

⁶⁰ <https://www.ismsforum.es/ficheros/descargas/normativa-y-certificacion-en-la-nube1448462714.pdf>

⁶¹ <https://www.genbeta.com/a-fondo/nube-y-proteccion-de-datos-que-deberia-saber-una-empresa-al-usar-dropbox-o-google-drive>

⁶² <http://www.estudiosdemercado.org/cloud-computing-espana.html>

⁶³ https://administracionelectronica.gob.es/pae/Home/pae_Estrategias/Racionaliza_y_Comparte/soluciones_cloud.html?idioma=en#.WlIkP_Iuu3E

Political Will	<i>Strong commitment</i>	<i>The Declaration of SARA⁶⁴ as the basis of Government cloud platform highlights the firm and resolute commitment of the Government of Spain on the implementation of the Cloud Computing paradigm in the public administration. Besides, Red.es develops funding programs like "promotion of the demand of solutions of cloud computing for SMEs"⁶⁵.</i>
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⁶⁴ The Network SARA (Django systems and networks for administrations) is a set of communications infrastructure and basic services connecting networks of Public administrations of Spanish and European Institutions to facilitate the exchange of information and access to services.

⁶⁵ <https://administracionelectronica.gob.es/ctt/verPestanaGeneral.htm?idIniciativa=redsara&idioma=en#.WLIImIvIuu3E>

3.3.8 Data Analytics

Component I - Impact Assessment

Innovation Actions Description			Public services’ usage analytics - Report generation; Citizen information repository with shared access by multiple government organisations (while adhering to privacy restrictions); Predictive analytical framework to identify crime “hot spots”, based on historical and real-time crime data, to efficiently allocate resources and reduce crime; What if scenarios analysis; Policy making, but also public sector management based on data analytics; Predictive Analytics (pattern analysis to predict future developments or behaviour (e.g. of consumer)).				
Type of Innovation			Service innovation, conceptual innovation, policy innovation, systemic innovation.				
Needs Addressed			Individuals’ needs: <ul style="list-style-type: none">Inclusive well-being and health Businesses’ needs: <ul style="list-style-type: none">Easy access to public sector information (open data). Governments’ needs: <ul style="list-style-type: none">Accessible Public Sector information				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Indirect	Positive
			Efficiency / Productivity	-	-	-	-
			Sustainability	√	Local, Regional, National, International	Indirect	Positive
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Indirect	Positive
		Image Modernization	-	-	-	-	
	Political	Level of Participation	-	-	-	-	

	PS as an Innovation Driver (II)		Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
			Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
		Economical	Entrepreneurship	✓	Local, Regional, National, International	Direct	Positive
			Innovation	✓	Local, Regional, National, International	Direct	Positive
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	✓	Local, Regional, National, International	Indirect	Positive
			Quality of Health	✓	Local, Regional, National, International	Indirect	Positive
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	✓	Local, Regional, National, International	Indirect	Positive
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.9 e-Identities

Component I - Impact Assessment

Innovation Actions Description			e-Identities for citizens (also for refugees and migrants); Pan-European electronic-identity authentication system; Use digital IDs in European processes.				
Type of Innovation			Service/service delivery innovation.				
Needs Addressed			<p>Individual's needs:</p> <ul style="list-style-type: none"> Transparent and participative access to public sector services <p>Businesses' needs:</p> <ul style="list-style-type: none"> Streamlined and reliable administrative procedures in the Public Sector Lessen complexity Technology implementation Easy access to public sector information (open data). <p>Governments' needs:</p> <ul style="list-style-type: none"> Participative democracy Accessible public sector information 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development				Type	Quality
			Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	√	Local, Regional, National, International	Direct	Positive
			Quality of Services Provided	√	All levels	Direct	Positive

		Political	Image Modernization	-	-	-	-
			Level of Participation	✓	Local, Regional, National, International	Indirect	Positive
			Transparency	✓	Local, Regional, National, International	Indirect	Positive
			Creation of Trust & Confidence	✓	Local, Regional, National, International	Indirect	Positive
	PS as an Innovation Driver (II)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health				
			Equity & Inclusiveness	✓	Individual	Indirect	Positive
			Privacy & Security	✓	Individual	Direct	Positive/ Negative
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	✓	National	Direct	Positive
			e-Security	✓	All levels	Direct	Positive
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

Component II - Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Greece		
	Assessment	Justification
Existing Infrastructure	<i>Inadequate</i>	<i>No large-scale electronic identity scheme has been developed yet, with the exception of the PKI infrastructure for public servants, which is being developed in the framework of the Syzefxis project.</i>
Legislative framework and regulation	<i>Inadequate</i>	<i>?</i>
IT literacy (PS employees, citizens, businesses)	<i>High</i>	<i>Not many people are familiar with the use of e-Identities.</i>
Political Will	<i>Inadequate commitment</i>	<i>A strong political will is not visible.</i>

3.3.10 e-Signatures

Component I - Impact Assessment

Innovation Actions Description			Citizen to Citizen Transactions; Business to Citizens transactions; eGovernment Services				
Type of Innovation			Service innovation, conceptual innovation.				
Needs Addressed			Businesses’ needs: <ul style="list-style-type: none">Streamlined and reliable administrative procedures in the Public SectorLessen complexityTechnology implementation				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Direct	Positive
		Political	Image Modernization	-	-	-	-
			Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
	Innovation Driver	Economical	Productivity (Labor / Capital / Resource) & Growth	√	All levels	Direct	Positive
			Entrepreneurship	√	All levels	Direct	Positive
			Innovation	-	-	-	-
			Employment	-	-	-	

		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.11 Geographical Information Systems

Component I - Impact Assessment

Innovation Actions Description			Traffic updates; Local services suggestion; Indoor localization services; Integration with cadastral and energy consumption data for tax collection and energy saving purposes.				
Type of Innovation			Service innovation, systemic innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Environmental Amicability Businesses' needs: <ul style="list-style-type: none"> Technology implementation Reduce taxation levels and lessen complexity 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
-Impact Assessment Dimensions - Vertical Dimensions	Innovation Driver	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization		-	-	-
			Efficiency / Productivity		-	-	-
			Sustainability		-	-	-
			Cross-organization Cooperation		√	Local, Regional, National, International	Indirect
			Quality of Services Provided		√	Local, Regional, National	Direct
		Political	Image Modernization		-	-	-
			Level of Participation		-	-	-
			Transparency		-	-	-
			Creation of Trust & Confidence		-	-	-
			Productivity (Labor / Capital / Resource) & Growth		-	-	-
	Innovation Driver	Economical	Entrepreneurship		-	-	-
			Innovation		-	-	-
			Employment		-	-	-
					-	-	-

		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	✓	<i>Local, Regional, National</i>	<i>Direct</i>	<i>Positive</i>
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.12 Internet of Things

Component I - Impact Assessment

Innovation Actions Description			Use of IoT solutions for fall prevention or quick responses; Logistics and Supply Chain Management in the public sector; Health care applications (remote health monitoring; emergency notification systems/contacting the hospital in case of emergencies; telemedicine; early detection of and warning about patients at risk); Transportation-related applications (road condition monitoring; public transport vehicle monitoring system; inter and intra vehicular communication; smart traffic control, smart parking; connected cars (data of mobile phones to compute the density of traffic); electronic toll collection systems; logistic and fleet management; vehicle control; safety and road assistance); Environmental and Disaster Management applications (Energy management; Smart lighting (depending on the twilight value); smart irrigation of green areas; Waste management - management of garbage bins (with individual sensors); Forest fire detection; earthquake or tsunami early-warning systems; Monitoring and controlling operations of urban and rural infrastructures (e.g. bridges, railway tracks, on- and offshore- wind-farms, etc.))				
Type of Innovation			Service/service delivery innovation, systemic innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Inclusive well-being and health Housing and secure shelters Businesses' needs: <ul style="list-style-type: none"> Agile and participative Public Sector Governments' needs: <ul style="list-style-type: none"> Digitization 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (✓)		Extent of Application	Influence	
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	✓	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	✓	Local, Regional, National, International	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	✓	Local,	Direct	Positive

					<i>Regional, National, International</i>		
			Image Modernization	-	-	-	-
	Political		Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
			Productivity (Labor / Capital / Resource) & Growth	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
	Economical		Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	✓	<i>Individual</i>	<i>Direct</i>	<i>Negative</i>
			Prosperity & Well-being	-	-	-	-
	Social		Quality of Education	-	-	-	-
			Quality of Health	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	✓	<i>Individual</i>	<i>Direct</i>	<i>Negative</i>
	Infrastructural		Public Safety	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Transport Infrastructure	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			ICT Infrastructure	-	-	-	-
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Negative</i>
	Environmental		Quality of the Biosphere	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Energy Consumption – Natural Resources Utilization	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Environmental Awareness Creation	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>

Component II - Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<i>The paradigm is taking off in many industries, as a consequence the public sector is being influenced. Mobility, security, environmental protection are just a few examples of current</i>

		<i>applications.</i>
Legislative framework and regulation	<i>Sufficient</i>	<i>Overall the current legislation is not presenting significant hurdles to the diffusion of IoT-based solutions.</i>
IT literacy (PS employees, citizens, businesses)	<i>Moderate</i>	<i>A moderate level of literacy is present in the country.</i>
Political Will	<i>Strong commitment</i>	<i>The commitment on this topic falls under the umbrella of Industry 4.0.</i>

IoT - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Existing Infrastructure	<i>Sufficient</i>	<p><i>Spanish market for IoT accounts for about 9% of the total market of Western Europe, with more than 8.100mn Euro in 2015. According to the data of IDC (International Data Corporation Research), this figure will double in the next three years, reaching 16. 400mn Euro in 2018⁶⁶.</i></p> <p><i>While the main investment drivers in IoT are currently linked to improvements in productivity, customer experience and the speed of reaction to changes in the demand, the most common barriers are still linked to the cost associated with the deployment of IoT projects and the necessary investment in equipment, devices, and infrastructure. Concerns about the safety and privacy</i></p>

⁶⁶ <https://diarioti.com/internet-de-las-cosas-en-espana-cual-es-realmente-la-oportunidad/88825>
<http://www.muycanal.com/2016/06/29/145-millones-dolares-negocio-iot>

		<p>of the data are one of the main barriers in the corporate world when it comes to investment in IoT.</p> <p>Currently, its use and application is framed more in the private field than in the public one, except for the Smart Cities, where local administrations are committed with the provision of best services to their citizens through the use of IoT (environmental policy, waste collection, public transport, etc.)</p> <p>Example in Spanish public administration: http://www.tsc.uniovi.es/blog/?id=4nktc314</p> <p>Orange, Telefonica and Vodafone are boosting the take-off of this industry in Spain and have several projects like Aguas de Valencia, Thinking Things Open, FIWARE, Vodafone Automotive Porsche Car Connect, etc.</p>
Legislative framework and regulation	Inadequate	<p>One of the most sensitive issues in IoT is the allocation of legal responsibilities among data controllers based on the specifics of their respective interventions (device manufacturers, social platforms, third-party applications, device lenders or renters, data brokers or data platforms). In other words, is the smartphone operating system liable for a connected car accident?</p> <p>New forms of consent, new forms of information to the users are needed, but until the creation of a normative that covers specifically this technology, we have to refer to the regulation relative to the protection and privacy of personal data.</p> <p>The right to be disconnected must also be addressed.</p>
IT literacy (PS employees, citizens, businesses)	Moderate	<p>Citizens are demanding IoT services in their cities and public administrations are increasingly managing their infrastructures in an effective way by making use of IoT.</p>
Political Will	Strong commitment	<p>The National Plan for Smart Cities, driven by the Ministry of Industry, comes to corroborate the great effort various Spanish administrations are doing⁶⁷.</p>

⁶⁷ <http://www.agendadigital.gob.es/planes-actuaciones/Paginas/plan-nacional-ciudades-inteligentes.aspx>

3.3.13 Machine Learning

Component I - Impact Assessment

Innovation Actions Description			Adaptive web sites; Text-based sentiment analysis (opinion mining); Natural Language Processing and Speech recognition applications for enhanced customer service; Handwriting recognition; E-mail spam filtering; Recommendation systems; Fraud detection; Network intrusion detection; Machine learning systems for identification over the phone (e.g. via the pulse frequency of the caller); Machine learning systems used in the waiting room of a general practitioner to ask the patient about his/her symptoms and suggest the doctor a first diagnose on which the doctor can agree or disagree.				
Type of Innovation			Service innovation, administrative and organizational innovation, systemic innovation.				
Needs Addressed			Governments' needs: <ul style="list-style-type: none"> • Digitization • Recruitment, training 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	√	Local, Regional, National, International	Direct	Positive
			Efficiency / Productivity	√	Local, Regional, National, International	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	√	Local, Regional, National, International	Indirect	Positive
		Political	Image Modernization	-	-	-	-
			Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
		Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-

			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	-	-	-	-
			Quality of Education	-	-	-	-
			Quality of Health	-	-	-	-
			Equity & Inclusiveness	✓	<i>Local, Regional, National, International</i>	<i>Indirect</i>	<i>Negative</i>
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.14 Natural Language Processing

Component I - Impact Assessment

Innovation Actions Description			Conversational interfaces / Voice interfaces; Automated online assistants (question answering); Sentiment analysis; Native language identification.				
Type of Innovation			Service innovation, policy innovation.				
Needs Addressed			Governments' needs: <ul style="list-style-type: none"> Digitization Rework the trust deficit 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS Modernization (I)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization		-	-	-
			Efficiency / Productivity		-	-	-
			Sustainability		√	Local, Regional, National, International	Indirect
			Cross-organization Cooperation		-	-	-
			Quality of Services Provided		√	Local, Regional, National, International	Direct
			Image Modernization		-	-	-
	PS as an Innovation Driver (II)	Political	Level of Participation		√	All levels	Direct
			Transparency		-	-	-
			Creation of Trust & Confidence		-	-	-
		Economical	Productivity (Labor / Capital / Resource) & Growth		-	-	-
			Entrepreneurship		-	-	-
			Innovation		-	-	-
			Employment		-	-	-
		Social	Prosperity & Well-being		-	-	-
			Quality of Education		-	-	-
			Quality of Health		-	-	-

			Equity & Inclusiveness	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Privacy & Security	✓	<i>Individual</i>	<i>Direct</i>	<i>Negative</i>
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.15 Virtual Reality

Component I - Impact Assessment

Innovation Actions Description			Virtual tours on Museums; Rescue teams training; Citizens training for crisis situations.				
Type of Innovation			Service innovation				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> • Experiential education and training • Environmental Amicability • Modern Workplaces Businesses' needs: <ul style="list-style-type: none"> • Talent acquisitions and retention Governments' needs: <ul style="list-style-type: none"> • Recruitment, training (and IT Literacy) • Resource optimization 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS as an Innovation Driver (II)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	-	-	-	-
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
			Quality of Services Provided	-	-	-	-
			Image Modernization	-	-	-	-
	PS Modernization (I)	Political	Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
		Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
	PS as an Innovation Driver (II)	Social	Employment	-	-	-	-
			Prosperity & Well-being	-	-	-	-

			Quality of Education	✓	<i>All levels</i>	<i>Direct</i>	<i>Positive</i>
			Quality of Health	✓	<i>Individual</i>	<i>Direct</i>	<i>Negative</i>
			Equity & Inclusiveness	-	-	-	-
			Privacy & Security	-	-	-	-
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

3.3.16 Wearables

Component I - Impact Assessment

Innovation Actions Description			Wrist computers; Smart watches; Digital glasses.				
Type of Innovation			Service innovation.				
Needs Addressed			Individuals' needs: <ul style="list-style-type: none"> Inclusive well-being and health Modern workplaces Governments' needs: <ul style="list-style-type: none"> Civil servants as a community of change 				
			Impact Assessment -Horizontal Dimensions				
			Individual Directions Addressed (√)		Extent of Application	Influence	
						Type	Quality
Impact Assessment Dimensions - Vertical Dimensions	PS as an Innovation Driver (II)	Institutional / Capacity Development	Degree of Resources (Capital, Personnel, Infrastructure) Utilization	-	-	-	-
			Efficiency / Productivity	√	Individual	Direct	Positive
			Sustainability	-	-	-	-
			Cross-organization Cooperation	-	-	-	-
		Political	Quality of Services Provided	√	Local, Regional, National, (International)	Direct	Positive
			Image Modernization	-	-	-	-
			Level of Participation	-	-	-	-
			Transparency	-	-	-	-
			Creation of Trust & Confidence	-	-	-	-
	PS Modernization (I)	Economical	Productivity (Labor / Capital / Resource) & Growth	-	-	-	-
			Entrepreneurship	-	-	-	-
			Innovation	-	-	-	-
			Employment	-	-	-	-
		Social	Prosperity & Well-being	√	Individual	Direct	Positive
			Quality of Education	-	-	-	-
			Quality of Health	√	Individual	Direct	Positive

			Equity & Inclusiveness	✓	All levels	Direct	Positive
			Privacy & Security	✓	Individual	Direct	Negative
		Infrastructural	Public Safety	-	-	-	-
			Transport Infrastructure	-	-	-	-
			ICT Infrastructure	-	-	-	-
			e-Security	-	-	-	-
		Environmental	Quality of the Biosphere	-	-	-	-
			Energy Consumption – Natural Resources Utilization	-	-	-	-
			Environmental Awareness Creation	-	-	-	-

Component II - Feasibility Assessment

Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Existing Infrastructure	Sufficient	<p>The existing infrastructure is supporting in parallel the wearables requirements. Current technology is ready to convert ideas in gadgets. Modern technology is the true enabler for the current and future generations of wearable devices.</p> <p>Sensors, Storage, computation, communication and interfaces advances are key for the rapid growth.</p> <p>Other complementary technologies are enabling operation of body-worn devices: miniaturization of electric devices, advances in materials science leading to creation of smart textiles, and flexible electronics, advances in battery technology, energy harvesting, and so on⁶⁸.</p>

⁶⁸ [Wearable Sensors: Fundamentals, Implementation and Applications](#)

Legislative framework and regulation	<i>With Shortcomings</i>	<i>As end-user and private product in most of the cases, there is no inconvenient from legal point of view, and the use is approved in majority of country regulations and by the society in general. Privacy issues, however, still stand.</i>
IT literacy (PS employees, citizens, businesses)	<i>Moderate</i>	<p><i>The success of any innovative product in the marketplace depends on:</i></p> <ul style="list-style-type: none"> <i>• Its effectiveness in successfully understanding the user's needs and meeting them</i> <i>• Its compatibility with or similarity to existing products or solutions</i> <i>• The extent of behavioral change needed to use the new product</i> <i>• The reduction in the cost of current solutions or technologies it aims to supplant</i> <i>• The improvement in the quality of service (or performance)</i> <i>• The enhancement of the user's convenience⁶⁹.</i>
Political Will	<i>Strong commitment</i>	<i>Based on the welfare of the citizen, it is undeniable to think of the use of wearables as something positive for society, which can be strong point of support of politics and base of new political initiatives.</i>

⁶⁹ [Wearable Sensors: Fundamentals, Implementation and Applications](#)

4 Public Sector Future Scenarios

This section consolidates the outcomes of the scenario building exercise (step (vi) of the SONNETS Innovation Identification Framework), which sets the scene for the application of the identified technologies and trends and the respective solutions through a series of hypothetical scenarios. These scenarios have been generated through a crowdsourcing approach involving both the project partners as well as the members of the SONNETS Experts Committee, while they were announced to the public initially during the SONNETS Athens workshop that took place on February 10th, 2017, and then through the Internet. The audience was asked to provide their feedback (using either a specially designed hard-copy templates or through an online web form) on these Key Uncertainties by pointing out which they consider more likely to realise (Probable Scenario) and which they would like to happen (Desirable Scenario).

The responses collected through these means summed up 76 responses (23 from hard-copy templates and 53 from the online form). These were analysed by the consortium and specific threshold points were set to distinguish the different combinations that prevail and lead to scenarios that are different from each other.

The different votes and the threshold points set by the consortium are visible in the following two figures. It needs to be noted that setting different threshold can enable mining different scenarios, however since in this case there was a clear “winning” scenario in each case, these were deemed unnecessary.

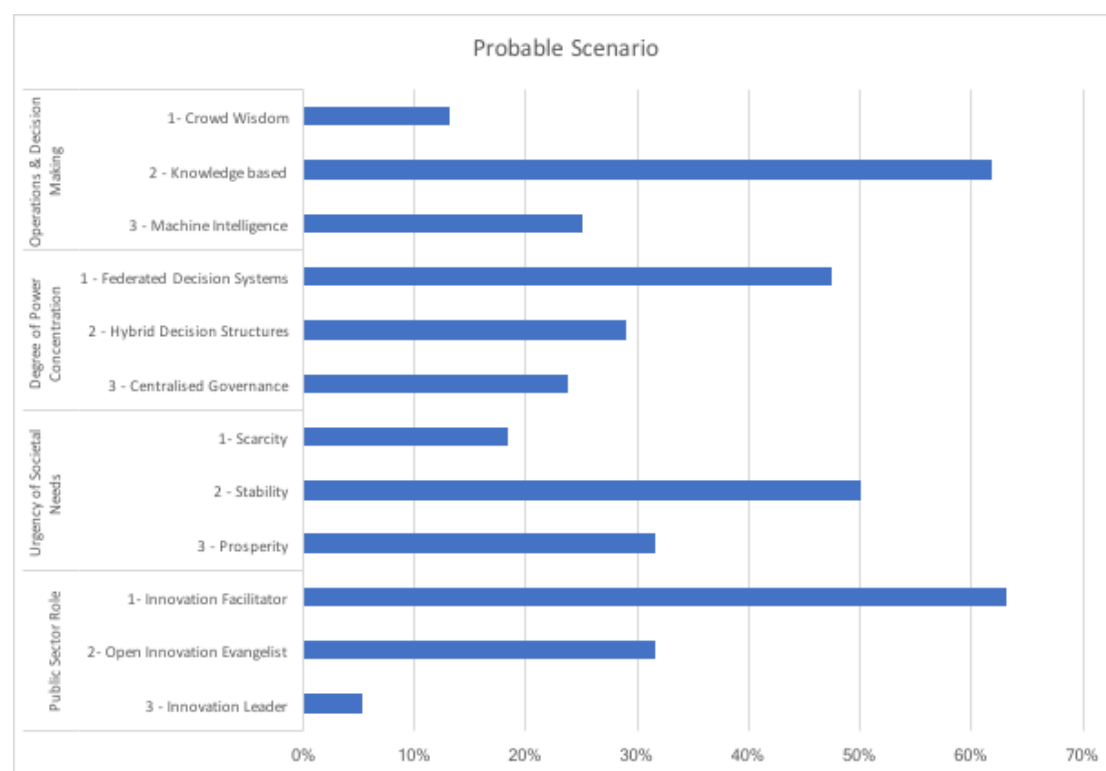


Figure 16: Scoring of Key Uncertainties during the crowdsourcing exercise – Probable Scenario

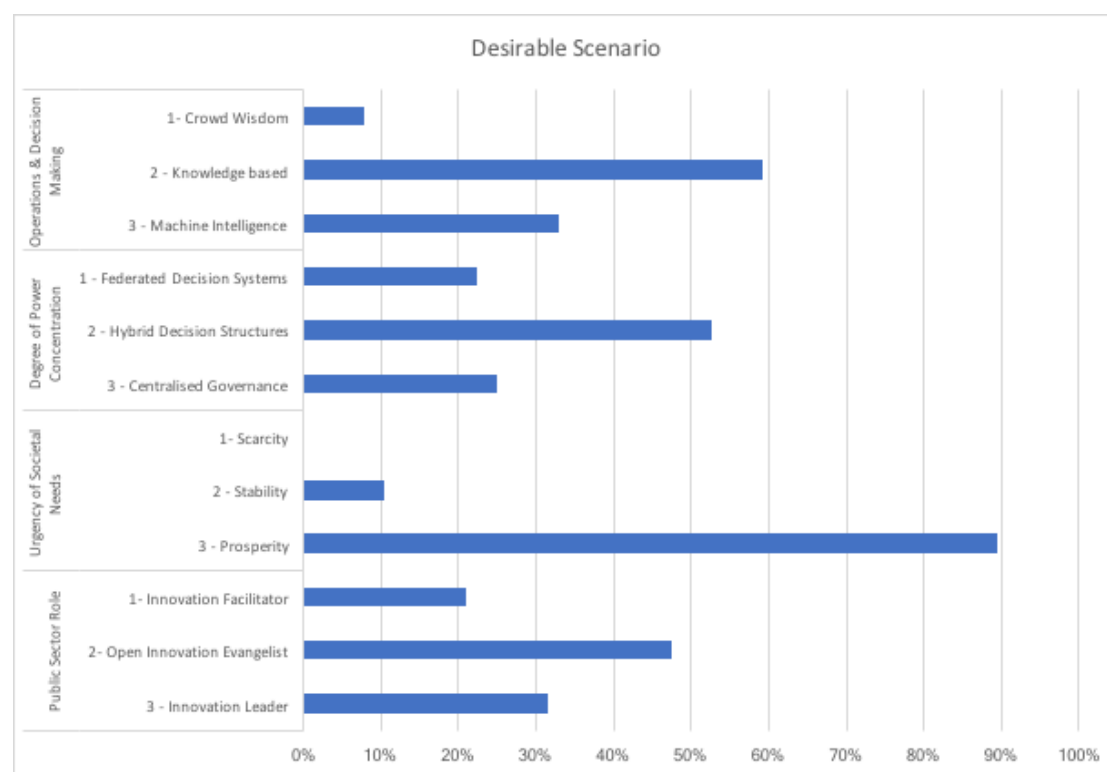
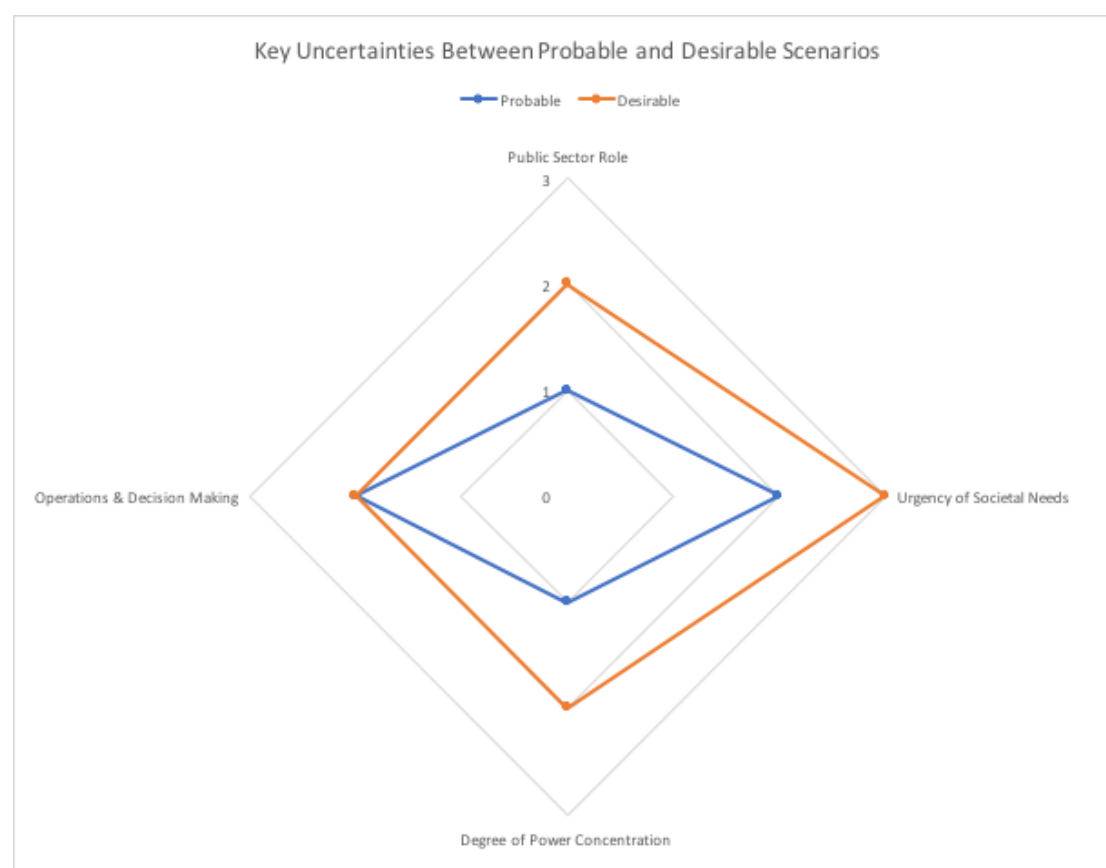


Figure 17: Scoring of Key Uncertainties during the crowdsourcing exercise – Desirable Scenario

The two main scenarios that prevailed, discussed at greater detail in the next section are the following:

- **Probable Scenario** – A gradually self-improving Public Sector building on the developments of today, operating in a mixed manner and being clearly an innovation facilitator. This scenario includes the following values of the Key Uncertainties: Innovation Facilitator, Stability, Federated Decision Systems, Knowledge based.
- **Desirable Scenario** – A revamped, semi-federated Public Sector, embracing Open Innovation, which includes the following values of the Key Uncertainties: Open Innovation Evangelist, Prosperity, Hybrid Decision Structures, Knowledge based.



Public Sector Role	Urgency of Societal Needs	Degree of Power Concentration	Operations & Decision Making
3 - Innovation Leader	3 - Prosperity	3 - Centralised Governance	3 - Machine Intelligence
2 - Open Innovation Evangelist	2 - Stability	2 - Hybrid Decision Structures	2 - Knowledge based
1 - Innovation Facilitator	1 - Scarcity	1 - Federated Decision Systems	1 - Crowd Wisdom

Figure 18: Probable vs Desirable Scenario against the four key uncertainties

4.1 Probable Scenario - A gradually self-improving Public Sector building on the developments of today

4.1.1 Scenario Characteristics and Description

Public Sector Role: Innovation Facilitator

Technology has allowed the Public Sector to take advantage of well tested applications and services. Each organisation is trying to improve itself, utilising broadly adopted ICTs, targeting both image modernisation, productivity gains and better services to the public. Still, however, the Public Sector is considered a technology laggard, with innovations being delivered to it at a later stage than in

other domains compared to the business world. This is mostly due to inability to rapidly change, as well as to invest the necessary resources (financial and human) to catch up with the latest developments and play an active role. However, the Public Sector's willingness to promote innovation sees him trying to support existing movements and technological breakthroughs, mostly indirectly by being more open to the extent this is possible and by supporting innovation schemes that are presented to him and reflect a direct gain for the organisation.

Urgency of Societal Needs: Stability

The stability in economies and societies has allowed the development of global, generally accepted directives, but they remain high-level; there is moderate and more consultative bureaucracy (i.e. suggested frameworks). Local communities are responsible to develop legislation and enforce laws based on their needs and special characteristics. Nevertheless, the way different communities interact is predefined and centrally controlled (e.g. taxes, balance of trade etc.), based on each community's performance and productivity, coming from real big data analysis. As long as the legal frameworks work towards effectively competitive markets, authorities act only when needing to resolve conflicts. Labour market regulations, patent systems and migrations rules are strictly controlled by local centres, and define the relationships among different entities, internally and externally the community.

Degree of Power Concentration: Federated Decision Systems

Power centres are still dispersed, with central authorities providing guidelines, directives and generic strategy recommendations. Decision poles are to be found within each organisation, as there is no unification; an issue that in some times results in disputes, micro-conflicts and unorganised efforts to tackle similar issues. As such, access to information and services depends on the will and mind-set of each organisation, and the same applies to their priorities regarding ICT adoption and innovation generation.

Operations & Decision Making: Knowledge-based

Machines and automation is gaining ground, and people are considered cheap, adaptable workforce, resulting in most operations and processes being machine-intensive. Nevertheless, this high degree of automation has given space to people being involved in more creative tasks, like product design, customised offerings, and unique offerings, which are all factors that give birth to innovation. As a result, operations are mainly knowledge based, conceived, scheduled, controlled and managed by humans, as well as is creativity and innovation.

The next table shows which of the technologies and the trends analysed in the previous sections are expected to strongly contribute towards the realisation of the conditions of this scenario.

Trends / Technologies	Contribution to Key Uncertainties			
	Public Sector Role Innovation Facilitator	Urgency of Societal Needs Stability	Degree of Power Concentration Federated Decision Systems	Operations & Decision Making Knowledge based
API Economy			X	X
Crowdsourcing			X	(X)
Digitalization	X	X	X	
e-Participation	X	X	X	
Gamification				
Mobile Devices				
Open Data	X	X		X
Open Government	X	X		
(Service) Personalization	X			
Policy Making 2.0			X	
Sentiment Analysis				X
Smart Workplace				
Social Networking		X		X
Artificial Intelligence				
Augmented Reality				
Big Data				X
Biometrics				
Blockchain				
Bots				
Cloud Computing		X	X	
Data Analytics	X	X		X
e-Identities	X	X		
e-Signatures	X	X		

Trends / Technologies	Contribution to Key Uncertainties			
	Public Sector Role Innovation Facilitator	Urgency of Societal Needs Stability	Degree of Power Concentration Federated Decision Systems	Operations & Decision Making Knowledge based
Geographical Information Systems	X		X	
Internet of Things			X	X
Machine Learning				
Natural Language Processing				
Virtual Reality				
Wearables				X

Table 3: Main Technologies and Trends Identified pushing towards Probable Scenario

4.1.2 Society-related Characteristics

Public Sector organisations are collaborating to the extent they find mutual benefits, however each one has its own individual agenda. They adopt technology innovations, however are unable not only to foster innovation and pose as innovation leaders, but also to adopt a more open innovation character due to lack of resources, a commonly agreed strategy and their priority of solving still standing societal needs. Citizens continue to play the role of service consumers, receiving improved QoS but not at the same quality level as they do from businesses, while enterprises and SMEs are working together with the public sector to release innovation (through business schemes) in specific occasions where collaboration opportunities are evident and not to be neglected.

Citizens continue to play the role of service consumers, while there are also limited cases where they provide also material that is used by the Public Sector to build services and assets. They follow the technological trends and developments, using more and more technology to assist not only their working conditions but also their personal life, such as wearables, smart devices, sensors etc. However, they are still troubled when it comes to access certain public services, while the different levels of management (and provision) of such services by their owners (public sector organisations) makes their situation even more troubling.

Enterprises/SMEs contribute efficiently to the economy, as they are the main drivers of innovation, while they are also trying to tackle societal needs through responsible CSR schemes. However, going global is still an issue, due to scattered regulations and laws (following the “federalisation” stream). Their relationship with the Public Sector has improved over the last years, as they are co-producing services, based partially on assets and support schemes offered by the Public

Sector. However, they are tightly bound, and at the same time constrained, by the Public Sector's will; nevertheless, innovation support by the latter is constantly improving.

Entrepreneurs are considered romantics and visionaries, trying to innovate on their own with little support from the public sector, both in terms of funding but also in terms of infrastructure and assets sharing. They see the public sector in most of the cases as an impeding factor to letting them innovate, acknowledging however important steps forward taken by the public sector and trying to use the maximum out of the little available assets offered by the latter. As such, they turn to private incubators and accelerators that are able to get their innovations to the market faster, providing better services but taking a large piece of equity in return.

4.2 Desirable Scenario: A revamped, semi-federated Public Sector, embracing Open Innovation

4.2.1 Scenario Characteristics and Description

Public Sector Role: Open Innovation Evangelist

The Public Sector is amongst the leaders in adopting new technologies and trying them out, initially in experimental testbeds and later, once they come closer to maturity and social acceptance, in its production cycle. Transparency and openness is a key priority amongst organisations and there are little ownership concerns, as there is a movement to give back to the people the assets that have been produced with their money as taxpayers.

However, the fast ICT adoption rates are not automatically proclaiming the Public Sector to an Innovation Leader, as due to various reasons (amongst which is the structure of the economy and the deregulated markets in the various regions) innovation is still coming out of the private sector. Nevertheless, the Public Sector contributes heavily to promoting and boosting innovation, through offering assets, knowledge and funding, acting as a donor of raw material to be transformed into innovative products and services by experts.

Urgency of Societal Needs: Prosperity

Society has eventually found ways to overcome the different economic, environmental and societal barriers that existed in the beginning of 2010. New natural energy resources, which do not harm the environment, have been found and energy shortage is no longer an issue, resulting in increased machinery utilisation and computer power. There are various social benefits for individuals, while increased quality of life, and high average income per capita and the better education, very low unemployment rates and the prolongation of human life have turned societies more peaceful. Wealth is distributed in a fair way and social equality is all around, while access on education and health are equal to everyone.

Degree of Power Concentration: Hybrid Decision Structures

The world, following the prosperity witnesses has made great progress towards unification and central decision making. Governments have joined forces and in

some crucial areas such as the ones under the most pressing societal challenges of the past, decision are taken centrally by cross-country decision boards that all respect the same rules and work for the mutual benefit. However, in other areas, such as finance, education, health etc. a more federalised approach is evident, as the different socioeconomic levels of the population amongst each country does not allow for unification. To this, cultural differences are also playing a role, as past conflicts are still too fresh to be phased out of people's minds.

Operations & Decision Making: Knowledge-based

Living in a world of prosperity has given humanity the resources to continuously invest on automation and robotics, and intense labour tasks (And dangerous ones) are fully taken care of by computers. People retain creative tasks and ones which are easy and pleasant to perform, enjoying the most out of technology but at the same time not handing over the important decisions and management of technology to machines too.

The next table shows which of the technologies and the trends analysed in the previous sections are expected to strongly contribute towards the realisation of the conditions of this scenario.

Trends / Technologies	Contribution to Key Uncertainties			
	Public Sector Role Open Innovation Evangelist	Urgency of Societal Needs Prosperity	Degree of Power Concentration Hybrid Decision Structures	Operations & Decision Making Knowledge based
API Economy	X	X		X
Crowdsourcing			X	(X)
Digitalization	X	X	X	
e-Participation	X	X	X	
Gamification		X		
Mobile Devices	X	X		
Open Data	X	X	X	X
Open Government	X	X	X	
(Service) Personalization	X	X	X	
Policy Making 2.0	X	X	X	
Sentiment Analysis	X			X
Smart Workplace		X		

Trends / Technologies	Contribution to Key Uncertainties			
	Public Sector Role Open Innovation Evangelist	Urgency of Societal Needs Prosperity	Degree of Power Concentration Hybrid Decision Structures	Operations & Decision Making Knowledge based
Social Networking	X	X		X
Artificial Intelligence				
Augmented Reality		X		
Big Data	X	X		X
Biometrics		X		
Blockchain		X		
Bots		X		
Cloud Computing		X	X	
Data Analytics	X	X		X
e-Identities	X	X	X	
e-Signatures	X	X	X	
Geographical Information Systems	X	X	X	
Internet of Things		X	X	X
Machine Learning		X		
Natural Language Processing		X		
Virtual Reality		X		
Wearables		X		X

Table 4: Main Technologies and Trends Identified pushing towards Desirable Scenario

4.2.2 Society-related Characteristics

The Public Sector has become more open and collaborative than ever before. The realisation of up taking ICTs very early on has renovated the way the Public Sector operates and the different stakeholders enjoy a better service experience in all dimensions. This has also contributed heavily to prosperity and to overcome societal challenges, as many of those have been tackled through innovations that were indirectly backed up by the public sector. Thus the latter acts as an

innovation facilitator, rather than a leader, having realised that there might be more rapid impact generated by third parties utilising its own resources and assets, as itself it is too big and too slow to act according to the paces of the modern era. As such, SMEs and Enterprises are very active in every aspect of decision making and social innovation is constantly gaining ground, becoming the dominant form behind the important changes that are happening.

Citizens are amongst the key innovators in the society. The Public Sector has transformed in their eyes from a bureaucratic beast to a valuable partner, which provides them all the necessary assets that are needed to fulfil their visions for a better society. Intense use of ICTs allows them to interconnect and collaborate in unprecedented ways, taking advantage of the wisdom of the crowd and realising collaborative decision making structures that tackle societal issues right in their roots, efficiently and effectively.

Enterprises/SMEs are the main innovation leader in this world. They build on the support and the offerings of the Public Sector and deliver services and products that are not solely targeting profitability; a balance between profits and social good has been struck and everybody in the business world is respecting this as the current market prosperity conditions are highly attributed to innovations that have solved everlasting societal challenges.

Entrepreneurs are the most passionate citizens that aim to take advantage of the current conditions to develop business ventures that at the same time are benefiting the society. As such, social entrepreneurship is a very hot topic, and there is a constant collaboration with the Public Sector to identify opportunities and get support for their ideas. At the same time, a very well collaboration culture is being developed between entrepreneurs and Enterprises/SMEs, which see more benefits in collaborating and mutually complementing each other, rather than being antagonists and working in a competitive fashion.

5 Results Validation

SONNETS has pursued the validation of its findings by coupling offline validation with online feedback, through the organisation of a physical workshop and an online consultation respectively. In this respect, this Section summarizes the outcomes and progress of these activities.

5.1 SONNETS Workshop on “Emerging ICTs and Innovation Potential for the Public Sector”

SONNETS organized a validation workshop, as per the needs of WP3, which took place in The Cube, Athens, on 10th February 2017. The workshop, scheduled as a half-day session between 10:00 and 16:00, had a strong focus around emerging technologies and trends and aimed at presenting and validating key project outcomes and in particular the SONNETS Innovation Identification Framework for the Public Sector and the results of its application in the context of the project.

The event hosted additionally presentations of affiliated projects and initiatives, and talks by key stakeholders in the field of public sector transformation. It further included a short panel discussion, during which the members of the SONNETS Experts Committee expressed their own views on the outcomes of the project and the talks that took place during the day and were engaged in an open discussion with the audience. At the end of the workshop participants also handed in their feedback to the consortium, by answering a short questionnaire, designed especially for this purpose.

The event was overall met with great success as it attracted the participation of an audience of 38 people, representing the public sector, the business and research communities. The materials prepared for the WP3 validation workshop (an invitation letter, the workshop agenda and the questionnaire) can be found in Appendices I to III.

The main outcomes of the validation workshop concern the identification of the most important technologies that could impact the public sector in the following years, the major societal needs, the desired and actual role of the public sector in the near future, the innovation dimensions that the public sector should focus more on, and the barriers that hinder public sector innovation and are discussed in the following paragraphs.

As far as the technologies that could impact the public sector in the following years are considered, Big Data (56,5%) along with Data Analytics (47,8%) are the technologies that have attracted the majority of votes. The results indicate that Cloud Computing (39,1%) and e-Signatures (39,1%) are considered as equally significant, whereas the top 5 of the most important technologies is completed by Artificial Intelligence and Open Data, both found at the fourth place with 30,4%.

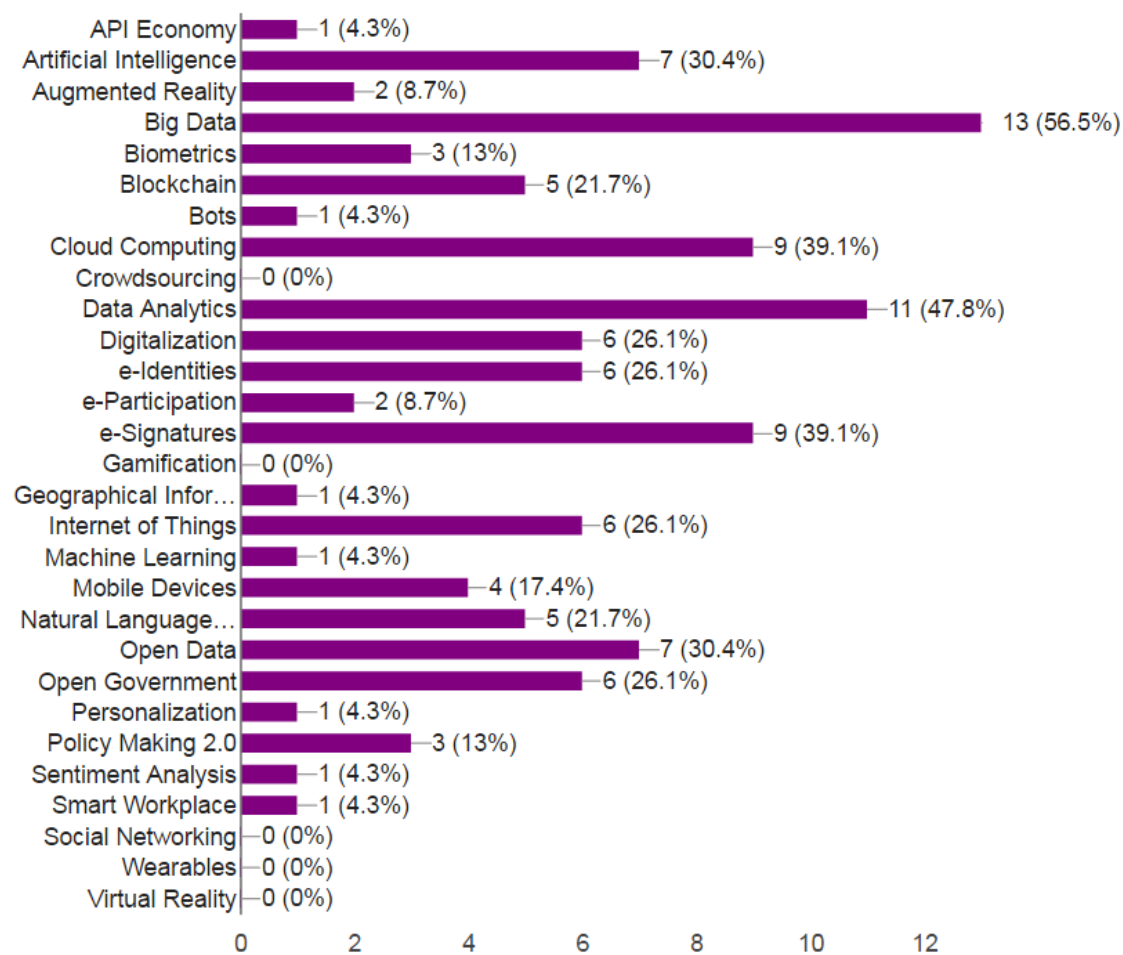


Figure 19: Distribution of respondents' beliefs around the most important technologies that could impact the public sector in the following (five) years

On the level of the innovation dimensions that the public sector should focus more on, respondents have emphasized the aspect of "Public Safety" with 60,9%, whereas they have further highlighted the aspects of "Transparency", "Quality of Education", and "Energy Consumption" with 56,5%. Respondents have further brought up the dimensions of "Productivity" at the economical domain with 52,2%, "Creation of Trust and Confidence" with 47,8%, "Quality of Internal Organization" and "Innovation" with 39,1% and "Efficiency/Productivity", "Prosperity and Well-being" and "Environmental Awareness Creation" with 34,8%.

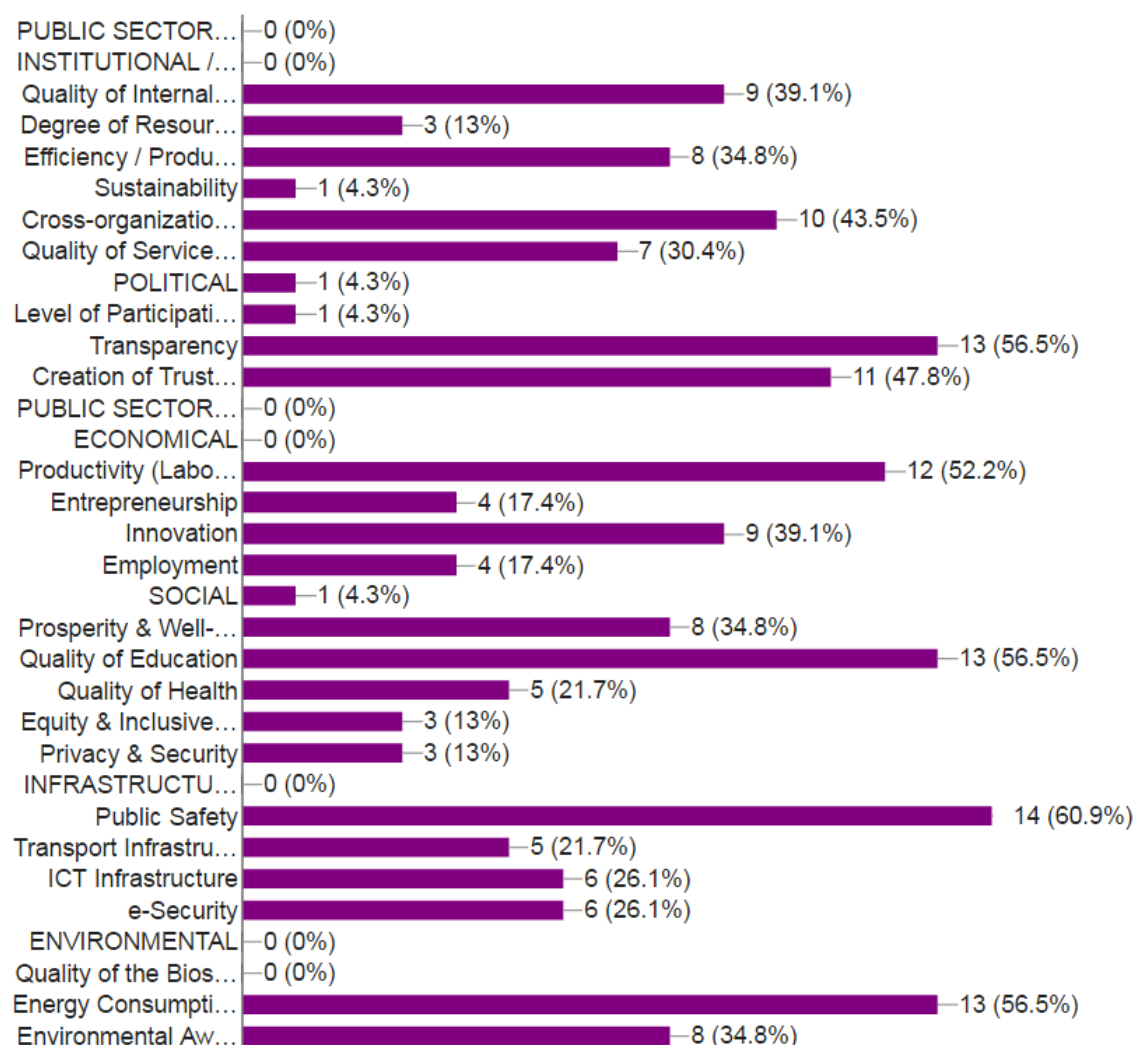


Figure 20: Innovation dimensions on which the public sector should focus

Workshop participants were finally asked to rate on a five-level scale the impact of a number of factors (1: low impact – 5: high impact), acting as barriers that hinder innovation in the public sector. These factors include low IT literacy, low interoperability, lack of trust by citizens, inadequacy of the legal framework, lack of finance, and lack of strategy.

The results are as shown in the following figures and indicate that 39,1% attributes a high impact to the lack of strategy (impact level: 5), whereas an equal percentage considers the lack of finance as a major inhibiting factor as well (impact level: 4). The same impact level is reserved by the majority of respondents to the inadequacy of the legal framework (30,4%). A more moderate impact is last but not least attributed by the majority of respondents to the low IT literacy (43,5%), the lack of interoperability (30,4%) the lack of trust by citizens (26,1%).

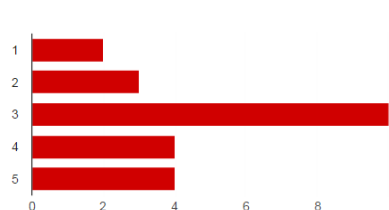


Figure 21: Low IT Literacy



Figure 22: Low Interoperability

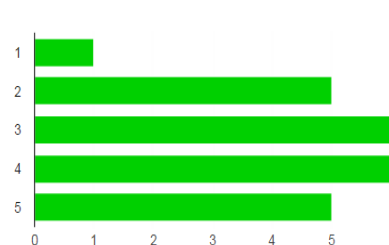


Figure 23: Lack of Trust by Citizens

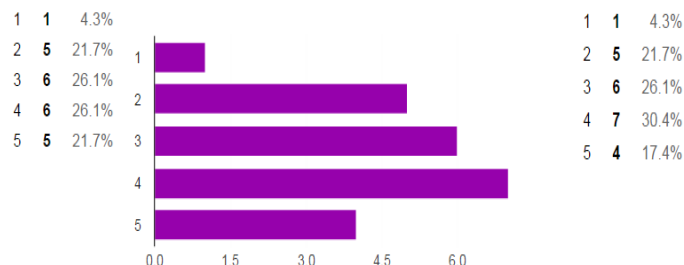


Figure 24: Inadequate Legal Framework

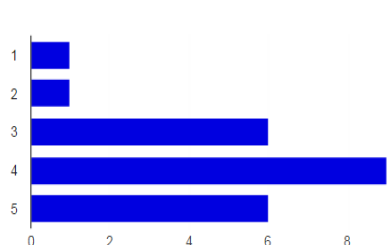


Figure 25: Lack of Finance

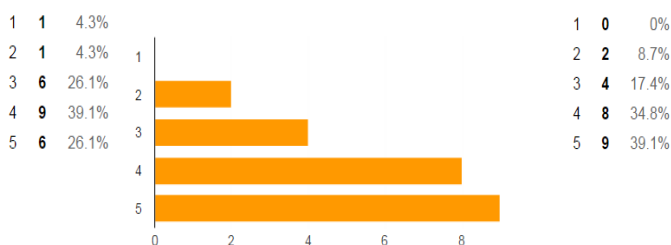


Figure 26: Lack of Strategy

5.2 SONNETS Public Consultation




Besides the validation workshop that has already been organized, SONNETS consortium has conducted an online consultation. The latter pursues to validate the results of WP3 and is to be carried out with the help of an online questionnaire, available at <https://goo.gl/forms/rDWbTQnN8qzQD67x1>.

Feedback was also acquired regarding the role of the Public Sector and the Key uncertainties that allowed the consortium to develop the different scenarios. The metrics of those are presented in Section 4 of this document.


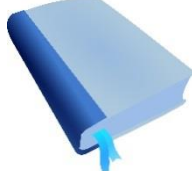

Finally, it is noted that after the workshop, the questionnaire has been revised in order to further accept responses after the end of WP3, and has been made also available through the project's website. In particular, the most important assets produced by WP3 (e.g. the SONNETS Innovation Identification Framework, as well as the "taxonomy" of technologies and their assessment) will be posted on the project portal, providing room for further improvements by all interested stakeholders. A relevant announcement will further be made through the Futurium platform⁷⁰.

⁷⁰ European Commission – Futurium <https://ec.europa.eu/futurium/en>


6 Conclusions

 <p>©openclipart.org</p>	<p>What is the purpose of this report?</p> <p>This report follows three different purposes. Firstly, it provides an updated and validated version of the <i>SONNETS Innovation Identification Framework</i>. This framework has built the basis of the methodology of SONNETS for collecting, analysing and cross-checking the usability of emerging ICTs in the public sector. Apart from guiding the activities within the project it is also a self-standing methodological aid for supporting the public sector's ICT transformation.</p> <p>Secondly, this report updates and <i>extends the outcomes of D3.2</i> and as such presents the results of the innovation identification analysis as well as the related scenario development exercise (step 5 and 6 of the SONNETS Innovation Identification Framework methodology).</p> <p>Thirdly, the outcomes of the SONNETS WP3 <i>Validation Workshop</i> and other validation activities are summarised (step 7 of the SONNETS Innovation Identification Framework methodology).</p>
 <p>©openclipart.org</p>	<p>Which objective of SONNETS does this report pursue?</p> <p>The related tasks to this report pursue the following objectives:</p> <ul style="list-style-type: none"> • The evaluation of ICT services' and solutions' innovation potential in terms of both their impact and feasibility • The selection of some ICT services and solutions that make more sense to be ported to the public sector through the development of adequate scenarios • Evaluation and updating of overall WP3 results through validation activities (workshop and online consultations)
	<p>Which methods form the basis for this report?</p>

©openclipart.org	<p>SONNETS pursues the aim to support innovation both <i>in</i> the public sector and through the public sector as an innovation driver with a focus on other policy domains.</p> <p>In the preceding report (D3.2) the results of the first four steps of the SONNETS methodology have been presented:</p> <ol style="list-style-type: none"> 1. Identification of societal needs and trends that need to be met by public sector services 2. Identification of emerging ICT technologies and trends 3. Analysis of these ICT technologies and trends in terms of their key characteristics and specificities 4. Assessment of these ICT technologies regarding their potential to meet societal challenges and public sector needs <p>In the report at hand the steps 5 to 7 of the methodology have been applied:</p> <ol style="list-style-type: none"> 5. Evaluation of the innovation potential of these solutions regarding their impact and feasibility <ul style="list-style-type: none"> ➤ As far as the <i>impact assessment</i> component is concerned criteria as the potential scope of application, the type and quality of influence of the identified solutions and technologies against a number of innovation dimensions, related to the public sector and other policy domains are taken into account. ➤ Regarding the <i>feasibility issues</i> the existing ICT infrastructure and know-how, the status of the related legislative framework and regulation, the readiness of the stakeholders involved as well as the political will demonstrated in the specific application context are taken into consideration. 6. Development of scenarios to validate the usability of a specific technology in the public sector:
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	<p>➤ The scenarios, generated through a brainstorming approach, are structured and differentiated along the axes of the public sector's role, which can be the leading one (public sector as the lead innovator) or a more supportive one (public sector as innovation facilitator), and the urgency of identified needs, which ranges from low to high. The selection of the ICT solutions is then based on the specification of the most desired and most probable public sector future scenarios.</p> <p>7. Evaluation of the overall findings of SONNETS (during the WP3 Valuation Workshop and online surveys) to include the insights and opinions of a broad range of experts.</p>
 <p>©openclipart.org</p>	<p>Which stakeholders have been involved in the process?</p> <p>This report uses information from the 38 participants of the WP3 Valuation Workshop and will in the upcoming weeks use further input from the SONNETS public consultation.</p>
 <p>©openclipart.org</p>	<p>How will this report be used within the project?</p> <p>Together with the preceding report (D3.2) this report will be used in WP4 as a compendium of emerging ICT technologies and trends.</p> <p>The SONNETS Innovation Identification Framework ensures that ICT technologies and trends further to be analysed in WP4 already link societal and public sector needs with emerging technologies by means of specific innovation solutions.</p>
 <p>©openclipart.org</p>	<p>What are the next steps?</p> <p>In WP4 the identified emerging technologies and trends will be further analysed (e.g. regarding current research activities, technology readiness level and relevant actors) by applying a reverse engineering approach to estimate the "distance" to be covered for these solutions to be implemented.</p>

I. APPENDIX A: Workshop Invitation



**SONNETS Workshop on
"Emerging ICTs and Innovation Potential
for the Public Sector"**

**On Friday, February 10th, 2017, 10:00 a.m.
The Cube, Athens, Greece**

We are pleased to invite you to the *SONNETS Workshop on "Emerging ICTs and Innovation Potential for the Public Sector"* where you can become an actor in the transformation of the public sector into a technology and innovation leader.


SONNETS ("**S**ocietal **N**eeds **a**nalysis and **E**merging **T**echnologies in the public **S**ector") is a project funded under H2020-EURO-6-2015 and aims at renovating the way the public sector operates by suggesting a concrete set of actions that will place the former in the front line of tackling societal challenges. As such, the project lays emphasis on the identification of emerging technologies and trends and the development of a roadmap for their rapid porting into public services and into policy domains, where innovation co-exists with increased levels of effectiveness and efficiency. You may find more information at [project website](#).


The workshop, scheduled as a half-day session between 10:00 and 16:00, has a strong focus around emerging technologies and trends and aims to present key project outcomes, as well as host presentations of affiliated projects and initiatives, and talks by key stakeholders in the field of public sector transformation. A provisional agenda for the workshop can be found attached.

As an expert in the issues addressed by the SONNETS project, your participation in the workshop is highly valued and your opinions are important to the discussions on the project outcomes and the process of shaping the future of the public sector. Please note that participation to the workshop entails no fee and that the SONNETS consortium reserves the right to reimburse travel and subsistence costs for a limited number of participants.


Should you be interested in attending our workshop, kindly complete the online registration for the workshop [here](#).

We look forward to hearing from you and welcoming you in Athens


 **SONNETS**




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[SONNETS project](#)

II. APPENDIX B: Workshop Agenda

Time	Description	Presenter
09:45-10:15	Arrival of the participants – Welcome (coffee, tea)	
10:15-10:20	Welcome Speech	Prof. Dimitris Askounis
10:20-10:40	The SONNETS project: An Introduction	Ms. Nuria Rodriguez Dominguez
10:40-11:15	The SONNETS Innovation Identification Framework & Major societal challenges and needs of the Public Sector	Dr. Sotirios Koussouris
11:15-11:30	SONNETS Roadmap for emerging research directions	Dr. Sonja Grigoleit
11:30-11:45	Coffee Break	
11:45-12:00	Emerging technologies for the public sector	Dr. Aljosa Pasic
12:15-12:30	The CLARITY project: Enhancing the up-take of open eGovernment services in Europe	Dr. Thordis Sveinsdottir
12:30-12:45	Public sector innovation in social services: the potential of ICT-enabled social innovation. The IESI research project	Mr. Csaba Kucsera
12:45-13:00	VisiOn - Visual privacy management of user's data for public administrations	Dr. Emmanouil Kafetzakis
13:00-14:00	Light Lunch Break	
14:00-14:15	Digitally Based Open and Collaborative Services	Mr. Francesco Mureddu
14:15-14:30	City4Age - Elderly-friendly city services for active and healthy ageing	Ms. Eirini Stafyla Ms. Ilia Christantoni
14:30-14:45	Public entities Innovation Potential in eHealth - Six barriers for adopting new eHealth solutions and strategy to overcome them	Ms. Ana Duran
14:45-15:00	OpenGovIntelligence: Improving public services with statistical linked data	Mr. Evangelos Kalabokis
15:00-16:00	Talks by the SONNETS Experts Committee and short panel discussion (moderated by SONNETS)	Prof. Yannis Charalabidis Dr. Filippo Addarii Mr. Giorgio Da Bormida
16:00	Closing	

III. APPENDIX C: Questionnaire

Name: _____

Country: _____

Email: _____

1. Put an X on the TOP 5 most important technologies / technological trends that could impact the public sector in the following (five) years?

- | | |
|---|--|
| <input type="radio"/> API Economy | <input type="radio"/> Geographical Information Systems |
| <input type="radio"/> Artificial Intelligence | <input type="radio"/> Internet of Things |
| <input type="radio"/> Augmented Reality | <input type="radio"/> Machine Learning |
| <input type="radio"/> Big Data | <input type="radio"/> Mobile Devices |
| <input type="radio"/> Biometrics | <input type="radio"/> Natural Language Processing |
| <input type="radio"/> Blockchain | <input type="radio"/> Open Data |
| <input type="radio"/> Bots | <input type="radio"/> Open Government |
| <input type="radio"/> Cloud Computing | <input type="radio"/> Personalization |
| <input type="radio"/> Crowdsourcing | <input type="radio"/> Policy Making 2.0 |
| <input type="radio"/> Data Analytics | <input type="radio"/> Sentiment Analysis |
| <input type="radio"/> Digitalization | <input type="radio"/> Smart Workplace |
| <input type="radio"/> e-Identities | <input type="radio"/> Smart Workplace |
| <input type="radio"/> e-Participation | <input type="radio"/> Wearables |
| <input type="radio"/> e-Signatures | <input type="radio"/> Virtual Reality |
| <input type="radio"/> Gamification | |

2. Which are top 3 societal needs in your country

1 _____

2 _____

3 _____

3. Which would you believe should be the role of the public sector in the near future? Please put a cycle.

a. lead innovator

b. innovation facilitator

4. Which do think will be the actual role of the public sector in the near future? Please put a cycle.

a. lead innovator

b. innovation facilitator

5. Which do you think are the innovation dimensions the public sector should focus more on? Please put a circle to each one.

Public Sector Modernization

- Institutional/ Capacity Development
 - Degree of Resources (Capital, Personnel, Infrastructure) Utilization
 - Efficiency / Productivity
 - Sustainability
 - Cross-organization Cooperation
 - Quality of Services Provided
 - Image Modernization
- Political
 - Level of Participation
 - Transparency
 - Creation of Trust & Confidence
- Energy Consumption – Natural Resources Utilization
- Environmental Awareness Creation

Public Sector an Innovation Driver

- Economical
 - Productivity (labour / Capital / Resource) & Growth
 - Entrepreneurship
 - Innovation
 - Employment
- Social
 - Prosperity & Well-being
 - Quality of Education
 - Quality of Health
 - Equity & Inclusiveness
 - Privacy & Security
- Infrastructural
 - Public Safety
 - Transport Infrastructure
 - ICT Infrastructure
 - e-Security
- Environmental
 - Quality of the Biosphere

6. Which barriers hinder innovation by the Public sector most: Please rate from 1 to 5 (1 low impact – 5 high impact) – Please put an X.

		1	2	3	4	5
a. Low IT literacy	0	0	0	0	0	
b. Low Interoperability		0	0	0	0	0
c. Lack of Trust by Citizens		0	0	0	0	0
d. Inadequate Legal Framework		0	0	0	0	0
e. Lack of Finance		0	0	0	0	0
f. Lack of Strategy		0	0	0	0	0
g. Other (Please specify)		0	0	0	0	0

IV. APPENDIX D: Public Consultation Preliminary Outcomes

In the current section the reader may find some preliminary input gathered through the online consultation that is currently running in the context of validating the outcomes of WP3.

Respondent 1

Biometrics - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Complete</i>	<i>"3M, in their security division, has a long experience in biometrics, and providing solutions to organizations and countries."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Based fingerprint biometrics solutions are used from long time ago in a stable legislative framework. Facial has an inadequate legislative framework basically because it is a not immersive technology, which different private rights regulations."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"Fingerprints as very matured is handled properly by experts and customers. Facial, as new efficient tech, is demanding new level of expertise."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Biometrics is still out of scope from political point of view. The governments use this technology because of security reasons. Private companies start using biometrics as it is demanded by society."</i>

Respondent 2

Gamification - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Innovation is strong in Atos, with the organisation participation in many R&D projects (e.g.. H2020, FP7, etc)."</i>

Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Budget is always limited, and not all senior management is open to new initiatives related to innovative ways of doing things (e.g., gamification)."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>High</i>	<i>"I understand that ARI (Atos R&D branch) has been involved in several projects where gamification was a key topic."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Already answered, sometimes it is difficult to "sell" these new approaches to senior management."</i>

Respondent 3

Wearables - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"The technology is starting to be used."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Policies and regulations related to wearables in Health are well-known and established even at international level."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"As this technology is starting to be implemented, not everybody is aware of the technology."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Priorities in Public Health are not in wearables for the moment, there are other pendant issues that are even more important."</i>

Respondent 4

Artificial Intelligence - Feasibility Assessment Dimensions
Assessment for Spain

	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"There are good enough research groups but industry based AI applications are not."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Not familiar with them, so cannot provide a valuable input here."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>High</i>	<i>"Academic level in AI is high."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"No sure about the political will in AI."</i>

Respondent 5

Internet of Things - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"Reinventing the wheel constantly, Harder to achieve goals than it seems."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Usually it is not a policies/regulation problem."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Low</i>	<i>"There is no know-how at a high level inside companies."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"The politicians do not know the technologies and usually spend the money in a wrong way."</i>

Respondent 6

Geographic Information Systems - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Although in my work environment this issue is not a priority, if you have the necessary tools to enable the necessary developments in the work covered."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"The existing regulations in this field are perfectly established by the competent bodies and following the European regulations."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Low</i>	<i>"It is not a priority issue for the part of our organization where I develop my work."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"This topic is not the focus of the work that my organization wants to develop."</i>

Respondent 7

Smart Workplace - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Sufficient knowlegde about what should be implemented and used."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"Regulation is not clear and not wide spread on relation to this."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"Depending on the type of company this literacy is bigger or smaller."</i>

Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"The adoption of the Smart Workspace from my point of view requires a cultural change that is not really implemented yet in Spain. This topic is not the focus of the work that my organization wants to develop."</i>
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Respondent 8

Smart Workplace - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Complete</i>	<i>"ATOS has ATOS Codex which is an open, powerful and secure analytics platform that allows companies and organizations to get value out of big data to be successful in their markets."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"In Spain there are not specific obligations on big data. It is therefore permitted, provided that it complies with all obligations in data protection legislation, especially obligations related to purpose limitation, information, consent, transfer to third parties, international data transfers, contractual obligations to data processors and security measures. Nevertheless, big data is currently a topic focus for the data protection regulator."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"In Spain there is still a lack of experts trained in Big Data and Data Analytics."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	<i>"There is a big data initiative in Spain where the main agents are the Industrial Technology Development Center (CDTI), Economy and Competitiveness Ministry (MINECO), Industry, Tourism and Commerce Ministry (MINETUR) and the Agriculture, Food and Environment Ministry (MAGRAMA)."</i>

Respondent 9

Digitalisation - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification

Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Complete</i>	"Although digitalization may not be a very common concept for many people in the country, digital services are present everywhere. Moreover, Spain has been pioneer in some digitalization processes, such as DTT deployment. And of course, the knowhow is very complete in my organization."
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	"Legislative efforts for digitalization have been intense during the last years. An example is the Spanish digital agenda. However, digitalization is not deployed in some key public sectors, such as the courts."
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>High</i>	"The stakeholders are aware of importance of digitalization (the technology I have chosen). And of course this is obvious in my organization, which is a technological company."
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	"I have chosen "strong commitment" due to initiatives such as the Spanish Digital Agenda. In fact, the respective ministry has changed its name to include this idea."

Respondent 10

Internet of Things - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Complete</i>	"The IoT is already present in many services running. It is a lot of areas where IoT is enabling new services and opportunities since 2010, this has helped to identify the main weaknesses and support of the drafting of recommendations and the polishing of platforms and technologies."
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	"Even being present for a long time, it is necessary to develop further regulation that prevent the disaggregation of the technologies and building more walls."
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>High</i>	"We have multiple resources coming from ongoing projects and also from the experts community inside my organisation. The documentation is easy to find and complete."
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	"They are taking IoT so as to promote Smart City concept, however, even pushing the technology the decisions made are more based on marketing than pure service development."

Respondent 11

Cloud Computing - Feasibility Assessment Dimensions		
Assessment for Estonia		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Complete</i>	<i>"Running our own cloud, deployed and operated several hybrid cloud solutions."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Security regulations allowing cloud computing for public sector are still in preview phase."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"Both very good and very bad examples exist, on average it is moderate across both public and private sector."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	<i>"The tradeoffs are clear and there is a desire to become better."</i>

Respondent 12

e-Identities - Feasibility Assessment Dimensions		
Assessment for Germany		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Laws and rules are aligned with the EU legislation, infrastructure and knowhow is being developed but the use of e-ID is reduced among the citizens."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Regulations aligned with the European ones."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Low</i>	<i>"Not too much people use eID."</i>

Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Laws and regulations are developed but a real political commitment is needed."</i>
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Respondent 13

Cloud Computing - Feasibility Assessment Dimensions		
Assessment for ???		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"As any other "new technology" it is used by everyone without a real and deep knowledge of it. This is a problem because sometimes the people get different inputs from the same technology."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"To be honest, I don't know the existing regulations in my country to answer correctly this question."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"The knowledge of this technology is increasing by the stakeholders."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"There are some interests by politicians to increase the use of this technology, but it's not enough."</i>

Respondent 14

Cloud Computing - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	-
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with	<i>Inadequate</i>	-

regard to the chosen technology		
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>High</i>	-
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	-

Respondent 15

Open Data - Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Sufficient for first needs, but they must be implemented for wider processes."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"ICT policies are challenging for a local body. Open data are particularly challenging, and our City accepted this challenge."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"ICT stakeholder community is not that easy to be looked at. It takes time and special tools and educational processes."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Difficult to be answered."</i>

Respondent 16

Data Analytics - Feasibility Assessment Dimensions		
Assessment for United Kingdom		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with	<i>Sufficient</i>	<i>"Sufficient but we aim to improve further."</i>

regard to the chosen technology		
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Lot of work ongoing around improving the legislative state across UK as well as widely in EU."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"There is a big skills gap in this arena however technology can help."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	<i>"Very strong commitment throughout local as well as central governments."</i>

Respondent 17

Big Data - Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"The European big data market has the second largest market share, 20% in terms of revenues worldwide. Germany, the UK, France, and Italy are key countries in this market. Investments are ongoing from both the public and private sector to deploy and test prototype applications in several different domains."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Being an emerging phenomenon, big data "per se" is not framed within any consolidated policy scheme. Likewise, legislation and regulation are not developed "ad hoc" but usually derive from those already existing in the area of privacy and personal data protection. However, big data related processes are often wholly new and require further consideration (see e.g. the case of data anonymization and de-anonymization)."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Low</i>	<i>"A very specialist knowledge is associated with big data, which largely exceeds any level of IT literacy. Data literacy education is still at its infancy in every country. Despite a few laudable initiatives promoting data visualization (starting from Google Analytics), we are too far away from really democratizing access to and use of big data."</i>
Rate the Political Will witnessed in your country/organisation to	<i>Strong Commitment</i>	<i>"There is a strong and diffused sense of awareness of the potential of big data for military, police or security support</i>

take up this technology		<i>applications. Experimentations are under way for civil and dual use purposes."</i>
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Respondent 18

Loud Computing - Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"The Italian public cloud infrastrucrure is fast growing in size, and was worth €587 million in 2016 according to Politecnico di Milano estimates. Initiatives such as Cloud for Europe are transforming pre-existing infrastructures and applications to make them compatible with the cloud, and increasing data management and computing capacity for a variety of purposes."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Beside the familiar issues of privacy protection and data security, a huge and additional problem engendered by cloud computing is the (foreseen or just involuntary) migration of big data from one country to another without the possibility of full monitoring and control."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"Strictly speaking the IT literacy requirements deriving from the use of cloud infrastructures are not extremely binding, however they should be supplemented by a more profound awareness of the inherent risks for data management, quality of service and business implications."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	<i>"Although there is no legal mandate to migrate public data and services to cloud infrastructures, investments are ongoing in ultra broad band at national and regional level in Italy, and a strong preference for open-source software exists in the national policy."</i>

Respondent 19

Data Analytics - Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow	<i>Sufficient</i>	<i>"Two CNR institutes located in Pisa, ISTI and IIT, co-funded in 2013 the European</i>

in your Organisation/Country with regard to the chosen technology		<i>laboratory on Big Data Analytics and Social Mining (www.SoBigData.it), aimed at pursuing interdisciplinary research initiatives connected to the impulse that "big data" and ICT are having on (socio-economic) sciences."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Data analytics and visualization are framed within the same policy and normative framework as "raw" Big Data. However, a Digital Transformation Team set up within the Italian national government is now working at a centrally available Data and Analytics Framework for regional and local public administration, which if successful may bring some institutional impacts too."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Low</i>	<i>"Same as Big Data and cloud computing, with the additional complication that data analytics and visualization are even more demanding in terms of specific IT skills and capacities."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	<i>"See the already mentioned initiative of the national government of Italy and more broadly the European and Regional digital agendas promoting the furthering of these trends."</i>

Respondent 20

e-Signatures - Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"Technical rules are in place since 2004 and several e-signature infrastructures and certification authorities have been built since then. However the diffusion of related know-how among the citizens and businesses is still very partial."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Sufficient</i>	<i>"The Italian legislation is fully consistent with the requirements of Article 5(1) of the European E-signature Directive. Electronically signed documents have the same value as written paper-based documents with a real signature."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"Although a lot of progress has occurred over the past decade, and more than 10 e-signatures per Italian (on average, including babies and retired persons) have been generated in the year 2016 according to the Agency for Digital Italy, more is to be done to realize the full dematerialization of acts, also in terms of education and training."</i>

Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Strong Commitment</i>	<i>"Even recently (in 2016) new obligations have been introduced for the contracts signed by Italian public authorities with private contractors, which have to be mandatorily e-signed. This is fully in line with the parallel trend occurring at EU level."</i>
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Respondent 21

Open Data - Feasibility Assessment Dimensions		
Assessment for Russia		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"New technology needed."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"No coordination between key subjects."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"Not satisfied."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Low budget."</i>

Respondent 22

Internet of Things - Feasibility Assessment Dimensions		
Assessment for Spain		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Inadequate</i>	<i>"Smart IoT appliances can be very intrusive in people's lives (collecting personal and sensitive information), but currently this is something which is not given the importance it should."</i>
Rate the Existing ICT policies, Legislative	<i>Inadequate</i>	<i>"The control over what information is told to be collected and the purposes for which</i>

Framework and Regulations in your Organisation/Country with regard to the chosen technology		<i>is used doesn't have to match the reality, and this is something difficult to be controlled by the regulations."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Low</i>	<i>"This is something trendy and widespread in any kind of devices, but the implications of the use of such technologies are not so evident. Everybody sees the potential and advantages, but very few are aware of the drawbacks."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Basically it is protected the interest of companies providing such technologies, but it does not seem the same care is taken to protect the citizens."</i>

Respondent 23

Internet of Things - Feasibility Assessment Dimensions		
Assessment for Italy		
	Assessment	Justification
Rate the Existing Infrastructure & Knowhow in your Organisation/Country with regard to the chosen technology	<i>Complete</i>	<i>"There are sensors, cameras and devices and some basic infrastructure. As for collecting data, using different protocols, exploiting and mixing information there's still work to do. This is true for the biggest cities. The little ones and the biggest ones in the South are less advanced."</i>
Rate the Existing ICT policies, Legislative Framework and Regulations in your Organisation/Country with regard to the chosen technology	<i>With Shortcomings</i>	<i>"Depending on the different users and devices, different regulations are enforced. This is in some way intrinsic to the chosen topic (different devices are used for different goals). To abide by different laws can be tricky."</i>
Rate the Stakeholder IT Literacy your Organisation/Country with regard to the chosen technology	<i>Moderate</i>	<i>"There is knowledge about the used devices and low level protocols. Big improvement can be done in terms of comprehensive understanding and treatment of data besides alarms and with different technologies."</i>
Rate the Political Will witnessed in your country/organisation to take up this technology	<i>Inadequate Commitment</i>	<i>"Up to now the political commitment is quite not uniform among the different cities. But it's strongly increasing with time especially because of the many emergencies for civil protection."</i>