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Societal Needs and Trends Analysis

Deliverable D2.2

Societal and Public sector Needs Analysis

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Abstract:	This deliverable propels the discussion in understanding the impact of societal trends and challenges on the provision of public services. This document highlights the societal needs, maps the societal needs to the policy domains, identifies the innovation requirements of the public sector, and outlines the barriers and the success factors to consider.

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Definitions, Acronyms and Abbreviations

Acronym	Title
PS	Public sector
SME	Small and Medium Enterprises
EU	European Union
EC	European Commission
NGOs	Non-Governmental Organizations
NPM	New Public Management
WP	Work Package
T	Task
D	Deliverable
API	Application Protocol Interface
GDP	Gross Domestic Product
PPP	Public-private partnership

Table 1: Definitions, Acronyms and Abbreviations

Executive Summary

The present report illustrates the final findings of the activities conducted in work package 2 (WP2) on "Societal and Public Sector Needs". The document offers an overview of the WP objectives, discusses the empirical sources and methods, and summarises the main findings.

The main aim of WP2 is to identify current and emerging societal challenges and trends that will have to be tackled by the public sector (PS) and subsequently analyze and map these challenges to different policy domains in order to identify public sector innovation requirements. Within SONNETS, WP2 represents a demand-driven and need-based approach to public sector innovation.

This report starts with an overview of the state of the art on needs identification, which includes a definition and explanation of the terms "need" and "demand" as well as an outline of high-level needs of society and public sector in the EU on the basis of academic publications. This introduction further describes the focus of EU projects similar to SONNETS and points out possible areas in which SONNETS could complement these other research findings.

From a methodological standpoint, WP2 is based on various data sources: (i) desk based research, which includes 232 individual papers, docs and reports; (ii) interviews with 34 privileged informants; (iii) a focus group with SONNETS experts committee composed of 4 experts; (iv) validation activities conducted through offline and online means. During the selection of data sources and interview partners, good care has been taken to include representatives of all three stakeholder groups: individuals/citizens, businesses and the public sector itself.

The research methodology comprises of four key phases: Phase 1 (desk-based research), Phase 2 (interviews with privileged informants), Phase 3 (a focus group with the SONNETS expert committee) and Phase 4 (offline and online validation activities). In the first phase, a review of the relevant documents present in both the academic and grey literature was carried out. During this phase, the needs of society, businesses and the public sector have been identified and summarized to a long list of needs, which subsequently has been clustered, revised and refined. The first phase also aimed to highlight the current societal trends and challenges relevant for each stakeholder group. In the second phase, interviews with privileged informants were used to validate and filter the long list of needs as well as highlight an number of dimensions along which the process of public sector innovation should unfold. The third phase consisted of a focus group to fine-tune and refine the results and develop possible innovation actions that could be employed to meet those needs. Finally, the forth phase was vital to further prioritize needs, validate the innovation dimensions and to single out potential barriers and success factors.

The application of such methodology allowed to identify a number of relevant trends and needs for the different stakeholders considered. To exemplify, for public agencies the following challenges have been identified: resources optimization; digitization; recruitment and training; appropriate remuneration and incentives. For the stakeholder group "businesses", instead, the promotion of a

more business friendly environment stimulating a start-up and entrepreneurial culture and an agile public sector emerged as important. Finally for the group of the individuals the key priorities elicited were: inclusive well-being and health; equal employment opportunities; experiential education and training as well as the adoption of a transparent and participative approach.

Two perspectives on public sector innovation were highlighted by the investigation activities. The first one may be situated outside the public sector and combines the standpoints of citizens, businesses and NGOs. Such stakeholders would like to see the process of public sector innovation unfold along three main dimensions:

- **Simplicity**: of laws and regulations, of interfaces for the interaction with the different public agencies.
- **Accountability**: in terms of response times (a key factor in mission and life critical processes) and of allocation of scarce public resources.
- **Inclusiveness**: to balance social inequality and for the engagement of local stakeholder in the definition of policy priorities.

The second point of view, instead, may be positioned within the public sector and proposes the following key dimensions as a compass to orient the process of public sector reform:

- **Meritocracy**: through the creation of incentive systems for employees to shoulder the risk connected with innovation activities as well as through the implementation of performance-based reward systems.
- **Agility**: promoted through an injection of fresh energies in the form of new and young personnel as well as through an ambitious training program for older workers.
- **Coordination**: with the private sector that, due to the shrinking of public budgets, is playing an increasing important role in the provision of services of public utility.

As situation depicted above shows, the complexity of the issues to be solved goes well beyond what a technological solution may offer. In this respect, technology should be considered as one ingredient of a more elaborated recipe. At the same time, some opportunities have been identified for the implementation of emerging technologies such as block chain, IoT, semantic web and linked data, artificial intelligence, virtual and augmented reality. In parallel, a number of more mature technologies still seem not to have exhausted their potential, among these it is worth to mention: social media, cloud, mobile and eID.

Finally, human capital was clearly identified as a core and cross-country issue for a successful implementation from both the demand and the supply side of public sector innovation. In this respect, any technological implementation should aim at being transparent to stakeholders both inside and outside the public sector. In other words, the innovative solutions should try to hide their complexity in order to reduce internal resistance to change and to promote an easier and widespread adoption among potential external users.

1 Introduction

1.1 Purpose and scope

The present report illustrates the final findings of the activities conducted in work package 2 (WP2) on "Societal and Public Sector Needs". The document offers an overview of the WP objectives, discusses the empirical sources and methods, and summarises the main findings. More specifically, this report serves the following purposes:

- Set the scene about the societal context in which the needs elicited from the different stakeholders arise by highlighting a number of strategic trends and challenges that may impact on the European public sector.
- Provide a synthetic yet useful representation of stakeholders' needs as a first step in the alignment of the innovation processes with societal priorities.
- Identify which are the most relevant policy domains that may impact on the needs identified.
- Highlight innovation requirements to consider for the identification of viable innovation actions (WP3) and future development roadmaps (WP4).

1.2 Approach for work package and relation to other work packages

The main purpose of WP2 within the SONNETS project is to lay the foundations for the implementation of a demand-driven and need-based approach to public sector innovation. This is done as a necessary step to guarantee a higher level of alignment between the process of public sector reform and a wide spectrum of societal needs. The work conducted within WP2 represents an input for the orientation of the Innovation Definition Framework developed within the context of WP3 towards socially relevant technological solutions. Finally, the list of needs identified by WP2 activities will be used within WP4 for the identification of potential research gaps through the matching of the demand and offer of innovative solutions within the public sector.

Figure 1 offers a brief and pictorial representation of the role of WP2 within the work flow of the entire SONNETS project, highlighting the interdependencies between the different work packages.

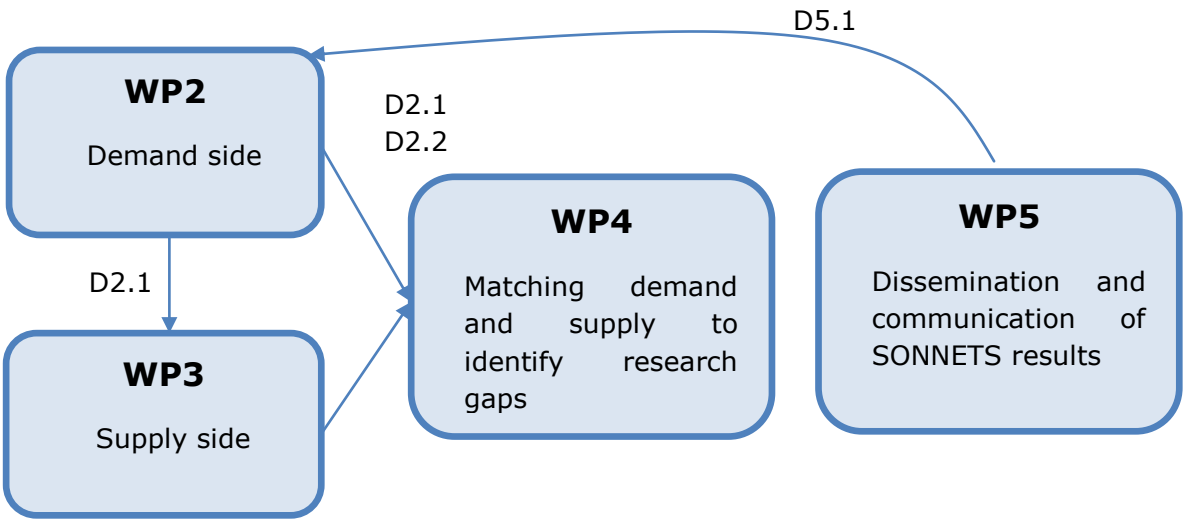

Figure 1: WP2 structure and dependencies with other WPs/tasks

From a work organization point of view, WP2 runs from the start of the SONNETS project until M12, it incorporates three interrelated and interdependent tasks and it is envisioned to produce two releases of the present deliverable. The first version of the deliverable (D2.1), submitted in M8, provided a methodological contribution and offered a first view on the preliminary results obtained by the secondary and primary data collection activities on stakeholders needs and societal challenges. The second version of the deliverable (D2.2), incorporates the results stemming from the validation activities conducted at local level in the four countries involved in the project (Spain, Italy, Germany and Greece) as well as through an online consultation conducted on the project website.

1.3 Structure of the document

Including this introductory section, the present deliverable is articulated in six sections. Section 2 provides an overview of the state of the art on needs identification in both the academic literature and other relevant EU-funded projects. Section 3 discusses the methodological approach adopted in WP2 detailing the data sources and collection methods utilized. Section 4 offers a brief summary of the key societal challenges emerged from the literature review and the interaction with the stakeholders. Section 5 presents the priority societal needs organized by actors' typology that should be targeted by the innovation activities to be promoted within the public sector, as well as the results stemming from validation activities. Finally, section 6, contains some conclusive remarks that may be useful in guiding the work conducted in the WP3 and WP4.

2 Relevant background

This section provides the theoretical and practical foundations for the identification of societal needs, which is a cornerstone in the adoption of a demand-driven approach to public sector innovation.

2.1 Academic literature

In a broad sense, *Needs* are categories or schemas that individuals create to simplify, organize, and guide their experiences in areas related to satisfaction[1]. Additionally, "Needs refer to deficiencies that an individual experiences at a particular point in time. The deficiencies may be physiological (e.g., a need for food), psychological (e.g., a need for self-esteem), or sociological (e.g., a need for social interaction)[2]. Majority of the needs' frameworks mainly focussed on individuals as the key unit of analysis and thus, are difficult to be generalized to ecosystems of individuals such as organisations operating in the public and private sector.

The notion of needs was initially developed in the field of psychology by Abraham Maslow to explain individual motivation process[3]. His 'hierarchy of human needs' consisted of five needs, ranked in a pyramid: physiological (hunger, thirst, warmth, sleep, etc.), safety (protection, order, law, etc.), belongingness and love (affection, family, etc.), esteem (competence, approval and recognition), and self-actualisation needs (realising personal potential, self-fulfilment, seeking personal growth and peak experiences). Maslow also hypothesized a gratification/activation proposition arguing that once a need has been at least relatively satisfied, that need immerses, allowing the next hierarchical level of need to emerge. Prior research endeavours, have used the hierarchy of needs' framework to study employee motivation in different contexts and have found that the physiological needs of humans are generally met by most of today's organizations, while the other needs are only partially satisfied in most instances[4],[5]. Furthermore, majority of studies have tested this classification in organizational settings to study employees' motivation.

Various studies have highlighted the inadequacies of the needs hierarchy[6],[7]. For example, individuals can have affection even if their physiological needs are not fully satisfied. Moreover, the model implies that only sufficiently well-off people can achieve self-actualisation, which contradicts the realities of, for example, poor artists who have developed well their individual potential. In the context of environmental protection (which this model regards as a self-actualisation need), the hierarchical assumption has been used to justify the position that poor countries must first meet their basic needs before tackling environmental goals such as mitigating climate change.

Viewed as a means to address the inadequacies of hierarchy of needs pyramid, Max Neef[8] proposed another system to identify needs. He distinguishes between a need and a satisfier, which is viewed as a concrete solution to a particular need. However, both the classifications focus only on people's needs. In addition, the needs are numerated, stable over time and across contexts, and are only

discussed on a personal level without considering factors such as social complexity and the particular context[9]. Even though both hierarchy of needs framework and Neef's classification hold significance promise to be adopted for analysing needs, the ex-ante classification is rather limited. For example, the hierarchy of needs was proposed first and then the model was empirically validated. Such an approach provides only limited consideration to the real, hidden and emerging needs of the society.

2.2 SONNETS approach

To better address the needs in the current societal context, it is imperative that the needs emerge through the interactions with the various stakeholders in the society. This is an approach that the SONNETS project adopts. Instead of starting with existing categories of needs that could infuse bias in the research approach, the project aims at eliciting societal needs and trends through an active engagement with the societal actors.

Society in the EU has undergone a metamorphosis from a stable and safe entity to a dynamic and vulnerable one. It is confronted with seismic changes in terms of shrinking labour force, acute climate change, resource constraints, influx of refugees, ageing population and unemployment. According to the EU: over 5 million young people (under 25) were unemployed in the EU-28 area in the second quarter of 2014. Present-day challenges related to migrants and Brexit continue to loom large in the EU. The new challenges posed by the evolution of society and the current financial crisis have once again shifted the spotlight on the modernisation of public sector[10].

Consequently, the public sector is under increasing pressure to perform. The litany of current challenges before the public sector is well documented: delivering quality services with fewer resources to diverse populations of users, partnering effectively with the private and non-profit sectors, responding flexibly and rapidly to shifts in demands and needs, assuring citizens' safety and security, stimulating widespread and equitable economic growth and opportunity, and coping proactively with transnational threats. These challenges call for looking beyond traditional supply side innovation and to actively engage with stakeholders. SONNETS methodology is also based on the recommendations by Heller and Rao[11] that call for engaging in dialogue with citizens, businesses and public sector officials to mutually define societal needs, aims, and the services and resources to ensure their achievement.

Demand is a major potential source of innovation yet the critical role of demand as a key driver of innovation has still to be recognized in government policy. Public demand, when oriented towards innovative solutions and products, has the potential to improve delivery of services. In line with this argument, SONNETS proposes a participatory and demand driven approach to innovation in the public sector. By carefully investigating the needs of each stakeholder group, these perceived needs could be translated into concrete market demand, an approach suggested by certain scholars[12]. A demand-driven innovation in the public sector paves way for an inclusive approach to innovation as suggested by Foster and Heeks (2013)[13].

A careful investigation of the needs could then initiate a systematic investigation to identify the innovation requirements of the public sector and highlight appropriate innovation actions that the public sector could undertake to foster innovation in the services. This document and the WP2 in particular conducts a detailed investigation of the needs of each stakeholder associated with the public sector and then identifies specific innovation requirements and actions that public sector could implement to adequately meet those needs. As rightly put, *'The public sector is, collectively, the world's largest service provider. Any incremental improvement in public services positively impacts millions of people. The first step to 'delivering the customer promise' is to know your customers and their needs.'*[14]

Knowing "who your customers" are and identifying them properly is an antecedent for identifying their needs. A holistic assessment of the customers and stakeholders involved would help the public sector in clearly understanding the different set of needs it wants to address. Such a task is even more accentuated in current societal context, which is characterized by actors from diverse backgrounds and motives. Thus, society has ceased to be a simple, contained, monolithic entity. Figure 2 below reconciles the key takeaways from section 2.1 and 2.2 and provides a visual representation of the SONNETS approach.

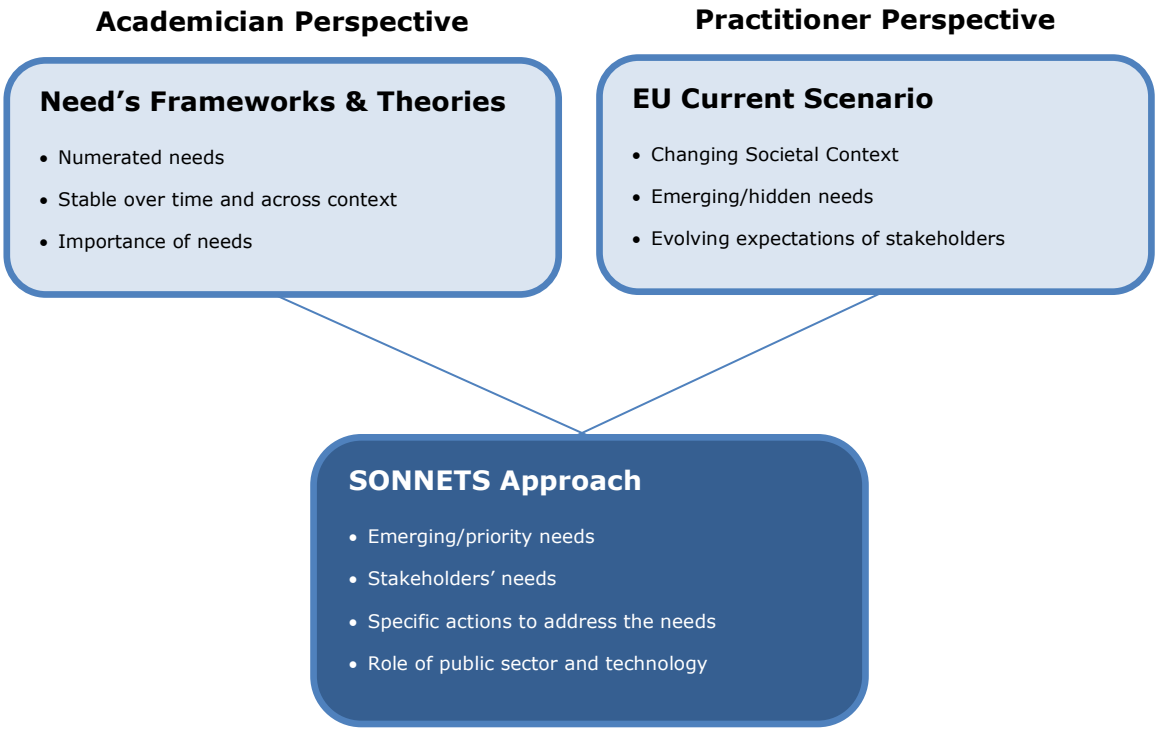

Figure 2: From theory to the SONNETS approach.

A brief discussion of the academic literature around emphasizes the importance of needs and that they have existed since centuries. Nevertheless, considering the pluralistic nature of society and the changing societal context, needs are no longer stable and numbered. The SONNETS approach aims to combines both these perspectives (an academician and a practitioner perspective) to understand the emergent and priority needs of the different stakeholders, a society is

composed of. The SONNETS approach also intends to examine the specific set of technology-enabled actions the public sector can undertake to address the specific set of needs for each stakeholder group.

Public sector has the arduous goal of addressing the society's needs. Albeit necessary, this goal is challenging given the information age we belong to. The society today, conspicuously noted, as the Information and Knowledge society, is a complex, diverse and pluralistic one. Thus, in practice, it is necessary for the public sector to identify the different entities and stakeholders, public or private, legally constituted or informal, singular or collective, that have a real or potential interest in public sector services. Such stakeholders include individuals, organizations (multi-national, SMEs or NGOs) and the civil servants (that are directly or indirectly associated with the public sector).

The subsequent sub-sections describe how the findings of WP2 could complement the other projects that focus on the public sector and the different stakeholders involved.

2.3 Relevant EU projects

This section elaborates how the findings of SONNETS project could complement or supplement the findings stemming from other similar EU projects. Below, some EU projects that hold significance for SONNETS project are highlighted.

CROSSROAD[15]: CROSSROAD was a European Commission FP7 Support Action (FP7-ICT-2009-4 with a budget of 470.000€) that aimed at identifying and characterizing the key research challenges in the field of ICT for Governance and Policy Modelling and ultimately outline a concrete, participative roadmap for future research. The roadmap was intended to drive towards the identification of emerging technologies, new governance models and novel application scenarios in the area of participation, electronic governance and policy modelling, leading to the structuring of a beyond the state-of-the-art research agenda. The Scenarios for ICT in Future Governance and Policy Modelling generated by CROSSROAD included an overview about societal trends that represented a useful starting point in phase one of the SONNETS methodology.

CROSSOVER[16]: CROSSOVER was a European Commission FP7 Support Action (FP7-ICT-2011.5.6 with a budget of 470.000€) in the field of governance and policy modelling. The project aimed at establishing the scientific and political basis for long-lasting interest and commitment to next generation policy-making, by focusing on use cases and a demand-driven approach, involving policy-makers and advisors in high-level conferences. Overall, CROSSOVER carried out significant work in linking ICT solutions with possible applications in the domain of governance and policy modelling and placed particular emphasis on the impacts of its approach. The international research roadmap on ICT for governance and policy modelling generated by CROSSOVER in addition to offering a best practice and a benchmark for the road mapping activities to be conducted in WP4 also offered a useful input in bridging societal needs related to participation and transparency with relevant enabling ICT technologies.

CIMULACT[17]: CIMULACT is project that started in 2016 and it stands for 'Citizen and Multi-Actor Consultation on Horizon 2020'. The project engages more than 1000 citizens in 30 countries in Europe, along with a variety of other actors, in a participatory way to understand the needs and visions of citizens. Currently, both CIMULACT and SONNETS are in running phase, therefore there exists significant complementarities between the two projects. CIMULACT considers the macro visions and needs of citizens and SONNETS considers the needs of multiple stakeholders associated with the public sector. Although the two projects in terms of methods adopted (i.e., a participatory approach) are similar, CIMULACT focuses on citizens/actors needs in the EU and SONNETS focuses on needs of different stakeholders with a specific focus on the public sector innovation. The collaboration with CIMULACT has been particularly valuable for the activities conducted in WP2. A representative of ISMB was invited to participate as an innovation expert in a two-day co-creation workshop conducted in Milan involving citizens from all EU member states. The event allowed to provide a contribution to the content generation process of CIMULACT as well as to experience first-hand the methodology adopted for the elicitation of social needs as well as to get some preliminary insights on the key topics discussed. Lastly the final list of social needs (for individuals) identified in CIMULACT was also used as a benchmark for the list generated within SONNETS. (On this aspect, it is important to remind the reader that neither CIMULACT nor SONNETS aimed at generating a statistically representative representation of the European society).

COCOPS[18]: COCOPS – Coordinating for Cohesion in the Public Sector of the Future - was a public management research consortium consisting of 11 universities in 10 countries. With a budget of nearly 2.7 million € from the European Commission's FP7, this was one of the largest comparative public management research projects in Europe. The project commenced in 2011 and culminated in 2014. COCOPS analysed the impact of New Public Management (NPM)-style reforms in European countries, drawing on a team of European public administration scholars from 11 universities in 10 countries. The project analysed the impact of reforms in public management and public services that address citizens' service needs.

The project focussed mainly on NPM and its effect on the behaviour and satisfaction of the citizens. A key finding of the project was that behaviour and satisfaction of citizens with public services is largely dependent on socioeconomic characteristics such as gender, age, education, and employment[19]. Thus, in our assessment COCOPS considered the role of citizens and the society EX-POST the usage of a public service. SONNETS on the other hand starts from the demand side and considers the specific requirements/needs of the society, furthermore it considers the role that the public sector can play in addressing such needs. In addition, SONNETS reflects upon the needs of different stakeholders (citizens, businesses and the public sector itself) involved in the domain of public sector. SONNETS critically analyses and concretely highlights the specific needs of each stakeholder, and discusses the innovation requirements for public sector in dealing with the needs. In this respect it may be said that SONNETS adopts a complementary approach to that adopted in COCOPS.

LIPSE[20]: LIPSE, a project in the domain of public sector innovation was funded by the EU's FP7 framework with the aim to identify drivers and barriers to

successful social innovation in the public sector in 11 EU countries. The project studied social innovation and co-creation practices and processes in 11 European countries and 7 policy sectors. In addition, the project explored the role of citizens in successful forms of co-creation and investigated how citizen enabled co-creation fosters social innovation in the public sector. Although there exists certain similarities between LIPSE and SONNETS in terms of the methodology employed and focus, SONNETS primarily builds upon the role of different stakeholders to suggest specific innovation actions. In addition, SONNETS focus isn't only on the aspects of social innovation but innovation requirements in general. SONNETS also considers that in addition to the role of public sector as a provider of services, it is a consumer of its own services as well. Furthermore, the project also considers the role of relevant and contemporary technologies in addressing these needs.

SIMPATICO[21]: SIMPATICO is an EU H2020 project whose objective is to improve the experience of citizens and businesses in their daily interactions with the public sector by providing a customised delivery of e-services based on advanced cognitive system technologies. The objective will be achieved through a solution based on the interplay of language processing, machine learning and the wisdom of the crowd (represented by citizens, business organizations and civil servants) to change to better the way citizens interact with the public sector. Thus, the project addresses well one of the key needs identified through SONNETS project: streamlined and transparent access to the public sector. The project also addresses other crucial needs identified until now as part of SONNETS: provision of multi-lingual services, especially to enable interaction with migrants and facilitate their integration. The results from SIMPATICO project helped SONNETS to understand the potential of technologies dealing with needs and the challenge of implementing such new technologies. Similarly, the needs identified through SONNETS have been recognised by SIMPATICO's as useful supporting evidence about the relevance of the innovation activities conducted within the project.

2.4 Stakeholders

The SONNETS approach accounted for both stakeholders external to the public sector (citizens and businesses) as well as for internal ones (civil servants). The remainder of this section provides a brief discussion of the rationale behind the involvement of each stakeholder category.

Individuals/Citizens: The theory and practice of public sector is increasingly considering placing the citizens at the centre of policymakers' considerations, not just as a target, but also as an agent of change[22]. The key objective of the current disposition in the public sector is to develop policies and design services that respond to individuals' needs and are relevant to their circumstances. Concepts such as 'co-creation' and 'co-production' have appeared to define this systematic pursuit of sustained collaboration between government agencies and individual citizens.

Businesses: Businesses across Europe continue to liaise with public sector for a myriad of different services. Some services include filing taxes, getting necessary information about setting up a business, accessing required permits and so on. In a survey of about 10.000 European firms, about 27 per cent of firms think that

public services for businesses have improved, 50 per cent think that public services for business have stayed the same over the past three years, and less than a fifth (17 per cent) think they have deteriorated[23].

Public sector as an internal stakeholder: As much as it is a provider of services, the public sector is a consumer of its own services as well and thus, has some of its own needs. The success of any innovation/change implemented within the public sector or by the public sector requires an assessment of the potential impact the innovation might exert on the civil servants. Thus, civil servants need to work in alignment with the public sector goals to implement the kind of innovation and to execute the level of change the public sector requires[24].

The public sector is also grappling with a plethora of internal challenges, the locus of which lies within the public sector. Such challenges include an aging civil servant workforce, resistance to change by the civil servants, red tape and bureaucratic procedures. Consider for example, a study in the UK highlights that two thirds (67 percent) of employees said the public sector was losing its top talent and 73 percent believed it needed to do more to attract the best people[25].

Additionally, a research conducted by Civica[26] to understand the perception of public sector employees demonstrates that the 27 percent of employees (in the public sector) believe that their leaders need to embrace modern working practices to aid change, 36 percent of public sector employees at middle manager level would welcome a move away from a traditional hierarchical structure and build a flatter one, and 34 percent of public sector employees at middle manager level and below claim that their organization doesn't offer any type of formal career development at all.

The above evidences establish the urgency for an in-depth scrutiny of the challenges that exist within the public sector. In particular, the public sector necessitates to consider the needs of the civil servants that work or are associated with the public sector. Governments are viewed as a partner or initiator in citizen engagement. The role of the civil servants in dealing with citizens is of paramount importance. Thus, an inquiry into the demands and needs of the public sector employees is essential to understand the emergent and unfulfilled needs within the public sector. Figure 3 below depicts the key stakeholders (internal and external) of the public sector.

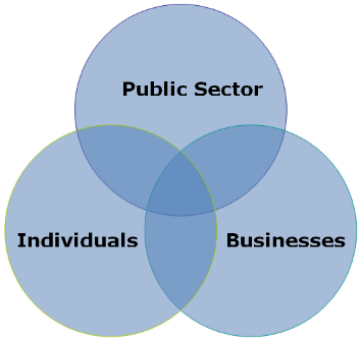

Figure 3: The three key stakeholders.

The next section introduces the methodology and the research process employed in this document.

3 Methodology and data sources

This section elaborates the research methodology employed and data sources included for the WP2.

3.1 Research methodology

The research methodology employed to conduct the exploratory activities carried out in the SONNETS project principally builds upon qualitative research[27] and multiple data sources. In particular the process of needs identification implemented in WP2 consists of 4 phases and may be summarized as follows: Phase 1 (desk based research), Phase 2 (interviews with privileged informants), Phase 3 (focus group with expert committee) and Phase 4 (offline and online validation activities).

A brief description of each phase is provided below.

- **Phase 1**: In Phase 1, a review of the relevant documents present in both the academic and grey literature was carried out. The presence of various loosely defined terms connecting innovation, public sector, societal needs, government, businesses and third sector posed a significant hurdle to conduct such activity. Given the wide spectrum of associated concepts about innovation, public sector and societal needs, the initial search was kept broad to incorporate all the relevant literature pertaining to public sector innovation, societal challenges, needs and trends.

  Thereafter, the study followed a three stage approach of planning, conducting and reviewing the literature. In the initial stage of planning, the needs at societal level (public sector, citizens and businesses) were identified. To do this, we carried out an electronic search in two databases, EBESCO and ISI Web of Knowledge to ensure that we included a broad range of scientific and other outputs. The last search was conducted in April 2016 and this generated 200 possible studies for inclusion. In addition, policy documents, white papers and European Union reports from various countries were added to minimize the risk of bias in the selection. Next, we contacted experts in the field of public innovation and asked them to check the list of eligible publications, and to indicate possible gaps. They identified 32 further studies. We received the last expert e-mail in April 2016.

  During the execution phase, the four pronged approach consisting of (a) identification of keywords, selection criteria and downloading of articles, (b) reading the abstracts to gauge the relevance of the article, (c) downloading the articles that were found interesting after reading the abstracts, (d) reading the downloaded articles in their entirety and then selecting only those that were found relevant for the research was followed. Although we used four search strategies, we must recognize a probable limitation caused by the search criterion of seeking the studies that mainly focussed on Europe. Thus, we are placing our work firmly within public sector in Europe.

A key aim of this phase was to identify the contemporary trends and challenges prevalent in the society. Another crucial objective was to understand the needs of key stakeholders. Hence, the corresponding outcome was the generation of a long list of needs relevant to the key stakeholders in the public sector domain (citizens, businesses and the public sector itself). To analyse the large amount of raw information collected in this information, we clustered the specific needs under broad heading and categories. Such a classification went through several rounds of revision and refinement, an activity jointly undertaken by the consortium partners.

Phase 2: The principal objective in this phase was to further refine and rework the long list of needs generated in phase 1. Thus, the key objective was to prioritise the needs and to identify appropriate innovation requirements that could help identify potential technological solutions (object of WP3). To arrive at the results of this phase, we conducted interviews with privileged informants across Spain (Madrid), Italy (Turin), Greece (Athens) and Germany (in multiple cities). A total of 34 interviews with representatives from NGOs, common civilians, public sector and industry were arranged and analysed to filter out a first short list of needs. This list then served as an input for the subsequent phase. The interviews were conducted in July and August 2016 and the results were analysed in the first week of September 2016. The list of questions, presented in the Appendix (A, B and C), is quite exhaustive and represents the basic questions designed beforehand. Customized questions, based on the respondent's profile and experience within the organization, were added. The questions differed according to their role and the organization they belong to. Thus, different set of questions were devised for informants from public sector, individuals (common civilians) and businesses. The respondents were given full liberty in discussing the aspect that they thought were important (in some cases to deviate from the question asked). The results of this phase included, inter alia, a first list of needs identified as important, an overview of current trends for the stakeholder group the informant belonged to, and two perspectives about the dimensions along which the process of public sector innovation should unfold.

- **Phase 3:** In phase 3, a focus group was organized on the 20th of September 2016, with the four members of the expert committee. The objective of this activity was to further validate the needs by identifying possible missing needs, identify the ones that could be addressed by the joint action of government and technology. However, the key role of this phase in the overall process was to leverage the committee's expertise to highlight innovation requirements and potential actions that could be leveraged to meet those needs. Furthermore, the discussion generated during the focus group was also leveraged to triangulate our findings from the previous phases, fine-tune our results and interpretations, as well as our recommendations. Figure 4 below depicts the different steps of the focus group part for WP2 (conducted in Turin).

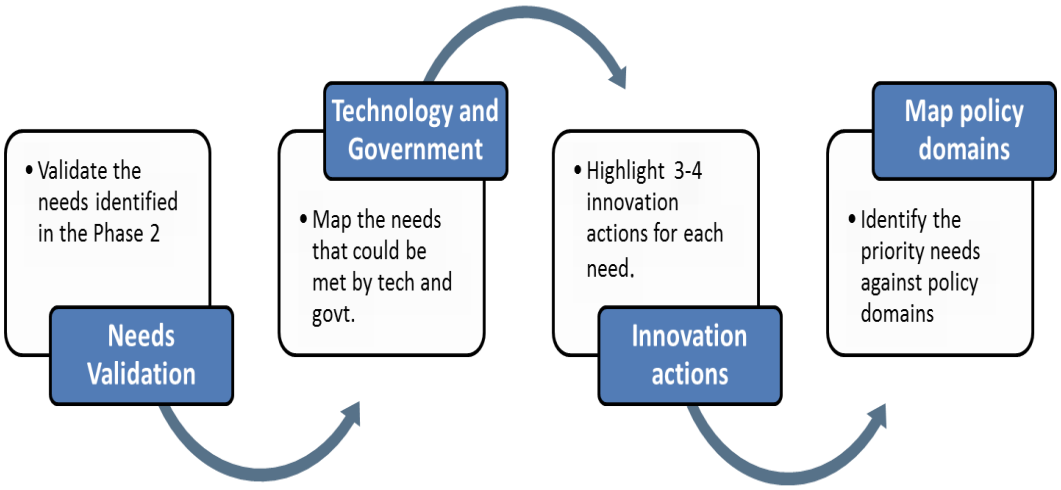

Figure 4: The different steps in the focus group.

An agenda, along with the objectives and the process flow of the focus group, was circulated beforehand to the expert group and a website depicting a visual schema of the needs was also constructed. The focus group agenda is included in the appendix D.

Phase 4: In this phase, a final set of validation activities were conducted both offline and online. The main objectives were to understand the relevance of the needs identified at local level, let potential barriers or key success factors for implementation emerge and to validate a limited number of dimensions along which the process of public sector innovation should unfold. A set of guidelines defined at consortium level specifying the topics to cover and the required outputs to generate were defined (see Appendix E). For what concerns the implementation of the offline activities partners where left free to arrange such activities in the most convenient way (as a satellite workshop to a larger event, as an ad hoc event, via a set of conference calls or face to face interviews). The consultation conducted online, instead, was carried out through the project's website to complement the offline stream of activities and to allow a broader inclusion of interested stakeholders in the validation phase. The total amount of people that took part in the validation activities were 163 (33 offline and 130 online) and the results were analysed using descriptive statistical methods. Overall the validation activities conducted allowed to interact with the knowledge generated within the project (e.g., needs list, innovation perspectives) as well as to suggest new content (e.g., barriers and success factors). In addition, the stakeholders involved were allowed to vote in order to select high priority needs and to express their level of agreement with a number of statements aimed at orienting the process of public sector innovation.

To further clarify the process followed, a synoptic representation has been inserted in Table 2 highlighting for each phase the activities conducted, the inputs used, the outputs generated and the sources/stakeholders involved.

Phase #	Input	Activities Conducted	Output	Number of sources /stakeholders
Phase 1	Relevant literature (academic articles, projects' deliverables, policy documents, industry reports)	Review of content, identification of needs, trends/challenges	Long list of needs (53), preliminary list of trends/challenges	232 sources
Phase 2	Long List of needs	Needs discussion, matching and prioritization	First short list of needs (28), innovation perspectives, enriched list of trends/challenges	34 interviews
Phase 3	First short list of needs	Needs discussion, identification of potential innovation requirements and actions	Innovation requirements	4 experts
Phase 4	First short list of needs, innovation perspectives	Needs filtering, validation of innovation stances, identification of barriers and success factors	Final short list of needs (12), validated innovation perspectives, barriers and success factors lists	163 stakeholders from 9 countries

Table 2: Sonnets research process

3.2 Data sources

The SONNETS methodology employed four key sources for gathering data: Desk-based research, Interviews, Focus Groups and Online Consultations (offline validation activities were conducted using Focus Groups or Interviews).These are further discussed in greater detail below.

- **Secondary Research/Desk based research**: Secondary research was conducted through various sources. To ensure rigour in our research methodology, we included and utilized wide variety of resources for the secondary research. Table 3 below lists the data sources used for conducting secondary research.

Needs	Number of data sources	Division of data sources
Individuals	88	EU projects: 18, Academic Papers: 30, EC policy docs: 24, Industry reports: 16
Government/Public sector	84	EU projects: 10, Academic Papers: 32, EC policy docs: 27, Industry reports: 15
Businesses	70	EU projects: 10, Academic Papers: 18, EC policy docs: 18, Industry reports: 24

Table 3: Desk-based research

- **Interviews:** A total of 34 interviews were conducted with privileged informants. The informants belong to the different stakeholder groups such as individuals, businesses and the public sector. These were mainly discussions guided by a structured interview protocol, on a one-on-one basis between the consortium partners and the privileged informants with the aim of gathering information on a specific set of topics such as needs, priority needs, innovation actions, trends and challenges. These interviews were further used to tap into the expert knowledge of the informants. The method is particularly useful for exploring people's knowledge and experiences and can be used to examine not only what people think but how they think and why they think that way. Interviews were also adopted in the offline validation activities.

- **Focus Groups:** Focus groups are a form of group interview that capitalises on communication between research participants in order to generate data. As a part of SONNETS methodology, a one day focus group was organized with the SONNETS expert committee in Turin on the 20th of September 2016. The focus group was organized as an interactive session with the SONNETS experts. They were asked to discuss the priority needs, highlight innovation requirements of the public sector, suggest potential innovation solutions and identify some real life case examples. The focus group included a session on the needs and innovation requirements and another session that focussed on the emerging technologies. The focus group was moderated by the consortium partners. In addition, detailed notes during the focus group were taken (for both the sessions). Visual representation of the needs and their description were circulated in advance to the expert committee so that they could prepare in advance for the focus group session. A dedicated website to disseminate

and communicate the results from interviews and desk based research was created and shared with the consortium members and the SONNETS expert committee. The link to the webpage is here: http://innodev.ismb.it/sonnets/interviews/privileged-informants/. Focus groups were also adopted in the offline validation activities.

- **Online Consultation:** an online consultation was conducted on the project website in order to widen the validation activities about the identification of relevant societal needs as well as the potential barriers and successful factors in addressing them. The consultation allowed interested stakeholders to interact with the content generated in the first three phases of the methodology (societal needs and innovation perspectives) as well as to contribute with additional content. More specifically, stakeholders were allowed to comment on the results of D2.1 by suggesting additional needs and/or by proposing relevant barriers or success factors to consider. In addition, stakeholders were allowed to express their level of agreement (through Likert scales) with the perspectives singled out about the main dimensions along which the process of public sector innovation should unfold.

4 Societal trends and challenges

Building on evidences provided by an extensive literature review, data and insights from the privileged informants and expert committee, this section discusses the evidence and uncertainties underpinning EU societal trends and the associated challenges they provide for policymakers and the public sector. The section commences with analysing societal trends at a more general societal level and then later on, it deliberates the specific trends and the resulting challenges for each group of stakeholder, i.e., individuals (citizens), businesses, and the public sector. The societal trends and challenges are mainly the outcomes of the **Phase 1** (i.e., the desk-based research) with certain evidences from the interviews conducted in **Phase 2**. The objective in identifying the trends and challenges for each stakeholder is to highlight the current trends and associated challenges that pertain to the corresponding trend.

Table 4 contains a brief list of cross-stakeholder and macro-level trends together with some emerging societal responses. The table was created by the SONNETS research team through a filtering and elaboration process of the content present in Sections 4.1, 4.2 and 4.3 with the intent to provide a synoptic yet meaningful representation of the relevant trends underlying most of the stakeholder-specific challenges described in more detail in the subsequent sections.

Macro-level Challenges and Opportunities	Emerging Societal Responses
Reduced available economic resources	Sharing economy, social innovation, b-corporations
Environmental emergency	Circular economy, frugal innovation
Democratization of Technology	Open innovation, crowdsourcing, makers movement

Table 4: Key societal trends

A new resource slump cycle has surfaced[28], one that is earmarked with fewer economic and natural resources. Consequently a lot of activity has shifted under the purview of sharing economies and a new form of crowd based capitalism has emerged[29]. A lot of economic activities is shifting to getting services from individuals mediated by peer-to-peer platforms (e.g., BlaBlaCar, Uber and Airbnb). Consider for example, letting someone sleep in your spare bedroom or getting into a stranger's car and saying drive me to another city. These are high stake interactions requiring much higher level of trust than for example, getting something delivered from Amazon or E-bay. The challenge for the public sector thus lies in putting in place appropriate electronic identity systems and digital trust infrastructures, regulating digital peer feedback, and issuing digital government certifications. As a matter of fact, trust represents a key enabler of collaborative consumption.

Energy and environmental issues have become increasingly important[30]. Environmental issues in particular have cascading effects linked to resource management of key resources such as food, water and natural resources.

Urbanisation is further expected to exacerbate this resource strain, particularly in terms of energy and real estate[31].

The rapid proliferation of technologies has led to the evolution of new paradigms of innovation, new forms of engagement with the citizenry, and novel ways of working. Crowdsourcing, open innovation have emerged to be the de facto ways of implementing and diffusing innovation within organizations.

To move from a high level and synthetic representation to the identification of trends and challenges for the three categories of stakeholders discussed in section 2.4, we a) researched through the reports from EU projects (either currently running or recently concluded), other industry reports and b) consulted our privileged informants to highlight the trends for each category of actors. Thus, these interviews seek to corroborate the insights stemming from secondary desk based research.

4.1 Trends/Challenges for the public sector

- E-Government and E-Governance: Although the number of initiatives in this domain has increased over the past decade, the results remain mediocre and citizens' adoption of such services is rather limited. In particular, this raises new questions on the accountability, transparency and trust of government and public administration. E-government is still struggling to reach a fully transactional stage and to show a real citizen centric style. Thus, the challenge lies in efficient ways of engaging with the citizenry, private organizations, and other forms of businesses.

- Network Governance: Network governance involves a network of stakeholders (both external and internal) engaged in creating products or services based on contracts that are socially—not legally—binding[32]. In the realm of public sector such a form of governance implies a shift away from a hierarchical form of control and governance, and involvement of a large array of stakeholders that are interdependent[33]. At the same time such type of paradigm requires a redesign of processes as well as of information flows in order to minimize information asymmetries aimed at enabling higher levels of coordination.

- Co-creation and crowdsourced governance: Crowdsourcing has enabled public sectors and governments to interact with its citizens towards a value co-created[34]. Using crowd-sourcing techniques gave more voice to people and particularly more SMEs and enabled them to contribute directly to changing regulations in a transparent and user-friendly way. In the UK, the use of crowd-sourcing as a tool of consultation was taken up in many recent programmes, such as the UK Red Tape Challenge or the Cabinet Office's *Tell Us How* scheme16 (an internal crowd sourcing platform for public servants who can suggest ways of improving service delivery)[35]. Despite the promise that crowdsourcing and other open initiative hold for the public sector, challenges pertaining to social and ethical issues need to be addressed[36]. More specifically, challenges related to effective participation (establishing and maintaining participation), appropriate incentives (especially in case of internal crowdsourcing where employees of public sector are involved) and

digital privacy (ensuring appropriate privacy and safety for the contributors) need to be tackled at the earliest[37].

- Outcome based performance management: extended reforms in public sector have led to improved performance and higher efficiency. Nevertheless, there is still a long way to go to achieve optimal performance management[38]. Furthermore, research on public–sector performance management points to problems in the design and management of these systems and doubts their effectiveness as policy tools for increasing accountability and efficiency[39]. The key challenge in measuring performance management lies in identifying performance indicators that could aptly estimate the overall performance of the public sector and of civil servants in positively impacting on the lives of the key socioeconomic stakeholders.

4.2 Trends/Challenges for the businesses

- Collaborative production/Do it Yourself[40]: The age old distinction between the companies as producers and the individuals as consumers is changing. Internet-based technologies connect people in order to optimise the use of their resources. It empowers individuals/consumers to fund, design, prototype, produce, manufacture, distribute, market and sell their own goods. Examples include crowd solving, crowdfunding and makers' faire. Despite these initiative, several challenges exist especially for SMESs and entrepreneurs. Consider for example, a EC survey on SMEs that reports finding customers is a problem for 71 percent of EU 28 SMEs. Other important challenges are related to issues such as access to funds (a persistent problem for entrepreneurs), the non-availability of skilled labour, higher production costs, fierce competition, and regulatory barriers that affect the routine operations of all businesses across Europe[41].

- Silver economy: the Oxford Economics defines the Silver Economy *as "the sum of all economic activity serving the needs of those aged 50 and over including both the products and services they purchase directly and the further economic activity this spending generates."*[42]. This demographic change has created a huge market composed of elderly consumers that have very specific needs such as active aging and independent living[43]. Some businesses have already tapped in this market such as Giraff[44], a Swedish firm that produces an electronic device ("avatar") for telecare services to help caretakers conduct a virtual visit at elderly persons' home. In spite of some EU level initiatives, certain barriers still exist, albeit mainly at policy and readiness level (regulatory complexity and a low sense of urgency to support silver economy).

4.3 Trends/Challenges for the individuals

- Demographic changes: the notable changes that have appeared in the past years have profound implications for the EU and for the society as a whole. For example, since the 1950s, life expectancy has risen by 15 years, a trend that is set to continue, while retirement age has remained broadly steady. This ageing phenomenon increasingly will impact on the European labour

force, which will fall by 5.2 million from 2020 to 2030, marking a reduction of 2 percent[45]. This in turn, raises challenges with regard to the identification of appropriate employment opportunities and the renewal of pension schemes. The respondents highlighted concerns such as *"loss of life-time / full time jobs"* and "*Will I receive a retirement pension?*". Societal divide is another area of concern due to people moving to urban cities in search for better jobs.

- Climate change problems and issues: with the recent natural calamities such as the earthquake in Italy in which at least 298 people died and massive physical damage to the culture heritage took place[46] , concerns have arisen related to dealing with the aftermaths of such events specially the unforeseen effects. In addition, the growing concerns for global warming and environmental pollution have further accentuated the climate change problems.

- Fiscal consolidation, financial crisis, stagnation of economies: owing to recent downturn in the global economy, several concerns have appeared. New forms of exclusion or marginality are appearing: poor workers, the qualified unemployed, precarious worker[47]. 80 million people at risk of poverty, 14 million young people not in education, employment or training[48]. Thus, the challenge is how to provide equal employment opportunities to people across the societal stratum and how to continually upgrade the skills of the employed.

- EU Safety: several concerns exist related to safer borders, economic and physical safety in the context of the EU and International safety. For example, there could be a war in Europe led by raising nationalistic interests. One of the key societal challenges in this regard is to manage the influx of refugees/migrants into EU and provide abundant opportunities for the social integration.

- Geopolitical realignment[49]: geopolitical instability is increasing. In 2016, Europe will continue to turn inward to grapple with internal political challenges, violent extremism, and the migrant crisis. Political instability of the EU remains an unresolved issue to grapple with especially post the Brexit.

- IT revolution 2.0/Democratization of technology: emerging technologies will blur the line between real and virtual life and lead to growing personalization of consumer goods and retail experiences. Technologies today have become pervasive and omnipresent. This increased democratization of technologies poses further challenges related to data privacy and security. In addition, the growing proliferation of technologies has radically changed the concepts of work, training and retirement. The technological revolution is likely to have a profound effect on societies, individuals, their working life and their social relationships. Moreover, the intertwining of technologies into the facets of our everyday lives — employment, social relationships and our excessive/prolonged usage/dependence of/on technologies pose a crucial challenge of technostress. Thus, another challenge is to mitigate the technostress induced by excessive usage of technologies.

5 Societal needs and associated innovation requirements

This section elaborates the needs identified for each stakeholder through our analysis. Section 5.1 starts by presenting the initial long list of needs generated by the review of the relevant literature and then continues by explaining the broad categories of needs (called key needs) and the specific needs pertaining to that category. Section 5.2 provides an overview of the policy domains related to the different needs. Section 5.3 highlights the needs that the public sector could address through ICTs and proposes innovation requirements for the needs. Finally, section 5.4 reports the results stemming from the validation activities.

5.1 Societal needs and priority needs

The current section lists 53 needs generated by Phase 1 of the SONNETS methodology to then move on to discussing more in detail the priority needs identified by the privileged informants, providing a short description of each need, and explaining the sub-needs a priority need comprises of. (A pdf version of the needs' list is available for download in the results section of the project's website: http://www.sonnets-project.eu/content/results).

STAKEHOLDERS	NEEDS
INDIVIDUALS	Prevent rural out-migration
	Need for a democratic access and usability in retail environments
	More effective law enforcement
	Water security
	Connected and integrated Europe
	Environmental Amicability
	Fight transnational and organized crime
	More social and infrastructural resilience and better crisis management
	Housing and secure shelters
	Modern workplaces
	Poverty reduction
	Better alignment between government actions a societal needs

	Equal employment opportunities
	Experiential education and training
	Promote tolerance and solidarity
	Manage careers evolution in an ageing society
	Inclusive well-being and health
	Transparent and participative access to Public Sector services
BUSINESSES	Technology implementation
	Reduce taxation levels and lessen complexity
	Diffusion of eco-design and circular value chains
	Business expansion
	Access to a unified European market
	Promote social responsibility among for profit ventures
	Reduce reskilling time and costs
	Easy access to Public Sector information (open data)
	Talent acquisitions and retention
	Reduce weight of finance on overall overall economy
	Fight tax evasion to promote fairer competition
	Agile and participative Public Sector
	Stimulate an entrepreneurial and start-up culture
	Higher coordination with public sector where relevant
	Need for high speed broadband connections outside metropolitan areas
	Ease of doing business
	Streamlined and reliable administrative procedures in the Public Sector
GOVERNMENT	Accessible Public Sector information
	Civil servants as a community of change
	Exploring quasi-market solutions for public service delivery
	Leverage crowdsourcing

	Appropriate remuneration and incentives
	Employee empowerment and recognition
	Limit impact of the spoil system
	Assign political roles to people with specific expertise in the relevant domain
	Rework the trust deficit
	Participative democracy
	Reduce use of jargon for improved communication effectiveness towards stakeholders
	Promote inter-agency collaboration
	Digitization
	Recruitment, training (and IT Literacy)
	Improving risk management and resilience
	Promote teleworking
	Resource optimization
	Lean bureaucracy

Table 5: Initial Long List of Needs

The list presented in Table 5 represents the starting point of the work conducted about the needs identification. The list went through a process of discussion, matching and filtering with privileged informants and experts who also helped to identify associated innovation requirements and best practices. The whole process led to a more concise list of 28 needs described below in more detail.

5.1.1 Individuals' needs

A total of 11 informants were interviewed to represent the concerns of Individuals. The priority needs highlighted during the interviews may be found below:

- **Inclusive well-being and health (10/11) (Healthy Aging):** This broad category pertains to the pursuit of well-bring, provision of a primary health care services, realignment between work, personal and community life and a stable work-life balance across all age groups and gender[50]. Some instances of this need include providing basic health care services and personalized services for disabled and physically impaired, child care, maintaining the quality of life (work-life balance, cultural and free time), and reducing the stark economic and social isolation of elderly people. In the EU alone expenditure on care for elderly is 0.41 percent of GDP. 10 of our informants mentioned this as a priority need. Their comments and concerns embrace

issues such as *"more appropriate medical care", "improved access to primary health institutions", "social cohesion",* and *"lack of solidarity and rise of selflessness".*

- **Transparent and participative access to public sector services (4/11):** The societal demand for a trustworthy and interactive public sector resonates until today. This need also includes issues such as better quality public services – fairness and customer service standards in public service provision[51]. Informants mentioned establishing trust in governance, voicing their opinions, accessing timely and accurate information, unlinking public sector and politics as some of the key needs under this header.

  One informant expressed his opinion as: *"A clear point of authority to be established (often have to roam offices because it is not clear the authority for a particular task)".*

- **Equal employment opportunities (10/11):** Concerns about employment have become more pervasive in the last years. For instance, the statistics indicate that youth unemployment rate for the age group 15-24 is 22 percent while the employment rate of older workers is 51.8 percent[52]. Women's employment rate was under 60 percent in as many as 13 Member States (2015)[53].

  Thus, it is least surprising that needs related to plummeting unemployment and providing equal employment were stressed by the informants. In addition, similar needs emphasized were: encouraging gender equality in labour force through women participation and promoting fair wages. As elucidated by one of our informants, *"There are no adequate measures to integrate young unemployed people into the labour market".*

- **Experiential education and training (9/11):** The need refers to facilitate skills development, enable communication in different languages, and deliver affordable bilingual / international educational offer among youth and children. Specific instances as clarified by some informants are: *"Helping children in their development and education., "Technical and behavioural skills shortage.",* and *"Bilingual/multilingual environment with English as priority/Intercultural education at affordable prices".*

- **Housing and secure shelters (2/11):** This domain of need entails an urge towards an increased number of cheaper housing solutions, insured houses and protected homes from the increasing occurrence rates of natural calamities. Some specific quotes are: *"Would be good to have opportunities for renting apartments and housing loans" and "private insurances often do not cover damages generated by natural calamities".*

- **Modern workplaces (2/11):** This specific set of needs include the aspirations related to modern workplaces, flexible work hours, and recreation facilities at work. A specific example is, *"Should have some opportunities at work to get some break from sedentary lifestyles".*

- **Connected and integrated Europe (7/11):** Well-connected EU member states in terms of access to public sector is a commonly expressed aspiration.

In a similar vein, informants expressed the urge to better integrate citizens and in particular migrants within the society. In a number of instances, the informants stressed out the need to access interoperable public services, free access to services of similar nature in other countries, management of influx of refugees and migrants. *"The most important issue for the migrants is to get a job and somewhere to live". "but even migrants who have been living in Germany for several generations are still not integrated into the German society (e.g. Turkish women)". "Free access to public services in other countries.". "more proportionate distribution of refugees across countries".*

- **Environmental Amicability (3/11):** This need focuses on creating greater environmental awareness. It also entails a proactive attitude towards preserving environment, lowering CO2 and other pollutant emissions, accessing pollution free energy sources. 40 percent of Europe's energy demand is for domestic heating, water consumption, appliances and electronics (EEA 2010)[54].

A synopsis of the needs discussed above is presented in Table 6 below.

Needs	Examples	#[1]
Inclusive well-being and health	Personalized services for disabled, work life balance, isolation of elderly people	10
Transparent and participative access to public sector services	Trust in governance, voicing their opinions	4
Equal employment opportunities	Gender equality in labour force, encourage women participation	10
Experiential education and training	Skill development, enable communication in different languages	9
Housing and secure shelters	More and cheaper homes, protect homes from natural calamities.	2
Modern workplaces	Flexible work hours, recreation facilities at work	2
Environmental Amicability	Greater environmental awareness	3
Connected and integrated Europe	Interoperable public services, management of influx of refugees	7

Table 6: First short list of needs for individuals

The results presented in the table above, although qualitative in nature and with no ambition of statistical significance, are to a large extent coherent and converging with the results stemming from the process put in place by the CIMULACT project on a much wider scale. The results of the of CIMULACT may be consulted at: http://www.cimulact.eu/publications-2/.

[1] Number of respondents mentioning the need (a total of 11 informants were interviewed)

5.1.2 Businesses' needs

A total of 12 informants were contacted to voice the needs of businesses. The priority needs for the businesses deduced through the interviews are as below:

- **Ease of doing business (5/12):** This need represents the issues related starting a new business, dealing with construction permits, getting electricity connection, registering property. This need is even more noticeable, as pointed by an informant, *"Especially for start-ups and newly founded enterprises".*

- **Streamlined and reliable administrative procedures in the public sector (6/12):** This need is associated with reducing information redundancy and providing fixed response times. The public sector needs to be much less opaque especially in terms of its business dealings. Specific instances include, *"simpler and single interfaces (human/digital)", "Eliminate information request duplication (e.g., module certifying the payment of social security for employees", "Transparency in B2B and B2G transactions"* and *"Flexible and agile purchase and procurement procedures".* An initiative was proposed in the European e-government Action Plan 2011-2015, that involved a number of key cross-border services to be available on line and thus, enable entrepreneurs to set up and run a business anywhere in Europe independently of their original location[55].

- **Agile and participative public sector (7/12):** This need reflects the desire for a faster, more decisive, centralized and agile public sector; one that is led through civil servants' transformation. Some illustrations within this domain of needs are *"Civil servants better prepared in their relationship with the general public.", "Lack of experienced technical personnel in the PS."* and *"A lot of bureaucracy and the nonexistence of one-stop shop".*

- **Stimulate an entrepreneurial and start-up culture (5/12):** An aspect that was highlighted by many informants is related to propelling a start-up culture in the EU and provide adequate incentives/training for the same. Some quotes expressing this need are: *"Structured courses teaching how to become an entrepreneur", "Favourable fiscal regime for start-ups", "Not enough motives for entrepreneurs".*

- **Easy access to public sector information (open data) (4/12):** It is a tremendous resource that is as yet largely untapped. Many individuals and organisations collect a broad range of different types of data in order to perform their tasks. The data provided by public sector is particularly significant both because of the quantity and quality, and centrality of the data it collects. However, there are certain barriers to opening up of data which include loss of control over the information, low information quality and privacy concerns for the public sector. Thus, it is least surprising that there still exists a reluctance in the public sector to collect and release relevant data. In view of these issues, few of the informants expressed the need to *"Free access to cadastral and enterprises data"* and that *"Private companies depend on the PS will to open those data".*

- **Talent acquisition and retention (2/12):** This need pertains to recruiting talented employees and skilled staff, and retaining them by providing talent enhancement programs. The specific sub needs that emerged through our desk research are: attract skilled workers, STEM-skilled (Science, Technology, Engineering and Mathematics) workforce and enhance talent of existing employees[56]. Our informant mentioned, " *Stop brain drain of young talents".*

- **Business expansion (6/12):** This need primarily addresses the challenges faced by firms in accessing funds and expanding their businesses[57]. A difficulty in accessing funds is one of the main impediments to the growth of many businesses, particularly SMEs[58]. The problem is even more severe given the resource shortage that companies face today and the reduced public spending[59]. The sub-needs pertaining to this theme are : internationalisation of business, increased access to funds, especially for SMEs, getting credit, expanding exports. Some of the quotes from our interviews include, *"Existing rules and regulations hold back business expansion" and "Research and innovation funding for large and small enterprises".*

- **Access to a unified European market (3/12):** This need implies the need for "One market without borders". European businesses operating in the EU have unrestricted access to nearly 500 million consumers and the idea of single market is potentially attractive for foreign investors. Despite considerable advances on this front, certain barriers remain. Such barriers include lack of e-commerce facilities, limited uptake of service sector and inconsistent rules for recognition of vocational qualification[60]. In the light of these, it is almost inevitable that our informants picked out this need as a priority one. The sub-needs identified under this category are a unified European Market, digital single market, addressing international markets segments, homogeneous EU laws. A related quote is: *"Vision not implemented or followed by policies yet fully".*

- **Technology implementation (8/12):** This need reflected a complete digitization of processes and services and a comprehensive regulatory framework for the new cutting edge technologies. This also reflects the need to adequately address the privacy/security concerns businesses are exposed to in implementing innovative technological solutions. Sub-needs under this header include specific needs such as Implement cyber security, improved regulations as far as the field of cloud computing and digital processes is concerned. The informant expressed them as , *"Issues especially when dealing with G2B systems", "Regulation framework imposes difficulties in the procurement of cloud services.", "Non-existent electronic services.", "There are still procedures that cannot be done digitally".*

- **Reduce taxation levels and lessen complexity(6/12):** This need concerns lower level of taxes and simpler rules in paying taxes to provide a business friendly environment to large corporations, SMEs and entrepreneurs. This need also implies resolving the loopholes such as tax evasion and frauds stemming from the complex taxation rules in the EU. Some issues our informants highlighted are, *"Complexity of rules and quantity of taxes." "High business taxation.", "Not stable taxation coefficients.", "Tax rebates for SMEs and small organizations".*

Table 7 further summarizes the needs discussed above in a succinct way.

Needs	Examples	#[2]
Ease of doing business	Starting a new business.	5
Streamlined and reliable administrative procedures in the public sector	Reduce information redundancy	6
Agile and participative public sector	Faster, decisive, centralized public sector	7
Stimulate an entrepreneurial culture.	Training to be entrepreneurs.	5
Easy access to public sector information (open data).	Free access to enterprise and cadastral data.	4
Talent acquisition and retention.	Attract skilled workers, enhance talent of existing employees.	2
Business expansion	Internationalisation of business, increased access to funds	6
Access to a unified European market	Unified European Market, Digital single market	3
Technology implementation	Digitising processes	8
Reduce taxation levels and lessen complexity.	Lower taxes and simpler rules.	6

Table 7: First short list of needs for businesses

5.1.3 Public sector needs

A total of 12 informants were contacted to voice of the public sector. The priority needs for the public sector deduced through the interviews are as below:

- **Resource optimization (5/12):** There is a growing consensus about the need to optimally utilise available resources in the public sector. This need is even more challenging given the implicit need to reconcile the growing demands on social and other services with shrinking budgets and conditions of ongoing economic uncertainty. The need is to frugally utilise available resources (to do more with less) and manage their movement across the public sector in an efficient manner (especially in this era of constrained resources). The sub needs under this header include: Fairer distribution of resources, Lack of resources, working without budgets, increase resource productivity. This also implies secondment of resources across departments. Our informants expressed their voices as, *"Ensure the appropriate resources for the services offered.", "Ensure sustainability of the actions and projects undertaken."* and *"Resources should be sufficient and transferable across departments.".*

- **Lean bureaucracy (5/12):** This need implies a shift towards more experimental governments. This encompasses a shift to leaner structures within the publics sector (a critical shift from the Weberian ideal type of bureaucracy). Specific sub-needs are: reducing red tape and overbearing bureaucracy. Some relevant quotes, indicated by respondents: *"Struggling to generate value: too much bureaucracy too much hierarchy.", "Promote one-stop government.", "Unclear/complex legal framework in certain issues.".*

[2] Number of respondents that mentioning the need (a total of 12 informants were interviewed

- **Digitization (6/12):** This need refers to the paradigm of "digital by default". Although considerable advances have been made on this front, much of the e-government initiatives are still informative rather than interactive. This need reflects the urge towards more interactive e-government initiatives and enabling communication through electronic and internet channels (wherever non-existent). Specific illustrations include: *"Manual processes (especially those regarding citizens' data processing should be fully automated.", "Still not possible to do the paperwork regarding a relocation to another city online.".*

- **Recruitment, Training (and IT Literacy) (9/12):** This need represents a serious concern, existing within the public sector. According to a recent report[61], certain aspects related to the status of employees in the public sector were highlighted. For example, two thirds (67 percent) of employees said the public sector was losing its top talent and 73 percent believed it needed to do more to attract the best people. Thus, the need to recruit, retain and train employees is a major aspiration for civil servants. Specific sub-needs include: attract/recruit top talent, invest in staff development/ motivate staff (invest in training, leadership development, succession planning, talent management), allow internal mobility (transfer staff from diminishing sectors to growing ones), retain high quality staff and offer job security. Some of the quotes under this header are: *"Many employees are still struggling with word and excel.", "IT Literacy level in older Personnel is low.", "Need for continuous education.", and "Need for continuous skill evaluation, improvement and reorganisation.".*

- **Rework the trust deficit (2/12):** This need indicates the requirement to improve the image of the public sector and enhance and restore trust in government, and raise standards of ethics and integrity. Sub needs include under this heading include: increase attractiveness of the public sector, change public sector staff attitudes towards work and institute citizen trust in government. A specific instance is: *"Public employment services not trusted by employers as they don't get to the suitable candidate.".*

- **Participative democracy (2/12):** This need reflects the urgent to empower citizens to take an active role and responsibility in addressing their problems and needs, through the introduction of apt participatory decision making procedures. Putting in place an infrastructure for co-creation and access to knowledge is also acknowledged as a need for the public sector. Examples under this domain comprise of: Public participation, transparency and giving voice to people, citizen participation and engagement. Quotes to instantiate these are, *"Citizens need to be more aware of their possibilities to contribute to the development of their city.", "Citizen participation should be regulated by law.".*

- **Appropriate remuneration and incentives (6/12):** When given the choice to improve one aspect of their own job, 36 percent cited pay, 26 percent said career development, 11 percent said their pension and 81 percent said their organisation had not changed its recruitment practices in light of greater collaboration with the private sector. Sub-needs under this domain include: offering rewards and benefits based on periodic evaluations, pay for

performance, getting rid of ineffective incentives systems, formulating a collective wage agreement, and offering job security. Certain quotes to highlight the concerns of informants are: *"Distorted incentive systems.", "The wages are quite low in comparison with the industry sector.", "Make public sector jobs more attractive, like offering apartments or retirement provisions.".*

- **Employee empowerment and recognition (4/12):** There is a general consensus (within the Expert Group and the informants) that civil servants and public sector management are the distinct most vital spring of public sector innovation. Initiatives to develop, motivate and deploy internal talent are, however, still inadequate. Thus, there is a clear need to address this concern of empowering them in terms of decision-making. Sub-needs under this heading are employee voice and interaction systems. Further, reflected by some informants, *"Civil servants do not feel part of the organizational mission." "Detachment from the organizational mission, and "Bring employees at the centre of governance thinking.".*

- **Accessible public sector information (2/12):** Public sector organizations are mainly knowledge-intensive organizations, and to exploit their knowledge, effective knowledge sharing among the different departments is required. Sub-needs include open data, metadata, interoperability between data formats, free access to basic data. Some specific quotes from the informants are:, *"Common database (across public and private actors)." and "Integration of different formats of data to make it useful."* .

- **Civil servants as a community of change (2/12):** It is widely recognized that people, not organisations, drive innovation[62]. This is even more true in the realm of public sector. Thus, it is necessary that the responsibility and the will to drive changes percolates down the hierarchy and must therefore become a responsibility at all levels: from top-level management to midlevel managers and front line staff. They must increase their ability to drive change by collaborating more and differently with each other and with end-users such as citizens, businesses and the third sector. Public sector innovation activities must become more embedded structurally, more strategic and more systematic. Sub needs include the need for a flexible public sector and the reflection that authorities need to be more open-minded. To further illustrate through the informants' voices: *"Need of an organizational structure that is flexible and adaptable" and "The collaboration between different municipalities is still difficult".*

Table 8 further summarizes the needs discussed above.

Needs	Examples	#[3]
Resource optimization	Fairer distribution of resources, lack of resources.	5
Lean bureaucracy	Reducing red tape and overbearing bureaucracy.	5

[3] Number of respondents mentioning the need (a total of 12 informants were interviewed)

Digitization	Communication through electronic channels.	6
Recruitment, Training (and IT Literacy)	Allow internal mobility, retain high quality staff, offer job security	9
Rework the trust deficit	Restore trust in public services.	2
Participative democracy	Public participation, citizen engagement.	2
Appropriate remuneration and incentives	Rewards based on periodic evaluations, pay for performance.	6
Employee empowerment and recognition	Employee voice and interaction systems.	4
Accessible public sector information	Metadata, interoperability between data formats.	2
Civil servants as a community of change	Flexible public sector, authorities need to be more open-minded.	2

Table 8: First short list of needs for the public sector

5.2 Policy domains

The list of policy domains included in this document are adopted from the list proposed by the EU (Policies adapted from : http://ec.europa.eu/policies/index_en.htm). Table 9 lists the broad policy domains and describes them.

Policy Name	Description
Agriculture, fisheries and food	Agricultural markets, CAP (Common Agricultural Policy), Rural development, Aquaculture, CFP (Common Fisheries Policy), Food safety, Animal diseases, Animal welfare, Food labelling, Food quality, GMOs and Plant health.
Business	Industry sectors, enterprise policies, SME's, Single Market, free movement, competitiveness, competition
Climate action	Climate change, energy for a changing world
Cross-cutting policies	Financial and economic crisis, Europe 2020 – a new economic strategy, better regulation, sustainable development, multilingualism
Culture, education and youth	Audio-visual and media, culture, education and training, sport, youth
Economy, finance and tax	Financial Services, Budget, Competition, Customs, Economy, Fight against fraud, Taxation
Employment and social rights	Employment, social affairs and equal opportunities
Energy and natural resources	Energy, Trans-European networks
Environment, consumers and health	Consumers, Environment, Food safety, Health, Maritime policy, Sustainable development
External relations and foreign affairs	Common Foreign Security Policy, Development, Enlargement, Cooperation, Foreign policies, Humanitarian aid, Human rights, External trade
Justice, home affairs and citizens' rights	Freedom, Security and Justice

Regions and local development	Regional policy, Regional Development Fund
Science and technology	Ethics, Information Society, Audio-visual and Media, Media, Research
EU explained	Civil Society, NGOs, EU Institutions, EU Treaties, Future of Europe, Treaty of Lisbon
Transport and travel	Tourism, Trans-European networks, Transport

Table 9: Key policy domains.

Table 10, Table 11, and Table 12 below map the priority needs for individuals, businesses and public sector with the associated policy domains for each need. The policy domains are mapped against the needs by considering the type of actors responsible in dealing with a particular need and the multiple domains a need pertains to.

Needs	Examples	Relevant policy domains
Inclusive well-being and health	Personalized services for disabled, work life balance, isolation of elderly people.	Environment, consumers and health, Regions and local development, Transport and travel
Transparent and participative access to public sector services	Trust in governance, voicing their opinions,	Science and technology
Equal employment opportunities	Gender equality in labour force, encourage women participation	Culture, education and youth, Employment and social rights
Experiential education and training	Skill development, enable communication in different languages	Culture, education and youth, Employment and social rights, Cross-cutting policies
Housing and secure shelters	More and cheaper homes, protect homes from natural calamities	Justice, home affairs and citizens' rights
Modern workplaces	Flexible work hours, recreation facilities at work	Justice, home affairs and citizens' rights
Environmental Amicability	Greater environmental awareness	Energy and natural resources Environment, consumers and health, Climate action
Connected and integrated Europe.	Interoperable public services, management of Influx of refugees	Justice, home affairs and citizens' rights, EU explained, Regions and local development

Table 10: Priority needs for individuals and the relevant policy domains.

Needs	Examples	Relevant policy domains
Ease of doing business	Starting a new business.	Business
Streamlined and reliable administrative procedures in the public sector	Reduce information redundancy	EU explained, Science and technology
Agile and participative public	Faster, decisive, centralized public sector	Science and technology
Stimulate an entrepreneurial culture.	Training to be entrepreneurs	Cross-cutting policies

Easy access to public sector information (open data).	Free access to enterprise and cadastral data	Science and technology
Talent acquisition and retention.	Attract skilled workers, enhance talent of existingemployees	Culture, education and youth
Business expansion	Internationalisation of business, increased access to funds	Regions and local development
Access to a unified European market	Unified European Market, Digital single market	Cross-cutting policies, EU explained
Technology implementation	Digitising processes	Science and technology
Reduce taxation levels and lessen complexity.	Lower taxes and simpler rules.	Economy, finance and tax

Table 11: Priority needs for businesses and the relevant policy domains.

Needs	Examples	Relevant policy domains
Resource optimization	Fairer distribution of resources, lack of resources	Cross-cutting policies, Economy, finance and tax
Lean bureaucracy	Reducing red tape and overbearing bureaucracy	Cross-cutting policies, Regions and local development
Digitization	Communication through electronic channels	Science and technology
Recruitment, Training (and IT Literacy)	Allow internal mobility, retain high quality staff, offer job security	Culture, education and youth, Science and technology
Rework the trust deficit	Restore trust in public services	EU explained, Environment, consumers and health
Participative democracy	Public participation, citizen engagement	EU explained, Environment, consumers and health, Science and technology
Appropriate remuneration and incentives	Rewards based on periodic evaluations, pay for performance	Employment and social rights
Employee empowerment and recognition	Employee voice and interaction systems	Employment and social rights
Accessible public sector information	Metadata, interoperability between data formats	EU explained
Civil servants as a community of change	Flexible public sector, authorities need to be more open-minded.	EU explained, Science and technology

Table 12: Priority needs for the public sector and the relevant policy domains.

5.3 Innovation requirements and appropriate examples

This section discusses the results of **Phase 3** (whose main objective was to identify a number of innovation requirements associated with the societal needs identified). Thus, this section contains some evidence of how technological solutions may help address pressing societal needs by providing some examples of real life innovation activities. To provide a better and more fine-grained matching between innovation actions and needs, some of the needs listed below are express either a narrower focus or a higher level of granularity with respect with the list of needs provided in section 5.1.

5.3.1 Individual needs

- **Paperless State/Digitization:** Dealing with this particular need implies directing efforts towards realization of a paperless and digital by default state. Thus, the key idea is to provide a platform for the citizens whereby they could store, encrypt and transmit the paper documents. This also implies the need to put in place a system to enable digital identity for citizens, at least across the four member states involved in SONNETS.

  Innovation Requirement: Create an ecosystem of different actors (from private and public sector) to enable a transnational digital identity.

  The public sector has been tremendously vital over the last half century in opening the way for the radical innovations through regulations, funding and policies. Such a requirement mandates a close cooperation between the public and the private sector. An initiative that serves as an exemplar is the e-Residency[63] initiative being implemented in Estonia. The Republic of Estonia is the first country to offer e-Residency — a transnational digital identity available to anyone in the world interested in administering a location-independent business online. e-Residency additionally enables secure and convenient digital services that facilitate credibility and trust online. e-Residents can digitally sign documents and contracts, verify the authenticity of signed documents, encrypt and transmit documents securely. Another EU project along similar lines is the STORK[64] project that also provides a pan-European identity to citizens; citizens can use their national eIds in any member State that was participating in STORK.

- **Experiential education and Training:** Addressing this need implies leveraging current technologies to provide an infrastructure to youth and other individuals (both currently employed and unemployed) for enhancing their skills. It also indicates providing ample opportunities for training with new competencies and enabling a continuous upgrade of their talents.

  Innovation Requirement: Scaffolding in education and fostering an experiential training paradigm by linking multidisciplinary education with practice.

  A high level comprehensive initiative is required that deals with multiple aims such as ensuring early childhood education and care, vocational education and training, promotion of talent in the field of higher education and science, art and creativity and providing bilingual education. Certain ways to fulfil this requirements is to create a learner profile for each individual (voluntarily basis) that links the skills acquired to each individual's profile. Another way to accomplish this is to include digital badges that indicate the skills, quality, accomplishments or an interest[65]. Furthermore, leveraging the use of mobile telephony could be also seen as a mechanism to achieve this need.

  Another solution to achieve this requirement is to utilise the public archives (by making them available in a linked data format) in the education and learning activities. An exemplar in this regards is the UK-RES project[66] that aims to improve access to UK's public archives for use in UK education and

research, by facilitating the use of audio-visual and other archive media in teaching and learning.

- **Transparent access to the PS Information:** Scholars and practitioners recognize that a transparent public sector is an essential element of a free and democratic society. Information from a wide variety of sources must be accessed and presented to citizens in an intuitive, easy to use fashion. In addition, the public sector should strive to provide an easy way for citizens to retrieve a wide variety of documents.

  Innovation Requirement: Promoting public sector as an "open and linked data platform" .

  The above requirement indicates new ways of harnessing the real value of open data by identifying relevant data and matching demand for relevant data with the open-data supply. This necessitates an active engagement with citizens and businesses. This could be achieved by creating local communities of interests involving different stakeholders to suggest specific kind of datasets that should be open by default. Another suggested alternative is organizing citizen hackathons to suggest which datasets to be open to ultimately improve public service. Certain initiatives are already in progress along these lines, however, these initiatives are still in the pilot phases in limited geographies. Some examples include Open4Citizens[67], an EU project involves citizens into a co-design process, together with IT experts, public administrations, interest groups and start-up companies, to raise citizens' awareness about the opportunity offered by open data and identify new ways of using such data. Another initiative in Italy is Visual OPML[68], that ensures availability of employment data through innovative interfaces.

- **Inclusive well-being and health:** Addressing this need entails optimizing opportunities for health, well-being, and security in order to enhance quality of life as people age. This also includes the provision of interoperable medical services and other basic primary care facilities.

  Innovation Requirement: ***Fostering social innovation and entrepreneurial capabilities in the EU.***

  Fostering social innovation initiatives through Public-Private partnerships (PPP) is an important step in this direction. An aging society represents a huge opportunity given the recent trend of silver economy in the EU. Solutions such as telemedicine, domotics and decision support systems to early detect health concerns are already being implemented in the EU.

  Some crucial initiatives (through the joint effort of public and private sector) in this domain is implemented through block chain technologies. For example, Guardtime, a block chain platform has partnered with Estonia's e-Health Authority with the goal to accelerate block chain-based security, transparency, auditability and governance for the lifecycle management for patient healthcare records[69].

- **Faster access to the public services:** The time frame in which the public sector is required to respond are tending to shorten to meet government imperatives, and citizen and stakeholder demands.

  Innovation Requirement: Provisioning a modern and an inclusive public service infrastructure.

  Specific solutions to meet this requirement could be: a) Establishing an interoperable infrastructure that utilises bots to answer specific questions and accessing public service providers based on performance rather area of residence and b) Harnessing the potential of block chain technologies. An example is a solution proposed Bitnation, a blockchain powered virtual nation in partnership with Estonia's e-Residency initiative. The solution allows the residents to choose their digital/public services best fit to them, regardless of the geographical area where they were born. Via the Bitnation public notary service, all e-residents can notarize marriages, birth certificates, and business contracts[70].

- **Political participation:** The youth needs to be empowered and trained to be a part of political processes to ensure democratic governance. Higher participation of the youth in raising issues that they associate with and the ones that are most relevant to them. Better exercising the right to vote and influence political decision making.

  Innovation Requirement: Inculcate the urge to participate in political processes.

  In this regard, approaches such as passive crowdsourcing, defined as the exploitation of extensive political content such as political blogs generated by citizens in Web 2.0 social platforms to better comprehend their issues and opinions concerning a particular public service or policy, are being utilized to allow the youth to voice their opinions. Another initiative that is launched in Germany relates to Liquid democracy systems[71] that aims to create a democratic voting system allowing voters to either vote on issues directly, or to delegate ones voting power to a trusted party[72].

5.3.2 Business needs

- **Talent acquisition and retention:** The digital demand today calls for a liquid workforce. Fulfilling this need would require solutions that allow for talent scouting, training on the job and talent development of existing employees. Specifically, it requires joint efforts from a broad range of stakeholders including governments and education providers.

  Innovation Requirement: Deploying talent readiness and scalability mechanisms to match talent demand and supply.

  Some actions to achieve this requirement include: Online cloud systems to classify and filter CVs, linked data to map connections through senior positions and adaptive training through real time tracking of activities. In addition, digital training platforms that combine enterprise-developed learning along with MOOCs into a single curriculum is also a probable solution.

Companies such as Unilever have partnered with local bootcamps like LaunchCode and General Assembly to develop relevant curricula, and then funnel graduates directly into related work[73]. AdZuna[74] is an online platform that allows employees to evaluate their CVs and attach a financial value to the CV.

- **Easy access to public sector information:** Dealing with this need would call for accessing valuable and reusable public sector information. Such information should be made available in reusable formats, intelligible by automatic means, and flexible. Also, wherever possible efforts should be directed at providing coordinated data sets that includes information combined from different departments and sources. For example in certain cases, even if the information is public, descriptions of what is published are not mentioned, thereby reducing the usability of such information.

  Innovation Requirement: Providing reusable, coordinated and intelligible public sector information

  Some proposed solutions for this requirement are: a) Good basic data for everyone[75], b) Using linked data and APIs to interact with the public sector and implementing interoperable public sector systems, and c) Utilizing data feeds to create value on the top of public information. For example, data feeds related to environmental pollution level, traffic signals can be opened up and then a private company can build services on the top of that data. Semantic information linking systems could be also deployed to better utilise public services. One such project that uses semantic linked data technology is 3CIXTY[76].

- **Cash injection/Capital infusion/Access to funds:** Fulfilling this need for businesses entails providing multiple possibilities for accessing funds and capital requirements (especially for SMEs). It also requires increasing the visibility of the businesses and better evaluation/screening of the businesses so that the potential investors could gauge the business potential.

  Innovation Requirement: Assessing businesses and their fund requirements.

  Certain initiatives running in the EU include crowdfunding platforms such as CrowdCube UK[77], a solution rolled out by the joint partnership of BNP Paribas Securities Services and Smart Angels. The solution leverages blockchain technologies[78] to provide investors with liquidity, a matter that has not been successfully addressed in the crowdfunding sector. Other initiatives utilise the data feeds. One such example is Finstat Data Feeds[79] to better evaluate businesses and the capital requirements.

- **Stimulate an entrepreneurial and start-up culture:** Dealing with a need such as this signifies incentivising people to become entrepreneurs and also facilitate them to set up and grow their ventures. The situation is only marginally optimistic as only 37 percent of Europeans prefer to be self-employed, compared to 51 percent in the US and China[80]. From a public sector perspective, this could imply situating mechanisms to screen potential entrepreneurial ventures, offering the right foundation for an entrepreneurial

career, providing access to markets, and enabling budding entrepreneurs to transform ideas into scalable ventures.

Innovation Requirement: Identifying means to scrutinize and evaluate start-up businesses.

Certain innovation solutions in this regard that emerged through the focus groups and desk research include: Digital Incubators/Accelerators, automated screening of start-ups, platforms to match start-ups with investors, machine based screening of start-ups based on big data.

5.3.3 Public sector needs

- **Employee remuneration and incentives**: To meet this need implies introducing practices such as pay for performance, collective wage agreement, periodic evaluations, establishing key performance indicators for all processes, including employee bonus mechanisms for good performance.

  Innovation Requirement: Implementing workflow management system and promoting outcome based performance measures.

  Certain solutions could be: a) Using Internet of Things to map the productivity of employees and measure the outputs and b) Introducing effective and open source workflow management systems within the public sector to map daily activities of each employee. Some examples of open source software to map workflow are the Zope platform, the OpenFlow framework and the Narval platform[81].

- **Civil servants as a community of change:** Addressing this need requires the public sector to provide a flexible work environment to the employees, wherein they can interact with each other, voice their ideas so that they can lead the change. It also implies encouraging a sense of public entrepreneurship and launching iterative waves of small-scale experiments in order to involve everyone – from front-line staff to senior managers and stakeholders in a collaborative manner.

  Innovation Requirement: Enhancing public entrepreneurship and promote radical innovation.

  To achieve this requirement proposed solutions are: revenue sharing systems, e-participation platforms for idea generation for public sector employees, and knowledge management systems (such as private WIKI for PS employees). One specific example of a knowledge management system is IKON, a knowledge management system in the Irish Army[82].

  Other solutions leveraging recent technologies include: living labs, gamification, virtual worlds (second life) and hackathons for PS employees. Incorporating intra-office messaging system such as Slack, Quip and Hipchat could be another alternative to allure employees to interact with each other. In addition, incorporating virtual reality tools such as second life as it allows employees to remain anonymous while being interactive[83].

- **Employee training and mobility:** This need requires directing actions towards training and retaining high quality staff, allowing inter-departmental mobility of employees based on skills and competencies and supporting flexibility in working environments.

  Innovation Requirement: Introducing ways to train civil servants and promoting an open work culture environment.

  Solutions to achieve this include: collaborative workspaces and co-work spaces in the public sector, online meetings through internet platforms, Easy to use equipment for elderly and disabled employees in the PS. Other examples include using Massive Open Online Courses (MOOCs) to train civil servants.

- **Resource optimization:** This precludes utilizing resources in a frugal and effective manner, reducing cost and increasing resource productivity. This is the vision for a Frugal and Efficient public sector[84]. The need for frugal government is even more accentuated in this wake of current fiscal crisis and austerity measures.

  Innovation Requirement: Optimize resource allocation in the public sector.

  The requirement could be addressed by implementing cloud solutions across all departments. Other ways to achieve this could be API Economy - API Platforms. Implementing Private APIs across the public means a greater shared awareness of the organizational processes and structures. It can also create greater clarity by enabling consistent data and information to be communicated across departments and thus, reduces the lead time to respond to internal/external request. For example, Apigee service is now used for UK G-Cloud Programme in the government procurement services. Other ways are for example Build ICTs to Share[85], an initiative that involves creating ICT shared services to support integration across all kinds of public services to drive efficiency, standardisation, consolidation and control cost.

5.4 Results from offline and online and validation activities

This section reports on the results stemming from the validation activities conducted offline in Turin, Athens, Madrid and Cologne as well as the online consultation published on the project website. The overall objective was to obtain a feedback from a plurality of local stakeholders on the work conducted in the SONNETS project. More specifically, the consortium was interested in investigating the different contexts in terms of key priorities, barriers or potential key success factors that may influence the potential adoption of emerging technologies as well as to identify a limited number of dimensions along which the process of public sector innovation could unfold.

Overall the validation activities involved 163 people (33 in through offline and 130 through online means) from eight European countries (BE, FR, DE, GR, IT, PT, ES, UK) and USA. The affiliations of the stakeholders involved in the offline

activities have been included in Appendix F. For what concerns those involved through the online consultation, instead, 35% of them conducted most of their professional career in the public sector, 43% in the private sector while 22% were people not represented by the previous two categories (e.g.: students, unemployed, etc..).

As a general remark, the work presented during the offline validation activities received a positive feedback by the participants across the different countries. The aspects that were mainly appreciated about SONNETS were:

1. The attempt to align public sector actions to concrete and pressing societal needs
2. The ambition to turn the public sector into a key driver of innovation adoption.
3. The multi-stakeholder perspective adopted (accounting for both external and internal views).
4. The creation of a methodology that could be replicated as an operational support to the points from 1 to 3.

Moving on to the identification of key priorities, Table 13 provides a synoptic representation of the results of both offline and online validation activities. More specifically, the table provides a view per stakeholder (individuals, business, public sector) about the needs identified as important within the countries involved. The table contains the needs that have been ranked in the first four places by priority and the countries in which those needs were identified as relevant.

STAKEHOLDER	PRIORITY NEED	COUNTRIES EXPRESSING THE PRIORITY
INDIVIDUALS	Inclusive well-being and health	IT, GR, ES, DE, BE, PT, UK
	Transparent and participative access to Public Sector services	IT, ES, GR, PT
	Equal employment opportunities	GR, DE, ES, IT
	Experiential education & training	ES, GR, IT, DE
BUSINESSES	Stimulate an entrepreneurial and start-up culture	IT, ES, PT, GR, UK

	Reduce taxation levels and lessen complexity	GR, ES, IT, FR, PT
	Easy access to Public Sector information (open data)	IT, PT, ES, GR
	Streamlined and reliable administrative procedures in the Public Sector	ES, GR, IT
PUBLIC SECTOR	Resource optimization	IT, GR, ES, BE
	Digitalization	GR, IT, ES, DE
	Appropriate remuneration and incentives	IT, GR, ES
	Lean bureaucracy	GR, IT, ES, BE

Table 13 Final short list of needs

Among individuals, the most shared priority regards the promotion of an inclusive well-being and health. The identification of such priority, apart from representing a need at the bottom of Maslow's hierarchy, may probably find its roots at the intersection of a number of concurrent trends having to do with the ageing of society and the consequent higher sensitivity to health and economic related matters, a gradual yet continuing shrinking of public budgets resulting in inevitable adjustments to capillary and affordable provision of public services, and, finally, to raising levels of inequalities resulting from a globalized capitalism where finance seems to prevail over the real economy and on which national or EU policy makers may only exert a limited amount of influence. In such a scenario, technology may represent a potential lever to break the trade-off between quality and availability of services and the related costs. More specifically, IoT, linked-open data, blockchain, bigdata and AI represent emerging technologies that may play a role in providing more operational efficiency thanks to a better level of information integration and exploitation, as well as in decoupling activities from the location in which they are conducted (e.g.: tele-health, telework, etc.) thanks to better communication channels and IoT-based monitoring systems.

Looking at the business stakeholders priorities, they could be divided into two main strands. The first has to do with the generation of innovation by supporting the birth and growth of new business ventures in the form of start-up companies. The obtainment of this objective requires operating on a number of dimensions necessary for the creation of an ecosystem of actors ranging from: venture capitalists with the necessary financial capacity, incubators and accelerators providing support services, universities offering entrepreneurship courses and adopting spin-out programs, would-be entrepreneurs with the right mix of technical and business skills. The second strand, instead, has to do with the promotion of a more business friendly public sector that is not perceived as a

burden in the competitive race but rather as a strategic partner a with simple interface.

Moving to the public sector, priorities mainly revolve around a better exploitation of resource and an innovation conducive environment. Such priorities have a number of technological, organizational and legal implications. On the one hand, the public sector is still struggling to fully embrace the potential of digital technologies; on the other hand, the ageing of the workforce is increasing the internal resistance to change due to skills obsolescence and a generalized reduced level of adaptability to change. In addition, the lack of incentive systems for civil servants to shoulder the risks involved in any innovation activity does not favor an environment conducive to challenging the status quo.

Two more cross-stakeholder aspects that emerged as key are: human capital and political participation. The former has to do with the central role of people in every societal process, more specifically the need for continuous training (especially in a world with high rates of change and prolonged working lives), and the need to retain talent as one of the key source of competitive advantage in a knowledge intensive society. Technologies like MOOCS leveraging gamification, virtual and augmented reality could play an important role in the process of knowledge and know-how acquisition of current and future generations of workers. Moving to political participation, instead, a need to rework the trust deficit in public institutions (from local, to EU level) by increasing accountability levels for the usage of the scarce public resources available and higher level of involvement of citizens in the policy cycle, leading to strategic and long term decisions. In this respect, open-linked data technologies, AI supported online discussions and social media may represent the techno-social infrastructure on which to build a more inclusive, accountable and citizen-oriented public sector.

Moving from needs to barriers, they were classified into four main categories: financial, legal, organizational, political and barriers having to do with human capital. The lack of necessary financial resources emerged as a leitmotif for both the public and the private sector, the current allocation processes for the scarce resources available were also judged as potential space for improvement. For what concerns legal aspects, complexity, corruption and administrative fragmentation were identified as important hurdles. Business stakeholders also identified the heterogeneity of legal systems and practices as an obstacle to companies' internationalization. From an organizational point of view, risk aversion together with lack of incentives and meritocracy were mentioned as key aspects hindering the promotion of an innovation friendly culture. At the same time, the lack of cooperation due to organizational silos and the presence of a significant amount of bureaucracy were also mentioned as important problems to act upon.

CATEGORY	BARRIERS
FINANCIAL	Shrinking public budgets
	Resources allocation processes
	Economic context
	Credit crunch & lack of VCs
LEGAL	Complex and sometimes contradictory laws and regulations
	Corruption
	Administrative fragmentation
	Internationalization obstacles
ORGANIZATIONAL	Risk aversion and fear of failure
	Lack of incentives and meritocracy
	Organizational silos and lack of cooperation
	Cumbersome processes and bureaucracy
POLITICAL	Lack of political will
	Inadequate leadership
	Political instability
HUMAN CAPITAL	Ageing workforce and lack of new recruits
	Insufficiency of IT skills
	Skills obsolescence

Table 14 Barriers to public sector innovation

At political level, the main three obstacles identified are a mix of lack of political will to change the status quo, inadequacy of people covering leadership roles and a high level of instability leading a to a high turnover of the priorities in political agendas. Finally, for what concerns human capital, the three main aspects slowing down the pace of innovation in the public sector have to do with the ageing of workforces due to reduced inflows of new recruits and the consequent skills obsolescence resulting in insufficient presence of IT skills.

Moving now to the identification of success factors supporting the implementation and diffusion of fruitful innovation, four areas of intervention were highlighted: legal, organizational, political and human capital. The legal aspects had to do with

the promotion of transparency, accountability, legal and fiscal simplification as well as the eradication of corruption. From an organizational standpoint, key ingredients for success reside in the diffusion of meritocracy, value and customer orientation, the proper application of management by objectives programs, the conduction of effective communication campaigns explaining the intended benefits of innovation actions and, finally, a higher osmosis and coordination with the private sector both in terms of start-ups and SMEs (in line with a government as platform logic). At political level, a long term and global orientation leading to persistent efforts for the obtainment of triple sustainability (economic, environmental and social) was highlighted as paramount. Finally, the success factors involving human capital have to do with a careful and continuous management of skills portfolios, the leveraging of qualified new cohorts of civil servants and the adoption of procedures and management styles capable of harnessing the collective intelligence that the workforce may express.

CATEGORY	SUCCESS FACTORS
LEGAL	Eradication of corruption
	Transparency
	Accountability
	Legal and fiscal simplification
ORGANIZATIONAL	Management by objectives vs. administrative fulfilment
	Meritocracy
	Value and customer orientation
	Effective communication of benefits
	Higher osmosis with private sector (start-ups / SMEs)
POLITICAL	Long term global orientation
	Persistence and stratification of efforts
	Triple sustainability mind-set
HUMAN CAPITAL	Education and training
	Employees empowerment
	Leveraging inflows of highly qualified youngsters

Table 15 Public sector innovation success factors

In addition to the results emerged from the online consultation, the offline validation activities allowed to go more in depth in discussing some important aspects to improve the chances of success of any process of reform in the public sector leveraging technological solutions. More specifically,

- INCENTIVES: The creation, where possible, of a quasi-market situations to create virtuous competitive cycles among public agencies thus promoting meritocracy and customer-orientated environments. This is already partly implemented in the case of universities who are competing for the attraction of students, but it may be extended to other public services having to do with certifications, health related services, etc.

- SIMPLICITY: The reduction to the minimum of the information requested to the end user who should only be required to prove her identity and to state her specific need, while the complexity about retrieving additional information, routing the request to competent agency should be left on the service provider side.

- AUTOMATION: The implementation of no-stop (fully automated) services should be considered. In other words, a number of services should not require the user to dedicate a single minute of her time. Services like the renewal of public transportation annual passes or resident parking permits could occur automatically (through an opt-in procedure) without requiring any action from the citizen.

To conclude, based on the findings generated, the situation emerged from the investigation activities may be summarized into two main stances. The first point of view may be situated outside the public sector and combines the perspectives of citizens, businesses and NGOs. Such stakeholders would like to see the process of public sector innovation unfold along three main dimensions:

- **Simplicity**: of laws and regulations, of interfaces for the interaction with the different public agencies.

- **Accountability**: in terms of response times (a key factor in mission and life critical processes) and of allocation of scarce public resources

- **Inclusiveness**: to balance social inequality and for the engagement of local stakeholder in the definition of policy priorities.

The second point of view, instead, may be positioned within the public sector and proposes the following key dimensions as a compass to orient the process of public sector reform:

- **Meritocracy**: through the creation of incentive systems for employees to shoulder the risk connected with innovation activities as well as through the implementation of performance-based reward systems.

- **Agility**: promoted through an injection of fresh energies in the form of new and young personnel as well as through an ambitious training program for older workers.

- **Coordination**: with the private sector that, due to the shrinking of public budgets, is playing an increasing important role in the provision of services of public utility.

To validate the above stances, stakeholders participating to the online consultation were asked to express their level of agreement with six statements highlighting the role of each dimension identified. As shown from the graphs below the opinions expressed comforted the preliminary conclusions drawn. The percentage of people that declared to either strongly agree or to agree ranged from 82% to 100%.

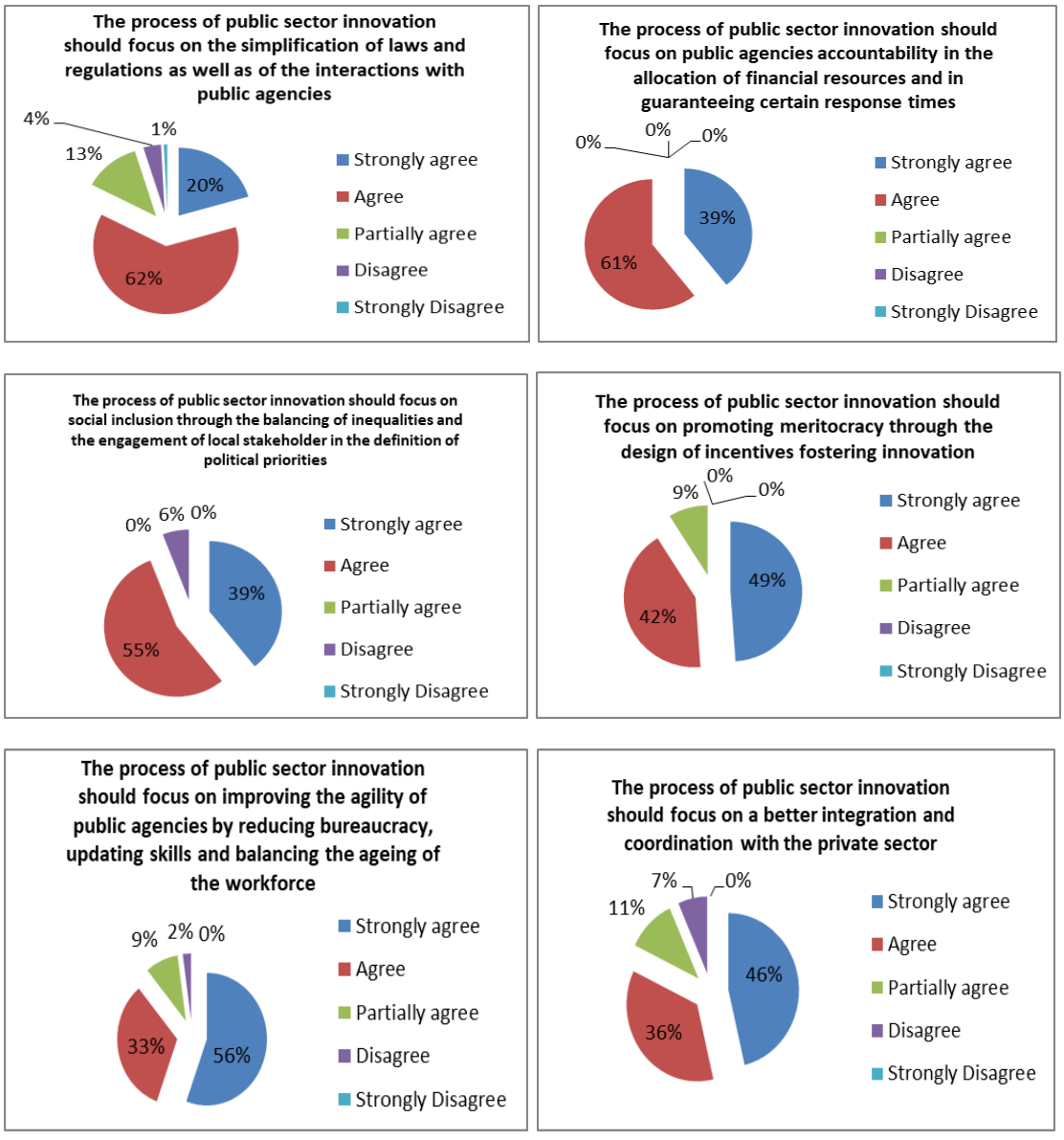

Figure 5 Agreement expressed towards innovation stances

6 Conclusive Remarks

The activities carried out in the context of WP2 were instrumental to lay the foundations of the work to be conducted in the entire project. As a matter of fact, SONNETS aspires to contribute to render the public sector more innovative in order to better meet pressing and evolving societal needs. For this reason, a demand-driven approach was adopted in order to orient the process of reform at answering the needs expressed by a plurality of stakeholders engaged in the first twelve months of the project (individuals, businesses, civil servants).
In terms of outputs, the work conducted in WP2 generated a two types of assets: a methodology for the implementation of a need-based and demand-driven innovation approach, and a snapshot that could be used as a compass for orienting the process of public sector innovation in terms of needs to be addressed, innovation requirements, barriers to consider and potential success factors to leverage.

Before briefly summarizing the main results obtained, it is important to highlight two caveats. The first has to do with the fact that a qualitative approach was selected. Thus, the representation of reality depicted should be considered similar to a painting, that is to say: a subjective yet meaningful representation of reality without any ambition of statistical representativeness. The second has to do with the prevalence of Southern European countries in the consortium (three out four). Such unbalance influenced the representation of the public sector emerged from the consultation activities conducted.

From a methodological standpoint, the key lessons learned throughout the activities conducted in WP2 are summarized in the following. Phase 1 (desk-based/secondary research) highlighted the critical role of a crowdsource approach (shared between the consortium and the expert committee) in carrying out a desk research deeply rooted in the relevant literature for identifying needs as well as for highlighting societal and public sector trends and challenges. This helped to situate our results in the current EU initiatives and projects that work on similar issues of public sector innovation and societal trends/challenges/needs. The subsequent phases (2 and 3) assisted our efforts at triangulating data and information from different sources and verifying the authenticity of the information collected through multiple sources. Finally, phase 4 was vital to validate and further prioritize and contextualize needs, potential barriers and success factors.

Moving from methodological considerations to domain specific results, the analyses conducted allowed to contribute to the improvement of the potential social relevance and the effectiveness of the process of public sector innovation by adopting a cross-stakeholder perspective in the identification of a short list of pressing societal needs together with a number of barriers and success factor to carefully consider in order to maximize the chances of success. In addition two perspectives have been characterized concerning the dimensions along which the process of public sector innovation should unfold. The first representing stakeholders operating outside the Public Sector and focusing on simplicity,

accountability and inclusiveness; the second, representing stakeholders operating within the Public Sector and focusing on meritocracy, agility and coordination.

The a complexity emerged from the analysis clearly showed that the issues to be solved go well beyond what technological solutions may offer. In this respect, technology should be considered as one ingredient of a more elaborated recipe. At the same time, some opportunities have been identified for the implementation of emerging technologies such as block chain, IoT, semantic web and linked data, artificial intelligence, virtual and augmented reality. In parallel, a number of more mature technologies still seem not to have exhausted their potential, among these it is worth to mention: social media, cloud, mobile and eID.

Finally, human capital was clearly identified as a core and cross-country issue for a successful implementation from both the demand and the supply side of public sector innovation. In this respect, any technological implementation should aim at being transparent to stakeholders both inside and outside the public sector. In other words, the innovative solutions should try to hide their complexity in order to reduce internal resistance to change and to promote an easier and widespread adoption among potential external users.

7 Appendices

APPENDIX A: Interview Protocol for privileged informants (Individuals)

Barring exceptional circumstances, all questions must be asked. If the interviewee does not expand on the questions him/herself, follow-up questions are provided that can be asked in order to get more expansive answers. Please record the interviews, unless the interviewee specifically asks for them not to be recorded. If the interviewee does not want it to be recorded, please take extensive notes on the interview.

At this time, we are not asking for full transcripts of the interviews. Instead, please provide detailed summaries or reports of the interviews. These summaries should be structured around the questions asked, along with any additional observations or insights that might emerge from the interviews.

Introductory Questions

1. **Can you briefly describe your profile, i.e., occupation, family etc?.**

2. **Could you describe the ways in which you interact with the public sector (PS)?**

Follow-up question:

What do you usually contact PS for? How often do you interact with the public sector and at what levels (municipality, state level or national level)?. How do you approach PS? What are the main problems or challenges you encounter in dealing with public sector.

3. **Since how long have you been interacting with public sector?**

Substantive Questions

4. **Could you please mention the key needs in your opinion?**

The interviewer should note down all the needs mentioned by the respondent.

5. **Out of the needs you mentioned, what are the most important needs?**

After the interview, the interviewer should match the needs against the list of macro needs, tick the ones suggested by the interviewee.

6. **Could you propose actions/solutions that might be taken to address these needs?**

The actions/solutions include both technological and non-technological solutions. Please ask for a solution corresponding to each need.

Follow-up: Can you please provide some real life examples or cases where such solutions have been implemented or are being implemented?

After the interview, interviewer should check the list of innovation items, tick the ones suggested by the respondent. If the action proposed is not included in the list of innovation actions, please add it to the list for future references.

7. **Apart from the needs mentioned on the list, are there any other major needs that are emerging and could impact you in the coming years?**

Follow-up questions: How can these needs be addressed ? Who can address these needs?

Do you think these future needs will have a positive or negative impact?

What do you think the overall repercussions of these new needs will be for public administration in your country?

APPENDIX B: Interview Protocol for privileged informants (Businesses)

Introductory Questions

1. **What is your business about? What are the main business activities you undertake?**

2. **How long are you in this business?**

Follow-up question: Has your business changed at all over time? In what way?

3. **Do you interact with the public sector? If yes, could you describe the ways in which you interact with the public sector (PS)?**

Follow-up question:

What do you usually contact PS for? How often do you interact with the public sector and at what levels (municipality, state level or national level)?. How do you approach PS? What are the main problems or challenges you encounter in dealing with public sector?

Substantive Questions

4. **Could you please mention the key needs in your opinion?**

The interviewer should note down all the needs mentioned by the respondent.

5. **Out of the needs you mentioned, what are the most important needs?**

After the interview, the interviewer should match the needs against the list of macro needs, tick the ones suggested by the interviewee.

6. **Could you propose actions/solutions that might be taken to address these needs?**

The actions/solutions include both technological and non-technological solutions. Please ask for a solution corresponding to each need.

Follow-up: Can you please provide some real life examples or cases where such solutions have been implemented or are being implemented?

After the interview, interviewer should check the list of innovation items, tick the ones suggested by the respondent. If the action proposed is not included in the list of innovation actions, please add it to the list for future references.

7. **Apart from the needs mentioned on the list, are there any other major needs that are emerging and could impact you in the coming years?**

Follow-up questions: How can these needs be addressed ? Who can address these needs?

Do you think these future needs will have a positive or negative impact?

What do you think the overall repercussions of these new needs will be for public administration in your country?

APPENDIX C: Interview Protocol for privileged informants (Public sector)

Introductory Questions

1. **Could you please briefly describe your role/the role of your organisation?**

2. **How long have you worked in this role?**

Follow-up question: Has your role changed at all over time? In what way?

Substantive Questions

3. **Could you please mention the key needs for your organization in your opinion?**

The interviewer should note down all the needs mentioned by the respondent.

4. **Out of the needs you mentioned, what are the most important needs?**

After the interview, the interviewer should match the needs against the list of macro needs, tick the ones suggested by the interviewee.

5. **Could you propose innovation actions/solutions that might be taken to address those needs?**

The actions/solutions include both technological and non-technological solutions. Please ask for a solution corresponding to each need.

Follow-up: Can you please provide some real life examples or cases where such solutions have been implemented or are being implemented?

After the interview, interviewer should check the list of innovation items, tick the ones suggested by the respondent. If the action proposed is not included in the list of innovation actions, please add it to the list for future references.

6. **Can you pick the policy domains necessary to address the societal needs and trends.**

At this point, interviewees should be shown the list of policy domains , so that they can match the policy domains against the key identified needs. If some policy domains are not mentioned, interviewees should be asked for their inputs. It is possible that a key need falls under the purview of multiple policy domains. The interviewees should be asked to map multiple policy domains, wherever relevant.

7. **Apart from the needs mentioned on the list, are there any other major needs that are emerging and could impact you in the coming years?**

Follow-up questions: How can these needs be addressed ? Who can address these needs?

Do you think these future needs will have a positive or negative impact?

APPENDIX D: Focus Group Agenda

Time Slot	Input	Estimated time
09:00-09:30	Welcome breakfast	
09:30-10:00	Introduction to the workshop	
	Part A	
10:00-10:30	Step#1 Posters will have refined needs (post interviews with privileged informants) copied on sticky notes attached to the poster Participants will be asked to look at the posters and the sticky notes to identify any emerging needs that are not mapped yet. If they come up with a new need, then provide a quote.	10-15 minutes per poster (one poster for each for individuals, business and government)
10:30-11:00	Step#2 Participants will be asked to work on the macro needs identified in the previous step. They will be asked to identify the macro needs (out of the list of macro needs) that could be addressed through technology and governmental action.	10 minutes per stakeholder
11:00-11:30	Step#3 Out of the macro needs identified, participants will be asked to prioritise the needs and identify 3 priority needs.	10 minutes for each stakeholder.
11:30-11:45	Coffee Break	
11:45-12:30	Step#4 Participants will be asked to map ¾ innovation actions that are feasible for the three priority needs identifies in step 3	15 minutes per actor
12:30-13:00	Open sessions: policy domains and real life examples.	10 minutes each actor
13:00-14:00	Lunch break	
	Part B	
14:00-14:15	Step#1 The SONNETS Innovation Identification Framework will be presented in terms of its goals, means and procedures. Participants will be asked to provide their feedback on the Framework, i.e. assess its completeness, point out	15 minutes

	omissions and suggest related aspects for inclusion.	
14:15-15:00	Step #2 Participants will be asked to discuss on the relevance of a number of trends and technologies for the public sector as well as map them against the goals of "public sector modernization" and "public sector as an innovation driver", based on a list that will be provided to them in advance. Each participant will have 10 minutes to argue on the trends/technologies that he considers more important for the public sector or bring up additional ones.	45 minutes
15:00-15:20	Step#3 Participants will be asked to match technologies with the innovation actions and further revise the list of innovation actions identified.	30 minutes
15:30-16:00	Wrap up and Thank note Conclude the overall session and mention the future steps	
16:00 onwards	Coffee session	

Table 16: Focus group agenda

APPENDIX E: Validation Activities Guidelines

1. Pick the two most relevant needs in the local context for each stakeholder from the list below

Individual needs	Business needs	Public sector needs
• Paperless state • Education and Training. • Transparent access to public sector. • Inclusive well-being and health. • Faster access to public sector services. • Political participation.	• Talent acquisition and retention. • Easy access to public sector information. • Access to funds(Cash injection/Capital infusion). • Stimulate an entrepreneurial and start-up culture.	• Employee remuneration and incentives. • Civil servants as a community of change. • Recruitment and training. • Increase resource productivity.

2. Identify 2 key innovation solutions (that leverage technology) for each identified need and repeat this task for each stakeholder.

3. From the list of technologies, map the appropriate and most relevant technologies that could be used to implement the solution. Repeat this step for each innovation solution.

4. What could be the potential barriers in implementing the innovation solutions and the technologies. The criteria for successful implementation of these solutions?

5. Validate the mapping between needs and policy domains (the mappings are presented below).

Needs	Examples	Relevant policy domains
Inclusive well-being and health	Personalized services for disabled, work life balance, isolation of elderly people.	Environment, consumers and health, Regions and local development, Transport and travel
Transparent and participative access to public sector services	Trust in governance, voicing their opinions,	Science and technology
Equal employment opportunities	Gender equality in labour force, encourage women participation.	Culture, education and youth, Employment and social rights
Experiential education and training	Skill development, enable communication in different languages	Culture, education and youth, Employment and social rights, Cross-cutting policies
Housing and secure shelters	More and cheaper homes, protect homes from natural calamities.	Justice, home affairs and citizens' rights
Modern workplaces	Flexible work hours , recreation facilities at work	Justice, home affairs and citizens' rights

Environmental Amicability	Greater environmental awareness,	Energy and natural resources Environment, consumers and health, Climate action
Connected and integrated Europe.	Interoperable public services, management of Influx of refugees	Justice, home affairs and citizens' rights, EU explained, Regions and local development

Priority needs for individuals and the relevant policy domains.

Needs	Examples	Relevant policy domains
Ease of doing business	Starting a new business.	Business
Streamlined and reliable administrative procedures in the public sector	Reduce information redundancy	EU explained, Science and technology.
Agile and participative public	Faster, decisive, centralized public sector	Science and technology.
Stimulate an entrepreneurial culture.	Training to be entrepreneurs.	Cross-cutting policies.
Easy access to public sector information (open data).	Free access to enterprise and cadastral data.	Science and technology.
Talent acquisition and retention.	Attract skilled workers, enhance talent of existing employees.	Culture, education and youth.
Business expansion	Internationalisation of business, increased access to funds	Regions and local development.
Access to a unified European market	Unified European Market, Digital single market	Cross-cutting policies, EU explained.
Technology implementation	Digitising processes	Science and technology.
Reduce taxation levels and lessen complexity.	Lower taxes and simpler rules.	Economy, finance and tax.

Priority needs for businesses and the relevant policy domains.

Needs	Examples	Relevant policy domains
Resource optimization	Fairer distribution of resources, lack of resources.	Cross-cutting policies, Economy, finance and tax.
Lean bureaucracy	Reducing red tape and overbearing bureaucracy.	Cross-cutting policies, Regions and local development.
Digitization	Communication through electronic channels.	Science and technology.
Recruitment, Training (and IT Literacy)	Allow internal mobility, retain high quality staff, offer job security	Culture, education and youth, Science and technology.
Rework the trust deficit	Restore trust in public services.	EU explained, Environment, consumers and health.
Participative democracy	Public participation, citizen engagement.	EU explained, Environment, consumers and health, Science and technology.

Appropriate remuneration and incentives	Rewards based on periodic evaluations, pay for performance.	Employment and social rights.
Employee empowerment and recognition	Employee voice and interaction systems	Employment and social rights.
Accessible public sector information	Metadata, interoperability between data formats	EU explained.
Civil servants as a community of change	Flexible public sector, authorities need to be more open-minded.	EU explained, Science and technology.

Priority needs for the public sector and the relevant policy domains.

6. Identify the governmental level at which a particular need could be addressed: Local, Regional, National.

Needs	Local	Regional	National	Pan European
Need #1	x		x	
Need #2		x		x

APPENDIX F: Affiliation of Stakeholders involved

Below a description of the affiliation (or the profile, for individuals) of the stakeholders involved in the offline validation (and/or the interviews with privileged informants) is provided:

STAKEHOLDER GROUP	AFFILIATION /PROFILE	COUNTRY
GOVERNMENT	Procurement Department, Madrid City Council	ES
GOVERNMENT	Employment Services Counselor, Castilla-La Mancha Regional Government	ES
GOVERNMENT	Madrid Municipal Police	ES
GOVERNMENT	S. G. de Tecnologías de la Información y Comunicaciones Mº Empleo y Seguridad Social	ES
GOVERNMENT	Technical innovation – Municipality of Segovia. Concejalía de Desarrollo Económico, Empleo e Innovación	ES
GOVERNMENT	RED.es	ES
GOVERNMENT	AEAT	ES
GOVERNMENT	ENISA, Ministerio de Economía, Industria y Competitividad	ES

GOVERNMENT	Municipality of Turin Economic Development Innovation European Funds Department	IT
GOVERNMENT	Policy Officer for Innovation at Municipality of Turin	IT
GOVERNMENT	Piedmont Regional Council Social Media Manager	IT
GOVERNMENT	Ministry of Labour	GR
GOVERNMENT	Ministry of Education	GR
GOVERNMENT	Special Secretariat of Digital Planning	GR
GOVERNMENT	ICCS	GR
GOVERNMENT	Municipality of Chalandri	GR
GOVERNMENT	NTUA	GR
GOVERNMENT	IT department, City of Munich	DE
GOVERNMENT	IT department, City of Bonn	DE
GOVERNMENT	IT department, City of Hamburg	DE
GOVERNMENT	IT department, City of Koblenz	DE
GOVERNMENT	IT department, City of Frankfurt	DE
INDIVIDUALS	Retiree	GR
INDIVIDUALS	Bank Employee	GR
INDIVIDUALS	Teacher	GR
INDIVIDUALS	Delwende NGO Executive Board Member	ES
INDIVIDUALS	Retiree	ES
INDIVIDUALS	Software Engineer	ES
INDIVIDUALS	ActionAID, NGO	IT
INDIVIDUALS	Engineering Student	IT
INDIVIDUALS	Young Immigrant Worker	IT
INDIVIDUALS	Member of RENA Association	IT
INDIVIDUALS	German Red Cross, Euskirchen	DE
INDIVIDUALS	Caritas, Bonn	DE
BUSINESSES	Getafe Inciativas, S.A.	ES
BUSINESSES	INNOBOOSTER	ES

BUSINESSES	Technology Transfer Director at Atos	ES
BUSINESSES	Software Engineer at Altran	ES
BUSINESSES	Ecovis STlex	IT
BUSINESSES	TOP-IX	IT
BUSINESSES	HUMAN PLUS FOUNDATION	IT
BUSINESSES	TALENT GARDEN	IT
BUSINESSES	42 Accelarator	IT
BUSINESSES	Microsoft	GR
BUSINESSES	Ubitech	GR
BUSINESSES	DImiourgia Consulting Group	GR
BUSINESSES	Suite5	GR
BUSINESSES	High-Tech Gründerfonds (HTGF)	DE
BUSINESSES	SPECTARIS - German industry association	DE
BUSINESSES	Arvato	DE
BUSINESSES	German Industry and Trade Federation	DE
BUSINESSES	Wiesbaden Chamber of Commerce and Industry	DE
BUSINESSES	Düsseldorf Chamber of Commerce and Industry	DE

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