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The Duality of e-Participation - A Model and Technical Infrastructure to Study and Harness Social Media-Based Participation

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Declaration

I declare that the work covered by this thesis is composed by myself and that it has not been submitted for any other degree or professional qualification except as specified.

Lukasz Porwol

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Abstract

Despite the proliferation of e-Participation initiatives, overall efforts towards mainstreaming social media-based and citizen-led political deliberations are still limited. Consequently, there is a paucity of research on expected mutual re-shaping of deliberations on traditional e-Participation platforms and spontaneous citizen discussions on social media platforms. This mutual re-shaping phenomenon also referred to as the "duality of e-Participation" has been identified by Macintosh et al. in 2009, however up to date there is lack of methods and tools to study or enabling to harness the duality. In particular, the duality requires a specific, e-Participation-aligned, technical infrastructure to enable decision makers in government to access relevant information about ongoing citizen discussions on social media platforms. In this dissertation, we investigate the nature of the duality of e-Participation phenomenon; we construct a design inter alia of a Social Software Infrastructure (SSI), as a tool to study this duality. The design has been based upon e-Participation domain structuration and analysis leading to specific infrastructure requirements. Specifically, we combine the Structuration Theory complemented by Dynamic Capabilities Theory in an integrated model for e-Participation – an essential theoretical lens for generation of the SSI requirements.

Also, we conduct a set of semi-structured interviews with politicians and decision-makers in relation to the duality. We investigate with politicians the nature of duality, we discuss possible ways of harnessing the duality and we

attempt to evaluate the feasibility of applying specific technologies, in the context of SSI, to enable effective social media-based e-Participation.

The consolidated, structured results from the interviews inform a comprehensive analysis of the phenomenon of duality of e-Participation. From our results, we identify the essential technical capabilities that need to be obtained by governments to harness the duality. Finally, based on the knowledge acquired throughout the study, and considering all the challenges identified, we elaborate on the revised technical infrastructure implementation realising en evolved SSI design. We conclude with recommendations for governments to realise this SSI and some proposals for future work.

Dedicated to my mother Jadwiga and my father Bogdan Porwol

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Prelude

I Prelude

1 Introduction

e-Participation, enables technology-mediated dialogue between citizens and the sphere of politics and between citizens and administration (Sabo, Rose, & Skiftenesflak, 2008) to enable effective, concurrent public participation and feedback (Chadwick, 2003) while also introducing new ways of political participation (Dijk, 2000). Here, following Macintosh et al. (Ann Macintosh, 2004) we consider e-Participation as a distinct area to e-Voting which is classified as a support tool for e-Enabled election.

In the last decade, many e-Participation platforms have been deployed. However, most of these solutions were characterised by low level of citizen engagement (Ann Macintosh, Coleman, & Schneeberger, 2009a). Literature defines multiple reasons why people participate (Batson, Ahmad, & Tsang, 2002; Clary & Snyder, 1999; Klandermans, 2003; McEwin, 1992; Rochester, 2006). Rochester et al. propose four general motivations in this context: 1) socio-economic, 2) opportunity or access, 3) historical and cultural factors; and 4) Individual motivation. Most of the motivation models in the literature share common factors: egotistic, self-development or career driven motivation. The authors agree that motives are transferred into active participation through engagement process. Therefore, individuals are willing to participate, triggered by their social networks. In this context, in order to address the problem of low participation, e-Participation researchers have

developed dedicated models and methods for e-Participation. Over the years, several reference models were developed in e-Participation domain which became a foundation for multiform e-Participation projects and architectures. The several most widely cited works include: Dimensions of e-Participation Framework (A. Macintosh, 2004), Levels of Participation Model (DESA, 2005b), Ladder of Online Participation (Li & Bernoff, 2007), Behavior Chain Model (Fogg & Eckles, 2007), e-Participation Assessment Framework (Tambouris, Liotas, & Tarabanis, 2007a), e-Participation Evaluation Framework (Ann Macintosh, 2008a), e-Participation Exploitation Framework (Phang & Kankanhalli, 2008a) and a number of others (Aichholzer & Westholm, 2009; Islam, 2008; Preece & Shneiderman, 2009b; Sæbø, Flak, & Sein, 2011). However, although these models address one or more aspects of e-Participation, the degree of complementarity of these models and the extent to which they collectively cover the different facets of e-Participation is insufficient. We argue that a research gap exists due to fragmented contributions in the e-Participation domain may be a major factor to limited success of the state-of-the-art e-Participation initiatives. In line with this thesis, Macintosh et al. in (Ann Macintosh et al., 2009a) observed that, although the current e-Participation methodologies consider public consultation as an important citizen involvement tool, they widely neglect the recent proliferation of spontaneous political discussions on social media, reflecting a strong preoccupation with the improvement of specific technical aspects of classic e-Participation platforms. Macintosh advocates that citizen-owned informal communication channels create new means of e-Participation, therefore, contributing to a form of the duality of e-Participation hitherto understood as a dichotomy between government controlled classic e-Participation and Citizen-led e-Participation. In particular Macintosh argues that the nature of the duality of e-Participation lays in increased citizen political activity through informal, spontaneous e-

Participation platforms like social-media, that run in parallel to dedicated, government-led e-Participation platforms. Nevertheless, Nevertheless, Macintosh et al. stress that duality (as opposed to dualism) is a complementarity of these two distinct e-Participation channels. In particular, the authors emphasise the need for synergy between the old and emerging channel as similar issues are being discussed on both types of platforms in a different way. The opportunity has been identified, that unofficial platforms experience far more engagement than the dedicated e-Participation tools. However, while the claim by Macintosh et al. is plausible, no empirical evidence or systematic investigation to support the existence or degree of the purported duality exists.

In our work, we have focused on developing methods and tools for better understanding and harnessing this opportunity, by delivering a coherent theoretical framework and corresponding technical design.

In particular, this thesis provides a first step towards creating the relevant technical infrastructure to study and to harness the "duality of e-Participation" phenomenon. Our specific goal is to apply state-of-the-art information technologies and knowledge management capabilities to develop a Social Software Infrastructure for harnessing social media-based political deliberations and for understanding the conditions for these inputs to shape and to be effectively used by decision makers. The specific stages of this research work were as follows

1) Structuring e-Participation research; 2) Developing Integrative model for e-Participation 3) Identifying the Social Software Infrastructure requirements derived from the domain literature and state-of-the-art e-Participation projects' documentation; 4) Aligning existing technological tools and processes as pre-requisites to implement such an infrastructure and determining technological gaps in realising the infrastructure; 5) Developing a comprehensive Social Software Infrastructure Design to harness the duality of

e-Participation; and 6) Interviewing politicians and decision-makers regarding the value of the citizen's contributions on social media for policy making. 6) Investigating with decision-makers and politicians the data analytics methods and technologies that could be used to directly support policy-making included in the final SSI design.

1.1 Problem Statement

While traditional e-Participation platforms face lack of engagement from citizens, the ubiquitous social-media solutions emerge as an important complementary component for e-Participation. Nevertheless, the significant efforts at harnessing social media-based citizen-led political deliberations for policy making are scarce. The major efforts are rather individual and are limited to content browsing through standard social media interfaces, or leveraging miscellaneous social media streams aggregators.

To provide a clearer view on the problem, we use a hypothetical scenario involving Senator K who is interested in engaging with citizens on the topic of transportation. In the morning, she starts a new thread on a local e-Participation platform. The topic of the thread is related to transportation in her city. In the afternoon, Senator K receives a couple of interesting suggestions, however she is not sure how representative are the contributors nor the opinions provided. She browses through social media in order to gain more information. However she is not sure how to identify the discussions of interest to her nor how to find citizens from her constituency in the vast social network. Moreover she feels overwhelmed with amount of contributions that is often of very low quality and largely on daily, unimportant topics. She doesn't know where to find valuable information or whether the information she needs exists on social media. She goes back to the local e-Participation

platform hoping for more comments though by the end of the day she receives only a few more, similar opinions.

The scenario presented shows, that in order to take a full advantage of social media in every-day policy-making, politicians and decision makers require more information backed by comprehensive analysis. Specifically they have to be provided with answers to the following questions:

- Where are the discussions taking place (where do participants come from)?
- What are the topics of the discussions?
- What tools are available to track these discussions?
- Where to find people and resources analyse social-media?
- How much information is really out there?
- What is the quality of information on social-media?
- How to make use of such information, how many people and how diverse are those that contributed this information?

The example scenario and the non-exhaustive list serves as brief indication of challenges with harnessing the duality of e-Participation. Thus, while the notion of duality of e-Participation is plausible specific capabilities must be developed by governments to harness this duality. Focusing on the technology aspects, we identify the requirements, we develop a design and corresponding implementation for Social Software Infrastructure (SSI) to study and to harness the duality of e-Participation.

1.2 Research Questions

The above challenges are materialized into following research questions:

Q 1.

What is the nature of the duality of e-Participation?

The duality of e-Participation, which manifests itself in the existence and influence of mutual re-shaping of deliberations on classic e-Participation platforms and social media, has been identified in the literature as an important emerging phenomenon. However, to the date, there is a lack of relevant scientific studies of the nature of this duality. It is essential to study and understand the phenomenon in terms of adaptive capabilities available and required by the governments in terms of e-Participation information processing. This capabilities relate to the governments' ability to adapt their internal processes to consume information derived from social media) Determining these capabilities is prerequisite for the development of relevant methods and corresponding tools to study and to harness the duality of e-Participation.

Q 2.

How can the duality of e-Participation be harnessed?

This question refers to the absorptive capabilities that have to be developed by the governments to harness the duality of e-Participation. The absorptive capabilities relate to governments' ability to leverage constructively the information harvested from social media in decision-making. In particular, specific capabilities need to be available at governments' disposal to ensure that quality information is identified and forwarded to relevant decision

makers, and that information is sufficiently representative to facilitate policy-making.

Q 3.

How can technology support the duality of e-Participation?

This question refers to the kinds of technology infrastructure that is required to deliver capabilities investigated in question 2. The role of the technology in harnessing the duality of e-Participation is to provide relevant, innovative capabilities that would enable governments to satisfy their social media information needs as a complementary input to classic e-Participation. In our context, the innovative capabilities relate to innovation through technology. The new (innovative) capabilities are enabled by specific technologies that are applied or developed to support required absorptive capabilities.

1.3 Approach

A major goal of this work is to study and harness the duality of e-Participation. In particular, the methods developed and implemented in the form of a technical infrastructure – a Social Software Infrastructure, facilitate capturing, processing and analysis of citizen-led political deliberations on social media.

1.4 Methodology

In our methodology we follow the Design Science Research Framework – DSRF (March & Smith, 1995) as the core approach. Design science creates and evaluates artefacts that define ideas, practices, technical capabilities and products through which the analysis, design, implementation and use of information systems can be effectively accomplished. Given that the outcome of this work is a technical artefact, our research follows the Design Science Research guidelines.

We adopt the DSRF to the specific needs of e-Participation infrastructure design. In this context, the produced research outputs include: 1) the e-Participation requirements elicited, 2) an e-Participation state-of-the-art

coverage map and identified gaps 3) the infrastructure design, and the 4) an instantiation through the selection and alignment of the existing technologies, with the design components of the infrastructure. The research activities performed include designing the infrastructure and analysing the results provided. The value of the methods implemented in the infrastructure is validated through qualitative research by conveying a set of semi-structured interviews with politicians and decision makers.

The approach is characterised by the following steps:

S1) Extensive review and structuring of the state-of-the-art for e-Participation – The first step involved development of a framework for structuring the e-Participation domain, to identify research gaps and to align our research line to the existing work.

S2) Development of a Comprehensive, Integrated model for e-Participation – In the second step, based on the state-of-the-art analysis we develop an Integrated model for e-Participation combining key e-Participation concepts and augmenting the current methods with explicit support for the duality of e-Participation. In particular this steps includes the following sub-steps:

S2.1. *Structuration Theory-based analysis of e-Participation* - we start by reviewing the structuration analysis of participation presented by (Chtinis, 2005) to obtain core Structuration Theory constructs relevant to the concept of participation. Following this, the obtained constructs were reinterpreted in the context of e-Participation.

S2.2. *Refining Structuration Theory-based analysis of e-Participation with Citizen-led participation* – We extend the model developed in Step 1 to

include citizen-led participation. The resulting model explains the duality of e-Participation; where both government- and citizen-led e-Participation emerge as mutually supportive and shaping processes.

S2.3. *Elaborating e-Participation structures and capability using Dynamic Capabilities Theory* – this step involves the refinement of the resource and capability related constructs in the integrated model developed with the dynamic capabilities theory (Wang & Ahmed, 2007). This enables the identification of specific types of capabilities required by the government in particular to harness the dual nature of e-Participation.

S3) Identifying the Social Software Infrastructure Requirements – based on our Integrated Model for e-Participation, we elicit the requirements for Social Software Infrastructure. This is achieved in two sub-steps. The first sub-step involves determining the required socio-technical and organizational capabilities for provisioning such infrastructure while the second consist in refining these capabilities into concrete systems requirements.

S4) Gap Analysis based on mapping of related social media technologies – we investigate existing practices and technologies that could support the implementation of the requirements defined in Step 3. Following the mapping, we elaborate on particular gaps identified with respect to the realization of the Social Software Infrastructure.

S5) Creating the Social Software Infrastructure (SSI) Design – based on the requirements and gaps identified in Steps 3 and 4, we develop the key design constructs for the SSI. The resulting model addresses both government- and citizen-led e-Participation as a synergic process. This includes the following sub-steps:

S5.1. *Design and implementation of executable (machine readable) Ontology for e-Participation* – We propose a comprehensive ontology to structure the key aspects of e-Participation from the perspective of political processes, e-Participation projects and technological platforms. The model enables us to identify specific processes and determine the information flow between the stakeholders and the key components of the e-Participation space.

S5.2. *Design and implementation of executable Deliberation Ontology for e-Participation* – The Deliberation ontology has been a tool to understand the key aspects of political deliberation in the context of e-Participation. The ontology enabled us to determine the specifics of e-Participation discussions in contrast to general, popular discussions on social media. Moreover, the ontology has been used as a tool to harness the information encapsulated by the discussions in a structured form.

S6) Validating the Social Software Infrastructure (SSI) Design – the final step involves the validation of the constructed design. We demonstrated to politicians (during interviews) the concepts included in the final SSI design to determine the value of the methods and the resulting technical solutions proposed. In particular, we investigated with politicians and decision-makers how the Social Software Infrastructure components respond to specific, policy-making-related information needs.

1.5 Thesis Outline

The reminder of this thesis document is divided into three major parts: 1) Part II – Foundations, 2) Part III – Core Research, 3) Part IV – Conclusion and Future Work. Every part starts with a relevant introduction to relate to the common structure and aim of the thesis.

Part II — Foundations

We begin by setting out the foundations for our work. This part is comprised of two chapters.

Chapter 2: Background - Describes the key concepts for e-Participation and introduces related work: Participation, Political Participation, e-Participation, Social Media, Web 2.0, Web 3.0 and its representative technologies

Chapter 3: e-Participation Models and Tools - Contains an overview of existing e-Participation solutions, methods and tools

Part III — Core Research

This part presents the core contribution of the thesis. The four chapters discuss the theoretical and technical artefacts generated by our research work.

Chapter 4: Structuring e-Participation Aspects – Describes our efforts at structuring the e-Participation domain, with an accurate map of domain coverage and research gaps.

Chapter 5: Integrated Model for e-Participation – Explains the concept of the duality of e-Participation and describes our solution to harness this duality in the form of an Integrated Model for e-Participation

Chapter 6: Social Software Infrastructure – Describes a technical application of the Integrated Model for e-Participation as a solution to study and to harness the duality of e-Participation. In particular, the chapter provides a detailed description of a Social Software Infrastructure (SSI) design for e-Participation implementation. The chapter describes the main building components developed and elaborates on the main use case for the solution**.**

Chapter 7: Analysis - Presents results of the analysis of the duality of e-Participation, based on the Social Software Infrastructure design, with an extended elaboration through feedback provided by politicians and decision makers.

Chapter 8: Implementation – Describes the revised Social Software Infrastructure design aligned to the results of the analysis. The chapter provides a detailed description of a prototype implementation of the designed SSI in the context of Irish politics.

Part IV — Conclusion and Future Work

Chapter 9: Conclusions – The last chapter contains the conclusion of the work, reiterating the contributions and how they answer our research questions. We discuss some of our results and the insights we gathered from the work. We also outline ideas for future research.

Part II

Foundations

II Foundations

2 Background

This chapter presents the background knowledge built upon in this thesis.

2.1 Participation

2.1.1 Participation Definition

Participation is a social science term and commonly refers to mechanisms leading to people expressing their opinion publicly. Participation can be defined differently in specific contexts. In our investigation of Participation as a concept, we followed a comprehensive survey by Brodie et al. (Brodie, Cowling, Nissen, Paine, & Warburton, 2009) as a roadmap to Participation literature. The authors divide the domain of Participation into three general categories: 1) Public participation, which refers to the engagement of citizens with public institutions in order to affect the policies (Conge, 1988); 2) Social participation, which describes how actively a person participates and refers to any collective activities that people can be involved in, in both a formal and informal way (Lindström, Hanson, & Ostergren, 2001); and 3) Individual participation, that covers any everyday activities that can be influenced by politics. In this work, we focus on Public and Social participation in the context of policy-making by governmental institutions. An effective citizen-Participation, which is derived from Public and Social participation, became an important component of every modern democracy both in developing and developed nations. Up until very recently, the policy-making processes relied entirely on elected representatives, but now our modern, more knowledgeable society's expectations have grown to influence a

government's decisions more directly, particularly those that affect people's everyday lives (Roberts, 2004).

2.1.2 Participation Motivation

In Psychology and Sociology, the problem of participation is liked with the motivation for volunteering. In this context, Clary et al. (Clary & Snyder, 1999) propose a Volunteer Functions Inventory (VFI) that defines six basic categories for participation motivations: 1) Values - humanitarianism; 2) Understanding: learning new skill or about some topic; 3) Enhancement: development and psychological growth; 4) Career: seeking for professional experience; 5) Social: to improve or to gain new relationships; 6) Protective: using participation as a distraction from personal problems and stress management tool. The model by Clary has been revisited and extended by McEwin (McEwin, 1992). In particular McEwin proposes a VMI model: Volunteering Motovation Inventory that overlaps the VFI and introduces two extra motivational factors (the combination of VFI is indicated explicitly by authors in one of the stages of VMI model creation – stage five of six stage process): 1) Reciprocity: The notion of doing good and receiving good in return; 2) Reactivity: an empathetic attitude where individual helps others who deal with the same problem (faced by the individual in the past); Other important models structuring the volunteering motivation space include works by Batson (Batson et al., 2002) and Klandermans (Klandermans, 2003). These models focus on community involvement. Specifically Batson proposes four factors dealing with the directon and range of benefit from volunteering: 1) Egoism: volunteering for personal gains – benefit self; 2) Altruism: volunteering to help other individuals – benefit other; 3) Collectivism: volunteering for the good of a group – benefit a group; 4) Principalism: volunteer to keep and promote moral principles – benefit or support a moral principle. Klandermans in in his model ("a social psychology of movement participation") refers in particular to motivations related to participation in social movements (such as

protests). In particular, Klandermans leverages the demand and supply principle from economics and applies it to motivation for participation. The author explains that social movement usually assembles in response to specific demand and in this context distinguishes three basic factors that may be dependant: 1) Instrumentality: mobilisation to change circumstances; 2) Identity: related to collective identity, to act as a group; 3) Ideology: mobilisation to express one's view or to "gain dignity and moral expression".

The models presented are complementary with the structuration proposed by Rochester (Rochester, 2006). The "Explanations" provided by Rochester offer more generalised view of the participation motivation space with more sociological lens. Nevertheless, Rochester provides some very practical examples to back each of the classifications. In particular Rochester attempts to explain and to classify the key reasons for participation with four general motivations: 1) Socio-economic factors: more educated individuals tend to contribute more to public services,; young parents usually get involved in volunteering services linked with the good of their children; people in rural areas often volunteer as a response to the lack of basic services; 2) Individual motivation: some individuals are more likely to participate due to their nature or personality – here the motivation can be self-interested (learning, development, acknowledgment, group protection), purely altruistic or expressive (helps individual to express himself/herself) 3) Opportunity or access: people volunteer when triggered by their social network (can be triggered by group of interest or religious group) – people tend to participate when asked by their social network peers; 4) Historical and cultural factors: the specific volunteering culture in particular country or area can be a strong trigger for participation – in extreme cases the cultural factors can take a form of social pressure.

All the models elaborated in this section share common factors. The most common motivations are related to egoistic gains like self-development,

career progression or benefits derived from being part of a collective. Most authors agree that motives translate into active participation through engagement process. Individuals have to be invited and encouraged to participate by their employer, supervisor, friends or some authority. Moreover, the deciding factor appears to be a well-defined job or set of tasks so that the personal cost involved (such as the time needed) is clearly articulated (Rochester, 2006).

2.1.3 Participation Barriers

The literature identifies multiple barriers that prevent citizens from active and effective participation: 1) Significant institutional barriers (Low, Butt, Paine, & Smith, 2007) related to the complexity and unjustified formalism of governmental structures; 2) Ubiquitous bureaucracy (Cairns, 2004; Rai, 2008) with all its associated delays and procrastination, along with 3) low state policy awareness caused by a lack of resources and proper education (Office of Public Sector Information UK, 2008) seems to effectively discourage people from participation. Lack of recognition for participation is also mentioned as one of the key obstacles that make volunteers refrain from contribution (Low et al., 2007). For many citizens, another barrier is low income due to the relatively high cost of travel required to access local institutions (Greg Power, Karl Wilding, 2007). Transport, time and access issues such as long queues and inconvenient opening hours are probably the most common barriers. These issues are followed by many psychological barriers such as lack of confidence (Reitsma-Street, Maczewski, & Neysmith, 2000) and insecurity about knowledge (POWER Inquiry, 2006), along with a lack of trust in public institutions (POWER Inquiry, 2006; Rai, 2008; Saddler & Hovi, 2007). A lack of faith in the engagement process at the local decision-making level appears to particularly limit participation (Office of Public Sector Information UK, 2008). There were also multiple cases recorded where people faced prejudice and discrimination regarding gender, race or faith by public officials (Rai, 2008).

The so-called 'lack of time excuse' also exists among a large group of citizens who are constantly refraining from participation (Greg Power, Karl Wilding, 2007).

2.1.4 Participation Challenges

Due to multiple barriers, including a shortage of proper tools and resources, political legitimacy is currently witnessing a deep crisis. A great loss of citizen's confidence in political representatives has been noted in many countries around the world (Colombo, 2010). Developed countries, the so-called 'Western Democracies', are facing a massive decline in participation at the local and national level, and both voting and interaction with elected representatives is at very low level (Hansard Society, 2009; Ann Macintosh, 2007; Tetteh, 2008), 'Developing Democracies' across the globe, from Latin America to India, have experienced an explosion of interest in public participation (Nierras et al., 2007). This situation is partly caused by a widespread 'ageing' of Europe's population, where senior citizens tend to be more passive in contrast to young, digitally included individuals. India, where over 70% of the population is below the age of 35, and one-third of the voters are below 25, shows great participation potential that has already been explored in multiple governmental initiatives (Gowda & Gupta, 2010). However, some young Latin American democracies (where many countries transformed from dictatorships 30-50 years ago) are experiencing severe issues with corruption and transparency that prevents participation from taking full advantage of citizens' emerging interest (Welp, 2010). The Global Corruption Barometer 2007 report (Saddler & Hovi, 2007) which issues ratings for 60 countries shows a high rate of corruption in governmental institutions and a great need to rebuild the dialogue between citizens and policy makers. Studies in Europe show that even though the population is generally educated, knowledge about the EU and the influence of EU on national legislation is low, therefore participation is very weak (Eurobarometer, 2011).

In response to governments' participation concerns, especially in 'Western Democracies', a large number of varying initiatives have been started to promote and support participation (G. Smith, 2005).

2.2 e-Participation

2.2.1 e-Participation Definition

Stiglitz (Stiglitz, 2002) states that emerging new technologies and changes in society offer new possibilities for meaningful participation and the success of development of modern democracies requires effective participation through modern technologies. According to the OECD (OECD, 2003), citizens demand a new approach for better government, which enables easier access, richer information resources, higher quality services and more enjoyable participation. Governments try to satisfy these requirements through e-Participation.

e-Participation as a term is composed of "e" derived from electronic and Participation. The "e" brings the e-Participation close to earlier disciplines like e-Government or e-Business. Studies related to supporting policy-making with ICT usually refer to e-Government (Nations, 2010; West, 2004; Wong & Welch, 2004). Therefore, e-Participation is usually correlated with terms: e-Government and participation, e-Governance and participation, e-Consultation, and e-Petition (Sabo et al., 2008).

Habermas (Habermas, 1996) and Dijk (Dijk, 2000) define e-Participation as a discipline that involves the transformation of participation into consultative democratic processes, mediated by communication technologies, such as the Internet, to support active citizenship. e-Participation is considered to be a knowledge intensive process (Islam & Business, 2008) and a grassroots for digital democracy, where democracy is understood as a participatory bottom-up-process (Fuchs, 2006) that empowers people towards decision-making processes. One of the biggest concerns of e-Participation, according to

Macintosh (Ann Macintosh, 2004), is the use of ICT technologies to address participation challenges and barriers and to support democracy by engaging citizens. According to Sabo (Sabo et al., 2008) and Chadwick (Chadwick, 2003), e-Participation can be simply defined as the technology-mediated interaction between citizens and the politics sphere or administration sphere that can transform the citizen's involvement in deliberation or decision-making processes. e-Participation solutions, in particular, should provide a common discussion place for citizens where they can discuss public issues and collaboratively work on solutions, and as a result actively participate in state or local policy making. Politics are concentrated on the public sphere and focused on an opinion-formation process that leads to effective policy making (Kies, 2010). Online deliberation, in particular, is considered as an opportunity to include so-called 'grassroots movements' more directly into policy making (Padget, 2005).

2.2.2 e-Participation Advantages

e-Participation, influenced by modern research and societal changes, is considered to promote liberal democratic values such as transparency, scepticism, and collective problem-solving, supporting wealth and security, hence enabling more effective and rational policy making (BROWN, 2004). According to Habermas (Habermas, 1996) and Dijk (Dijk, 2000), e-Participation significantly increases access to and availability of participation and hence promotes a fair and efficient society and government. Leveraging modern communication technologies eliminates many conventional participation barriers such as institutional barriers, lack of resources, transport issues or discrimination. Moreover, e-Participation has been proven to eliminate sociological issues such as the importance of expressiveness in political deliberation that is relatively low in online, fact-based, deliberations (Graham, 2010).

2.2.3 The Many Faces of e-Participation

e-Participation has many aspects and is realised in multiple ways. Regarding the communication channel, the Internet is dominant. Around 30% of initiatives employ non-electronic channels combined with electronic (Panopoulou, Tambouris, & Tarabanis, 2010), usually for dissemination and promotion purposes in well-established media like radio, TV, press or towards special symposiums and conferences. e-Participation initiatives are mainly built using existing, well-established ICT tools, that are sometimes particularly tailored for governmental purposes. Regarding the Internet technologies being leveraged, Web 2.0 technologies are dominant (Panopoulou et al., 2010). Web 2.0 has also been called the social web as content is generated by individuals as well as collectives (Kamel Boulos & Wheeler, 2007), reducing the producer and consumer dichotomy and with quality control relying on peer review (Charalabidis, Gionis, Ferro, & Loukis, 2010).

The most common tools supporting e-Participation include:

- Web-based virtual meeting systems and deliberation places (chat rooms, interest groups, discussion forums, political blogs): virtual political communities and citizen gatherings (Kanstrup, Jeremy Rose, 2006; D. Lee, Loutas, Sánchez-nielsen, & Mogulkoc, 2011);
- Web logging and web mining: Tracking and analysis of political activities in the Internet (Conover et al., 2010; Rowe, Angeletou, & Alani, 2011);
- Net-based Computer Supported Cooperative Working: online collaborative work on political tasks (Kanstrup, Jeremy Rose, 2006);
- Decision support systems: Community decision making (Rowe et al., 2011); Digital signature: New citizen identity enabling many citizens' electronic services (Kanstrup, Jeremy Rose, 2006);

- Mobile and Wireless Technologies: Mobile e-Participation, citizens are not bound to their home terminals, citizens can participate 'on the spot' (Islam & Business, 2008);
- Knowledge Technologies: Presentation, visualisation and analysis of knowledge on discussed topics (Bekkers & Moody, 2009);
- Geographical Information Systems: Visualisation of spatial data especially related to land use planning for cities and regions. GIS systems are considered to be a powerful mediator of spatial knowledge, social and political power and intellectual practice in geography (Elwood, 2006).
- Polling and e-Voting support systems: electronic voting online registration (Gowda & Gupta, 2010);
- Ontologies and the Semantic web: Support knowledge technologies for the conceptual organisation of knowledge and participation input (Belák & Svátek, 2010).

2.2.4 e-Participation Progress

e-Participation has brought fundamental changes to political systems and brought new possibilities in communication between citizens and policy makers (CLIFT, 2004; Kamarck, Nye, & others, 2004). According to Kamal (Kamal, 2009), the government's growing awareness of the need to successfully provide more democratic governance helps to support e-Participation initiatives/practices that empower citizens.

Today we can observe a widespread development of e-Participation solutions; many governments worldwide have rapidly deployed e-Participation systems. Almost 98% of 192 member countries of the United Nations have built such systems (Huang & Brooks, 2011). Many e-Participation projects have been funded in Europe (Yannis Charalabidis, Tasos Tsitsanis, Sotiris Koussouris, 2010). India has successfully deployed multiple e-Participation solutions targeting many different groups. The solutions support elections (including

online registration) and provide detailed information about candidates along with rankings and evaluations (Gowda & Gupta, 2010). There are a number of rankings showing the spread of e-Participation in the world. However, in the Top 10 countries we can find the same 'e-Participation enabled' countries: USA, Canada, Singapore, Sweden, Australia, Hong Kong, UK, South Korea and Taiwan (Islam & Business, 2008; West, 2007). The rankings also show that in developing countries like Bangladesh, web dissemination is very ineffective due to low PC availability in favour of mobile devices. In those countries, web-based e-Participation is replaced by an emerging mobile e-Participation movement (Islam & Business, 2008).

2.2.5 Success Factors for e-Participation Solutions

The overall progress of e-Participation has been shaped by many factors, both sociological and technical in nature. In literature, there are multiple success factors defined. The most common ones are:

1. Commitment by governments: Governments should constantly be supporting e-Participation initiatives, stay involved in communication with citizens (Jensen, 2003; Kamal, 2009; Panopoulou et al., 2010) and be responsible for sustaining participation (Kanstrup, Jeremy Rose, 2006). When designing e-Participation solutions, all the stakeholders should be properly addressed both power-holders as well as citizens (Saebo & Paivarinta, 2005). The saliency of at least one stakeholder group at many different phases of the initiatives is highly demanded by e-Participation (Sæbø et al., 2011).

2. Usability: An e-Participation solution should be as easy as possible to use. Therefore, individuals could incorporate them into everyday practices. It has been proven that user acceptance of a technology or tool is highly correlated with perceived usefulness and ease of use (Lane & Coleman, 2012). The solutions should be developed with the highest awareness of usability factors (S. Lee & Koubek, 2010; Panopoulou et al., 2010; Verdegem & Verleye, 2009),

best practices in ergonomics, and also user-friendliness (Ardito et al., 2005) and usefulness (Kumar, Mukerji, Butt, & Persaud, 2007).

3. Combining online with offline channels: An e-Participation initiative should involve both online and offline actions (Panopoulou et al., 2010; Scherer & Wimmer, 2010). The online suggestions should be reflected in real life, and the whole process should run in a seamless loop between the real and online worlds. At every stage, all the stakeholders should feel rewarded for their contributions.

4. Promotion: Promotion has been identified as one of the key factors which leads to the success of a particular solution. Experience shows that e-Participation solutions have to be widely disseminated through both online and offline channels. Offline channels are very important so as to include individuals that are not yet digitally involved. Online channels work the best with the young, educated and 'tech-skilled' part of the population. Solutions are perceived by this group to be much more attractive if they are advertised online (Charalabidis et al., 2010; Panopoulou et al., 2010; Sæbø et al., 2011; Scherer & Wimmer, 2010). Some authors argue that e-Participation solutions should be perceived as the official and convenient interface for e-Government (Gant & Gant, 2002) to perform well.

5. Security and privacy: Citizens while interacting with e-Participation solutions have to be reassured about the full security and privacy of their actions, considering both the technical and social aspects. The issue of bad security was raised as the main cause for many e-Voting solutions failing (it is difficult to provide completely anonymous and secure electronic voting). Individuals like to have certainty about privacy when they are asked about issues relating to tax or health, as a potential violation of privacy might strongly affect their living conditions (e.g. if insurance company will find out that a customer has some health issues, they might refuse to insure them or

reject their application) (Panopoulou et al., 2010; Puigserver, Lluís, Gomila, & Huguet, 2004; Sabo et al., 2008; Svensson & Ronald, 2003).

6. Organisational issues: Organisational issues refer to a proper e-Participation solution design that would match perfectly the organisational structure of governmental institutions. The design has to take into consideration all the complexity and bureaucratic issues and facilitate the policy-making process, facilitating the communication between power-holders and citizens (Panopoulou et al., 2010). Communication has to be maintained at a high level with all stakeholders, especially with citizens (Campbell & Jovchelovitch, 2000; Kamal, 2009; C. G. Reddick, 2005).

7. Topic complexity: The discussions held on-board e-Participation solutions should begin with very clear and easy to understand questions so that all citizens, regardless of their education level or participation involvement, could have a clear picture of the meaning of the discussion in regard to both the arguments and expected outcomes (Huang & Brooks, 2011; Panopoulou et al., 2010). The discussions should be very informative and free of unnecessary political expressiveness, which has been proven to have very little impact on discussion outcomes and just brings a noise factor to the deliberation process (Graham, 2010). The discussions should be focused on the matter of the subject with a structure as simple as possible (e.g. just pro and counter arguments).

8. The quality of participation: e-Participation should be designed in a form that is free of technical and sociological barriers as much as possible. The participation process (and associated interfaces) should be easy to use and clear so that every individual can actively contribute at every level of the policy-making process (Panopoulou et al., 2010). Some very important factors are the availability of required levels of online help and facilitating a relatively short amount of time for a user to complete basic tasks. Other important factors are structural complexity in the number of steps necessary to finish

tasks and the number of successful tasks completed. The visual side of the interface may strongly affect the participation (if the interface is not clear, citizens can be discouraged from contributing) (Bekkers & Moody, 2009; Charalabidis et al., 2010; Huang & Brooks, 2011).

9. Technical computing issues: The technical side is often forgotten by e-Participation solution designers, despite being a key factor for e-Participation effectiveness. e-Participation tools should be deployed on reliable hardware setups (or equivalent virtual hosts) that would provide constant and uninterrupted participation, enabling unlimited access to all interested individuals at any time (Sabo et al., 2008).

10. e-Participation for local government: Studies show that the most effective e-Participation has been performed at the local government level, and also in municipalities (Colombo, 2010). These results can be easily explained by the fact that the issues and solutions discussed at the local level are close to citizens' everyday problems (Charalabidis et al., 2010; Kamal, 2009). As well as this, personal contact with local politicians and fast, visible feedback encourages individuals to participate more often and more actively (Borge, Colombo, & Welp, 2007; C. Reddick, 2009; Scherer & Wimmer, 2010; Tolbert & Mossberger, 2006; Whyte, Macintosh, Mckay-hubbard, & Shell, 2006; Wohlers, 2009; Yigitcanlar, 2003).

11. Time, particular event and location: Whenever a new topic or issue is posted to be discussed, some very important factors regarding the expected level of response are related to the time, location and event (Islam & Business, 2008). For instance, topics related to elections and posted during elections are most likely to be the top rated topics in terms of popularity. That also applies to e-Participation tools deployment. Following the example, if a particular tool is deployed for some very particular purpose like the election, it will most probably gain a lot of attention, like the automatic.ie solution that

achieved tremendous success when it was deployed during quite recent elections in Ireland.

12. Broad stakeholders set: An important aspect of every e-Participation initiative is the involvement of as wide a range as possible of stakeholders. The more diverse the set of stakeholders, the more objective the policy-making process becomes, and therefore more fair from a citizen's perspective (Harrison & Freeman, 1999; C. G. Reddick, 2005). However in order to achieve that, some protection of oppositional participants is necessary, ensuring healthy and effective e-Participation (S. Smith & Commission, 2008). According to stakeholder theory (ST) (E Freeman, 1984), the relationship with the stakeholders should be constantly and carefully maintained (Flak & Rose, 2005), so that the community can deliberate and develop properly.

Based on these success factors, Preece (Preece & Shneiderman, 2009a) defines a detailed list of Usability and Sociability factors that may influence citizens at each level of participation, defined by his innovative Reader-To-Leader Framework. Usability factors are targeted at e-Participation solution developers, to provide them with a set of guidelines regarding a proper e-Participation solution. Sociability factors are directed at the decision-makers to show them how to approach citizens at a particular level of participation to provide proper and meaningful response.

2.2.6 The Challenges of e-Participation

Despite the rapid proliferation of e-Participation, it is apparent that overall citizen participation remains at a relatively low level, and many of the main e-Participation objectives are not yet satisfied. According to an OECD report (OECD, 2009), 78% of individuals have a low interest in policy and politics and 48% have a low trust in how the government uses citizens' input. Speroni (Speroni & Paterson, 2010) shows that despite all the technological advancement in developed countries, citizens are not sending much more information to the governments than they did in the eighteenth century. He

identifies multiple reasons for this situation. The experience of the last few years shows that there is no big diversity among e-Participation support efforts. For instance in the UK, almost 30% of e-Government projects are just focused on website development rather than researching innovative deliberation solutions (Huang & Brooks, 2011). ICT solutions in Latin America are rather symbolic and have no real impact on politics (Welp, 2010). Saebo (Sabo et al., 2008) makes the point that e-Participation activities are not new and represent an evolution of many existing activities, therefore even though they solve many problems they also inherit a lot of issues. Moreover, Saebo argues that e-Participation tools tend to be relatively trivial adaptations of existing technologies with not much effort on innovation. In this context, it seems that an argument regarding the key challenge for participation, posed by Glass in 1979, applies to e-Participation as well. Glass stresses that the probability of success for participation diminishes when the relationship between the true objectives of participation and the techniques applied are ignored (Jensen, 2003). A nationwide survey on e-Democracy among U.S. local governments (Department of Economic and Social Affairs Division for Public Administration and Development Management, 2007) identified a number of barriers to e-Participation that are widely confirmed by other studies: lack of funding, lack of technical staff, lack of technology upgrades, citizen demands, demands from elected officials, security issues, concern about the digital divide, privacy issues, technology expertise, concern about underrepresented groups, and participation by and support from elected officials. In Europe, Shrerer (Scherer & Wimmer, 2010) shows that the provision of participation opportunities at an EU level is rather low and furthermore has no significant impact on the decision-making process at Parliament level.

Among many barriers, the Digital Divide and Social Inclusion problem is mentioned many times in the literature (eEurope Advisory Group, 2005; Horrigan, 2005; Trust, 2007; Warschauer, 2003). Multiple studies show that

some ICT-based government systems can raise barriers and create inequalities between digitally included and digitally excluded citizens. E-Participation tools, with complicated interfaces that require an extended learning process before a citizen's contributions can begin, are a significant obstacle for many individuals. The other aspect the Digital Divide problem is a proper combination of online and offline channels for e-Participation. Digitally excluded citizens (who have no access to a computer or the Internet, or find it difficult to use) are neither offered relevant alternatives nor proper help to actively contribute to e-Participation. Moreover, Bekkers (Bekkers & Moody, 2009) mentions a significant barrier in communication in relation to the decision makers who are in control of e-Participation tools and ignore citizen's requests or defer responses to difficult questions to avoid potential public criticism. Kamal (Kamal, 2009) in his works supports this statement and points to a common ignorance of relevant policies and policy-making processes in the government sector. Charalabidis (Charalabidis et al., 2010) blames weak dissemination of e-Participation solutions, and consequentially e-Participation solutions remain largely unknown to the public. He also points to the weak topics of public deliberations, far away from a citizen's everyday problems. Moreover, some studies reveal that the use of new technologies for some participation solutions does not lead to greater participation but rather increases the chances of a low level, chaotic informal communication amongst individuals (Islam & Business, 2008; Komito, 2005).

Another big challenge for e-Participation is political system change and synergy with new ICT-supported participation methods. Norris (Norris, 2004) argues that achieving radical changes in real politics through technology is very difficult. This statement is also supported by Coleman (Coleman, Gøtze, & Coleman, 2001) who makes the remark that e-Participation needs a more scientific approach as most of the research results are mainly based on case studies of concrete experiences and empirical studies. Macintosh (Ann

Macintosh, 2007) makes the point that it is not enough to re-engage with citizens but also to ensure that individuals have an informed capability to participate. Information dissemination remains a weak point in most participation solutions. Dijk (Dijk, 2000) argues that e-Participation should be used as a complement to equivalent traditional political practices, and hence should only be incorporated into policy-making processes in a way that will achieve real value.

3 e-Participation Models and Tools

3.1 e-Participation Models

In this section, we look at the attempts to structure the e-Participation domain. In particular, we elaborate on the key aspects of the most prominent e-Participation models found in the literature. Two major sources of information on scholarly e-Participation publications were searched for using "e-Participation model" or "online participation model". The first is Elsevier's Scopus database, the world's largest abstract and citation database of peer-reviewed literature, and the second was Google Scholar, enabling search across many disciplines and sources: articles, theses, books, abstracts, from academic publishers, professional societies, etc. A snowballing technique was used to identify other e-Participation work from a seed model. Using the first identified model as the seed model, the process resulted in the 12 e-Participation models

3.1.1 Models Overview

First, we present a broad overview of the evolution of e-Participation models. This evolution is described in terms of explicit dependencies of models on earlier ones. Explicit dependencies are indicated through references to specific earlier models as a base or contributing model. Implicit dependencies among models are depicted by references to earlier models without an explicit statement of their influence on the model being described or developed.

As shown in Figure 1 the first listed participation model is the 'Ladder of Participation' described in (Arnstein, 1969) which implicitly shaped most participation and later e-Participation studies. The evolution of models

appeared to progress from initial attempts at scoping and eliciting the important dimensions of e-Participation (e.g. (A. Macintosh, 2004)), to models aiming to capture desired progression in levels of e-Participation (e.g. (DESA, 2005b), (Li & Bernoff, 2007)), to models for e-Participation processes (e.g. (Tambouris, Liotas, & Tarabanis, 2007a), (Islam, 2008)), and finally evaluation models for e-Participation (e.g. (Ann Macintosh, 2008a), (Phang & Kankanhalli, 2008b), (Aichholzer & Westholm, 2009)).

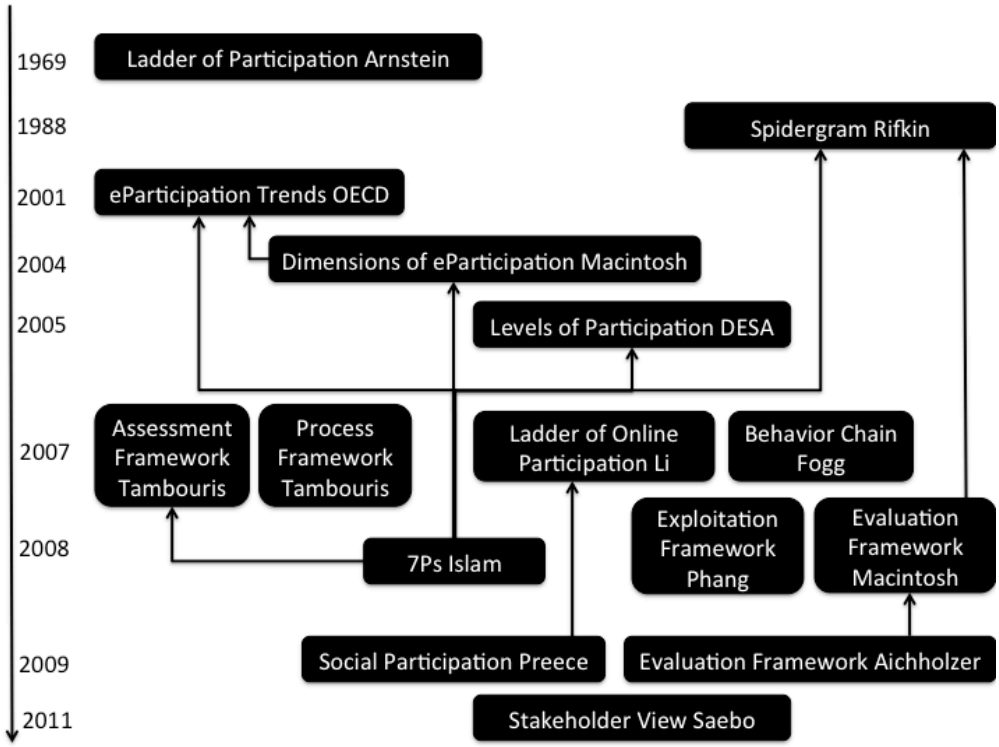

Figure 1: e-Participation Models Genealogy

Dependencies among models are organized around these development phases. The models genealogy also shows a number of conceptually independent models such as Stakeholder View (Sæbø et al., 2011) and Social Participation (Preece & Shneiderman, 2009b) as these works are underpinned by models from outside the domain of e-Participation. We describe each of these models next.

3.1.2 Models Description

We provide short descriptions of the 12 e-Participation models since 2004, highlighting their purpose and some of their key features.

Dimensions of e-Participation Macintosh 2004

Motivated by the need for consolidating ICT-supported participation research, Macintosh in 2004 developed a framework describing the key dimensions of e-Participation (A. Macintosh, 2004). The identified dimensions include: i) levels of participation (e-enabling, e-engaging, e-empowering), ii) stage in policy-making process, iii) actors, iv) technology used, v) rules of engagement, vi) duration and sustainability, vii) accessibility, viii) resources and promotion, ix) evaluation and outcomes and x) critical success factors. The dimensions are employed as a description and analytical framework for an e-Participation project.

Levels of Participation DESA 2005

The Department of Economic and Social Affairs (DESA) of the United Nations presented in 2005 a three-stage model to describe levels of participation (DESA, 2005b). The model describes three levels of participation: e-information, where government websites offer information to the public through various Web 2.0 tools; e-consultation, where the consultation process is explained, and the government website offers archived access to public meetings; and e-decision-making, where there is an acknowledgement by the government of citizens' inputs into policy-making. Though lacking explicit references, DESA's participation levels are similar to the trends identified by OECD in (OECD, 2001a) and the three levels of participation described in (A. Macintosh, 2004).

Ladder of Online Participation Li et al. 2007

In 2007, Li et al. presented as a part of their Social Technographics framework the Ladder for Online Participation model (Li & Bernoff, 2007). The ladder

refers to user engagement in participation activities on web portals. The original version consists of six levels of user activity: i) Inactives – users showing no activity; ii) Spectators – passive users, who read/watch and observe; iii) Joiners – registered users; iv) Collectors – users collecting and describing web content, using RSS feeds and tags; v) Critics – those providing comments and ratings to the online content, vi) Creators – those who publish and create content, maintain blogs, moderators. The authors presented an updated version of the ladder in 2011 (Charlene Li & Bernoff, 2011), adding an additional step: vii) Conversationalists – maintaining a level of activity between creators and critics. This level also refers to those who post status updates on social media.

Behavior Chain Fogg 2007

Fogg in 2007 presented a "User behaviour chain for online participation" framework (Fogg & Eckles, 2007) based on fifty cases. The model relates to the persuasion patterns of users to take specific actions and so could be considered a model for controlled user engagement. The model distinguishes between three basic levels of target behaviour: i) Discovery, involving learning about and visiting a service; ii) Superficial involvement, involving a decision to use and initial use of the tool, iii) True commitment, where the user creates content, involves others to participate, and forms sustainable participation.

Process Framework Tambouris 2007

In 2007, Tambouris proposed an e-Participation process framework which distinguishes between five levels and two possible directions of the sequence (Tambouris, Liotas, Kaliviotis, & Tarabanis, 2007). The levels are Democratic Processes, Participation Areas, Participatory Techniques, Categories of Tools, and Technologies. Based on the model, an e-Participation initiative's direction can progress from democratic processes top-down to the technologies or could be technology-driven bottom-up towards democratic processes (Tambouris, Liotas, Kaliviotis, et al., 2007).

Assessment Framework Tambouris 2007

Building on his earlier process model, Tambouris et al. proposed an e-Participation assessment framework, which distinguishes participation areas and accordingly ICT support. The model includes assessment recommendations along with the assessment templates (Tambouris, Liotas, & Tarabanis, 2007a).

Evaluation Framework Macintosh 2008

Macintosh et al. in 2008 presented an e-Participation evaluation framework characterised by three key dimensions: i) Evaluation criteria spanning the democratic, project and socio-technical perspectives; ii) Analysis methods comprised of field observations of relevant actors using the tool in the real world, interviews and group discussions with relevant actors, analyses of online questions and discussions, analyses of project documentation, and usage statistics from the tools and server logs; iii) Actors involved including decision-makers managing the e-Participation mechanism, experienced users of e-Participation platforms, people who do not use e-Participation platforms, officials considering e-Participation results, other officials, project managers and technologists (Ann Macintosh, 2008a).

Exploitation Framework Phang 2008

In 2008, Phang presented a framework of ICT exploitation for e-Participation initiatives (Phang & Kankanhalli, 2008a). The framework is based on four general e-Participation objectives with detailed requirements: i) Information Exchange - bringing together decision-makers and citizens for the open sharing of problems and ideas; ii) Education and Support Building - informing citizens on policy making and propaganda; iii) Decision-Making Supplements - extracting specific information from citizens, which can be used as supplementary input for policy making; iv) Input Probing - obtaining citizens' views on underexplored policy issues. The model also defines participatory techniques, ICT tools and e-Participation initiatives that could support particular objectives.

7Ps Islam 2008

Islam proposed in 2008 the 7Ps process model for sustainable e-Participation (Islam, 2008). The model builds upon and combines multiple earlier models from (OECD, 2001a), (A. Macintosh, 2004), (DESA, 2005b) and (S B Rifkin, Muller, & Bichmann, 1988). The model distinguishes seven general phases: i) *Policy and capacity building* - the phase involving education; ii) *Skill building, hardware and software infrastructure preparation* - followed by participation areas formulation; iii) *Planning and goal setting* - emerging e-Participation from the overall e-Governance initiative; iv) *Programs and contents development* - preparation of relevant programs and content that can be easily accessed via available tools; v) *Process and tools* - definition of the e-Participation process; followed by vi) *Careful tools selection;* and vii) *Tool-to-task matching*, taking into consideration participation barriers.

Evaluation Framework Aichholzer 2009

In 2009 Aichholzer et al. presented a framework for the evaluation of e-Participation projects (Aichholzer & Westholm, 2009). Their model is based on Macintosh's earlier e-Participation evaluation model (Ann Macintosh, 2008a). It distinguishes between three basic perspectives for an e-Participation project with a set of related dimensions: i) Democratic - representation, support of engagement, transparency and accountability, conflict and consensus, political equality, community control; ii) Project - management, engaging with a wider audience, community development, obtaining better-informed opinions, process quality, scope of deliberation, effectiveness, feedback behavior, sustainability; iii) Socio-technical including social acceptability, usefulness and usability dimensions.

Social Participation Preece 2009

Preece in 2009 proposed a framework for technology-mediated social participation, focusing on the user perspective (Preece & Shneiderman, 2009b). The model was designed for social participation and drew from communications theory, including key aspects important for e-Participation.

The model distinguishes between four key levels of user engagement: i) Reader - the user is passive, with actions limited to reading, browsing and searching; ii) Contributor - the user actively contributes to the content, rating, tagging, posting and uploading content; iii) Collaborator - the user creates content collaboratively and shares the knowledge; iv) Leader - the user takes on the governance of social interactions by promoting participation, mentoring novices, setting and upholding policies. Moreover, the model identifies the usability and sociability factors influencing each of the defined engagement levels.

Stakeholder View Saebo 2011

In 2011, Saebo et al. proposed a view of e-Participation based on stakeholder and genre theories (Sæbø et al., 2011). The model identified specific classes of stakeholders related to e-Participation initiatives and the forms of communication types. The consolidated factors enabled them to identify key actors and the roles important for the effective development of e-Participation initiatives. The proposed lens showed how to identify key stakeholders and the dynamics of salience (how prominent elements emerged).

Summary

The above 12 models are summarized in Table 1 indicating their purpose, major constructs, the approach adopted in developing the model, the disciplinary origin of the model, maturity of the model and the technology view adopted in the model. We adopt Orlikowski et al.'s technology views approach described in (Orlikowski & Iacono, 2001) by association with one or more of the views assumed in the models.

From Table 1, we note that most of the models focus largely on describing levels of participation or engagement and evaluating e-Participation. The table shows that most of the models are descriptive in nature with no conceptual or theoretical underpinnings. This potentially poses a challenge

when considering comparative analyses of models. At the same time, we observe an increasing use of case studies and a better methodological grounding in more recent models.

Concerning the maturity of models, most of the models have only been employed as either descriptive schemas or analytical frameworks for e-Participation initiatives. From the research perspective, Preece's Social Participation Model; Macintosh's Evaluation Framework, Tambouris' e-Participation Assessment Framework and Phang's Exploitation Framework are relatively more mature based on their citation records.

Analysis of the models shows that they generally lack conceptual and theoretical foundations. Few of the models were built from concrete case studies. In the area of usage, most of the models have been employed as either descriptive schemas or analytical frameworks for e-Participation initiatives. From the research perspective, Preece's Social Participation Model, Macintosh's Evaluation Framework, Tambouris' E-Participation Assessment Framework and Phang's Exploitation framework are significantly more cited than others.

Our genealogy analysis of the models as depicted in Figure 1 shows a quite disconnected model space, with the highest in-degree for models as 2. Thus, we offer concrete evidence to support the claim in (Ann Macintosh, Coleman, & Schneeberger, 2009b) about the fragmented nature of research contributions in the area of model development.

Table 1 e-Participation Models

Name of the Model	Purpose	Major Constructs	Approach	Disciplinary Orientation	Maturity	Technology Perspective (View)
Dimensions of e-Participation Macintosh 2004	Level of Participation	e-Enabling, e-Engaging, e-Empowering	Descriptive	e-Democracy, e-Participation	12 Citations	Tool: *Productivity, Information Processing and Social Relations Tool*
Levels of Participation DESA 2005	Level of Participation	e-Information, e-Consultation, e-Decision Making	Descriptive	Public Administration, Development, Management, e-Gov, e-Inclusion	Official Report	Proxy: *Perception, Diffusion*
Ladder of Online Participation Li 2007	Level of Engagement	Inactives, Spectators, Joiners, Collectors, Critics, Conversationalists, Creators	Descriptive	Online Participation, Social Media, Business	16 Citations as a Paper 464 as a Book	Nominal
Behavior Chain Fogg 2007	Level of Engagement and Influence	Discovery, Superficial Involvement, True Commitment	Theoretical Based on Over 50 Cases	Online Participation, Social Behavior	26 Citations	Nominal
Process Framework Tambouris 2007	e-Participation Process	Democratic Processes, Participation Areas, Participatory Techniques, Categories of Tools, Technologies	Descriptive	Management, Human Factors Theory	18 Citations	Nominal
Assessment Framework Tambouris 2007	e-Participation Evaluation	Participation Areas, Tools Category, Technology Category, Levels of Participation, Actors, Stages in Policy Making, Rules of Usage, Outreach Special Concerns	Descriptive	Political Science, ICT	57 Citations	Tool: *Productivity, Information Processing, Social Relations* Ensemble: *Development, Embedded System, Structure*

Exploitation Framework Phang 2008	e-Participation Exploitation (Technologies)	Information Exchange, Education and Support-Building, Decision-Making Supplement, Input Probing	Analytical Based on Case Studies	e-Participation, ICT, Communications	41 Citations	*Views same as above (Assessment Framework)*
7Ps Islam 2008	e-Participation Process	Policy & Capacity Building, Planning & Goal Setting, Programs & Contents Development, Process & Tools, Promotion, Participation Post-Implementation Analysis	Analytical Based on Other Models	e-Practice, Socio-Economic Settings, e-Participation	14 Citations	Nominal
Evaluation Framework Macintosh 2008	e-Participation Evaluation	Evaluation Criteria (Perspective): *Democratic, Project, Socio-Technical* Analysis Methods: *Field Observation, Interviewing, Discussions, Analysis of Online Questions and Documentation, Tools Usage Statistics* Actors Involved: *Decision Maker*, *Users*, *Officials*, *Project Managers, Technologists*	Analytical Based on Case Studies	e-Participation, Public Participation, ICT	70 Citations	Tool: *Productivity, Information Processing, Social Relations Tool* Ensemble: *Development, Embedded System, Structure, Production Network*
Evaluation Framework Aichholzer 2009	e-Participation Evaluation	Evaluation Perspectives: Democratic, Project, Socio-Technical	Analytical Based on 30 Case Studies	e-Participation Public Participation, ICT	21 Citations	Nominal
Social Participation Preece 2009	Level of Engagement	Reader, Contributor, Collaborator Leader, *(Usability, Sociability)*	Descriptive	Social Participation, Communications, Social Networks	183 Citations	Proxy: *Perception, Diffusion*
Stakeholder View Saebo 2011	e-Participation Process	Politicians; Administrators; Consumers; Activists; Vendor; Power, Legitimacy, Urgency	Theoretical	e-Government, Genre Theory, Stakeholder Theory	8 Citations	Nominal

3.2 e-Participation tools

3.2.1 e-Participation tools comparison

Many e-Participation projects have been funded in Europe. We would like to present a comparison between recent (also on-going) e-Participation projects based on results reported in Deliverable 2.7 (Yannis Charalabidis, Tasos Tsitsanis, Sotiris Koussouris, 2010) of the MOMENTUM[1] service. In the table below, we have gathered the most important properties, and later we discuss the findings.

The comparison (see Table 2) reveals that all the solutions utilise Web-based platforms enriched with Web 2.0 technologies. Most of them comply with well-defined accessibility standards and are built on top of relational databases.

The analysis of statistical data provided in the deliverable confirms observations and problems of e-Participation identified in the literature review. The results lead to the conclusion that even though the solutions fulfil most of the well-defined e-Participation technical requirements, are built according to best standards, and use state-of-the-art technologies, they seem to fall short regarding participation. This is quite visible when we compare the ratio of participation with dissemination efforts and the response of society. The eMPOWER[2] project has been disseminated using both electronic and non-electronic channels. Information about the project was available on the Internet as well as in press and radio. All the dissemination efforts brought only 918 users to the platform who generated in total only 1800 posts.

Table 2: e-Participation projects comparison

ASPECT	eMPOWER	EUROPETITION	HUWY	U@MARENOSTRUM
Mission	e-Petitions	Trans-European e-Petitions	Engage young people in political discussions	Involve local actors from the Mediterranean coastal zones in decision-making processes
Policy Issues	Environment legislation theme	No legislation supports third-party mediation	Internet policies (files sharing, etc.)	Water management and environment, territorial issues
Technology	DotNetNuke - .NET framework, Amap Maps	Web 2.0 tools - ePetitions, Public-i Webcasting system, ViewFinder, LEGESE, CitizenScape	WordPressMU, MediaWiki	Gov2DemOSS e-Democracy platform based on Joomla CMS
Accessibility	Interface ready for people with disabilities	W3C AA compliance	Complies with Web Accessibility Initiative's AA rating	Web Content Accessibility Guide (WCAG) 1.0 AA leve
Reuse / Deploy-ment	Web app, SQL database	Web 2.0 app, e-Petitioning API	N/A	Web app
Number of Users	918	223	N/A	375
Number of Views	3.268	26.558	N/A	3.654
Number of Posts	1.800	1.142	N/A	600
Promotion Ac-tions	Press, the Web, radio	Proactive targeting with specific groups	Workshop, youth organisations,	Press, press conferences, web links placed on the

		through Member State Clusters	policy-makers	authorities' websites, working groups, Involve Italian municipalities, involve Monaco, radio, flyers, meetings
Next Steps	Cross-country e-Petitioning, technological improvements	Technological improvements, development of e-Petitioning APIs to match open data standards, evolve from Web 2.0 to 3.0, will be produced and sold	Distributed discussion model	Installation in other regions/provinces, semantic tech-nologies
	VIDI	WAVE	VOICES	Puzzled by Policy
Mission	Enable a more efficient interaction between citizens and policy makers	Improve the inclusiveness and transparency of EU decision-making at the national and Eu-ropean level	Promote the dialogue between citizens from European regions and their regional policy makers from the Euro-pean Parliament	Teach citizens about policies, provide decision makers with feed- back from citizens
Policy Issues	European parliament elections, crime in municipalities	The environment and climate change	Consumer protection	Policy making at EU and national level

Technology	Existing web portals and forums, own visualization methods, ESPER, proactive notifications	Debategraph tool, .NET 2.0, Drupal, REST, Web 2.0	Joomla as the core of the system, Kunena as the forum	DotNetNuke
Accessibility	No considerations have been made	No accessibility considerations	WCAG A and partly AA compliant	No considerations have been made
Reuse/Deployment Capabilities	Can be used as a service	Web app	Easy-to-use toolkit	Web app
Number of Users	N/A	697	N/A	N/A
Number of Views	N/A	3000	89642	N/A
Number of Posts	N/A	1583	315	N/A
Promotion Actions	Local newspaper and TV	Social networking sites like Facebook, Twitter, YouTube, and LinkedIn	Stalls at fairs, participation in conferences, information tours, visits of school classes, online marketing activities: profiles on platforms like Face-book, Wikipedia, tuenti (ES), Xing (DE)	Facebook, Twitter, website, press releases, conferences
Next Steps	Provide VIDI as a service and	N/A	Further extension,	Development of the

	selecting a payment model		eliminate major issues	platform

Similarly, U@MARENOSTRUM[3], which was disseminated even more, also through special flyers, meetings and press conferences, gained only 375 users who generated 600 posts. This unfortunate trend was also followed by the EUROPETITON[4], WAVE[5] and VOICES[6] projects. The solutions did not stimulate as much participation as expected (Ann Macintosh et al., 2009a). The high ratio between the number of views and number of posts recorded on these platforms indicate low citizens' engagement. This high ratio was especially visible in the VOICES project (89,642 views and only 315 posts). Citizens remain passive even though they are provided with the relevant tools to actively contribute to policy-making (Yannis Charalabidis, Tasos Tsitsanis, Sotiris Koussouris, 2010). Thus, the platforms seem to reach again only the first information level of e-Participation (OECD, 2001b). There are multiple reasons for this situation. First, there is institutional resistance, especially by Governmental institutions, to participating in public deliberations (Ann Macintosh et al., 2009a). Politicians seem to be afraid of the consequences of constant input and evaluation by citizens and tend to avoid public discussions or refrain from comments on queries posted by citizens. Some institutions excuse their lack of contribution by pointing out the large resources that are needed to process feedback from citizens. This attitude acts against the basic e-Participation mission which is to support citizen participation by breaking physical, sociological and institutional barriers (Brodie et al., 2009).

The technology used to build e-Participation platforms usually represents the state-of-the-art regarding popular web applications. The eMPOWER and Puzzled by Policy projects are based on the DotNetNuke[7] content management system. U@MARENOSTRUM and VOICES utilise the Joomla[8] framework. Other like WAVE, HUWY uses popular content and blogging

platforms like Drupal[9] or WordPress[10]. These solutions again represent the most popular web app solutions but are missing innovation and careful alignment to e-Participation processes, as identified in the literature as one of the key e-Participation barriers (Huang & Brooks, 2011; Sabo et al., 2008). Moreover, again these tools are designed to be functional and complete while factors like cultural and sociological dynamics are not taken into consideration (Ann Macintosh et al., 2009a). Moving participation online should increase users' confidence and, in general, help to avoid most of the common negative feelings that occur in real life communication (Joinson, 2007), but the missing link between technology and sociology forces citizens to refrain from contribution and stay passive. This is why the future steps defined for these kind of projects need to be updated according to technological improvements over better ideological and cultural matching to provide tools that reflect real life participation more closely.

Finally, all these solutions introduce their own, user interfaces, and this involves learning for users which is time-consuming and introduces new technological barriers. Dedicated, built-in or embedded external Argumentation Tools, supporting deliberation on these platforms, seem to be too complex for ordinary users.

3.3 Conclusions

In Part II we presented the terminology that is used in the thesis, both from the area of the Participation and e-Participation. We presented an overview of the e-Participation Methods, Tools and core technologies.

In the next chapter, we show how the models presented have been used to create a comprehensive model for e-Participation, and finally how this has contributed towards the creation of the Social Software Infrastructure Design for e-Participation.

Part III

Core Research

III Core Research

In Part II of this dissertation, we have presented the key background theory behind our e-Participation work. In Part III, we present our main theoretical and technical contribution to the domain of e-Participation.

The phenomenon of the duality of e-Participation manifests itself through mutual re-shaping between classic e-Participation and spontaneous deliberation on social media. Based on the literature study and research project investigation presented in Part II of this thesis, we first address the research question about the nature of the duality of e-Participation. We start our investigation by structuring the e-Participation domain. We determine the state-of-the-art coverage of the e-Participation model space. We identify the research gaps, and we deliver a theoretical framework to study and harness the gaps identified. We leverage the framework to construct a comprehensive, integrated model for e-Participation. The model is the first step in our attempt to address the duality. We elaborate on the application of the model as a tool to study e-Participation and to support the capabilities that need to be developed by governments to harness this duality. We leverage the model to study state-of-the-art e-Participation methods and technologies. Focusing on technical aspects we then attempt to address the third research question, in which we elaborate on the technologies required to support the duality of e-Participation. We present a Social Software Infrastructure design to enable study of the phenomena and to deliver a technological tool to harness the duality of e-Participation. We present an example implementation. Finally, we show an analysis conducted with politicians and decision makers driven by the SSI design. The results from the

analysis enable us to determine the current shape of e-Participation and to identify the visibility of technology support for the duality of e-Participation.

4 Structuring e-Participation Aspects

This section describes works conducted to conceptualise, evaluate, shape, structure and provide a better understanding of e-Participation as a concept. A common element in e-Participation studies is their implicit attempt to answer two basic ontological questions (Schapper, De Cieri, & Cox, 2005): – (i) What is the form and nature of e-Participation? (ii) What should we know about e-Participation? We describe different perspectives on the nature of e-participation and highlight some of its aspects. We briefly discuss a generic conceptual tool for inquiring about the aspects of any phenomenon and show how this can be applied to define an ontological space for e-Participation.

4.1.1 Nature of e-Participation

Two recent studies have attempted to inquire about the nature of e-Participation. The first study presented by Cantijoch & Gibson (Cantijoch & Gibson, 2011) is unique in its efforts at conceptualising e-Participation. This work examines the nature of e-Participation in terms of whether it is simply an extension of existing forms, differing only in mode, or whether it offers a fundamentally different form of political participation. The study offered a typology of e-Participation, based on a representational category (i.e. the use of formal and institutional channels or informal peer-to-peer networks) and on the active or passive forms of voice-based participation. Based on an empirical analysis of UK voters in their 2010 general election, the study concludes on the nature of e-Participation as an internet-mediated political activity with four sub-types, namely e-communication, e-expressive, e-formal and e-targeted.

The second study (Ann Macintosh, 2008a) proposed a more holistic operationalisation of the concept of e-Participation by presenting an evaluation framework consisting of three overlapping perspectives of e-Participation, including democratic, project and socio-technical perspectives. According to Macintosh, these evaluation perspectives are embedded in one another with the democratic criteria providing a context for the project criteria and the project criteria defining a context for socio-technical criteria.

We interpret these embedded evaluation perspectives as also defining three related natures of e-Participation (democratic, project, socio-technical). Our elaboration implies ontological and sustainability dependencies among these three perspectives, with e-Participation as a democratic activity creating an e-Participation project and with the project leading to the creation of an e-Participation socio-technical system. A feedback relationship from the socio-technical system to the democratic activity is also shown later on in Figure 3.

4.1.2 Aspects of e-Participation

Five recent studies on e-Participation evaluation have presented different aspects of e-Participation based on different project experiences. The first major effort presented in (A. Macintosh, 2004) characterised their e-Participation project using 10 dimensions: level of participation, stage in policy making, actors, technologies used, rules of engagement, duration and sustainability, accessibility, resources and promotions, evaluation and outcomes, and critical success factors. The next effort by (Tambouris, Liotas, & Tarabanis, 2007a) proposed an evaluation framework that examined three aspects of e-Participation projects – participation areas, categories of tools, and technologies. The third study described in (Ann Macintosh, 2008a) identified a set of criteria for evaluating each of the three perspectives of e-Participation – socio-technical, project, and democratic, based on a set of

local e-Participation projects. The fourth study in (Aichholzer & Westholm, 2009) further elaborated on the criteria described in (Ann Macintosh, 2008a) based on e-Participation cases across Europe. The fifth work in (Sæbø et al., 2011) identified project stakeholders and supported communication types (or genres) as important aspects of e-Participation projects.

Unfortunately, given the different project contexts and conceptual underpinnings informing the identified aspects in the above studies, organising and integrating findings is challenging.

An approach to address the above challenge is to adopt a fundamental and more generic set of e-Participation aspects. Generic aspects such as the traditional journalistic questions of What, When, Who, Why, Where and How (5W1H) (Yates & Orlikowski, 2002) or Aristotle's Four Causes could provide a template for generating domain-specific aspects in e-Participation.

Here, we propose the use of Pepper's World Hypotheses or Views (Pepper, 1957) as a generic set of aspects for the area of e-Participation. The premise for our choice of Pepper's Views is based on the following: 1) Pepper's Views are metaphorically richer when compared to the journalistic questions or Four Causes (Lombrozo, 2006); 2) it is possible to map Pepper's Views to the journalistic questions and Four Causes; and 3) there is evidence of the suitability of applying Pepper's Views to structure and analyse socio-technical systems (Marca & McGowan, 1993).

Pepper identified four different adequate views of the world: Mechanism, Formism, Organicism and Contextualism (Hayes, Hayes, & Reese, 1988). He described each of the four views as follows (Hayes et al., 1988), (Marca & McGowan, 1993):

- *Mechanism* - the root metaphor for this view is that the machine is composed of discrete parts related to one another in a systematic way. The relations among parts do not change the nature of these parts. Some form of inputs is supplied to and transformed or transmitted through the machine to

produce predictable outcomes. For example, we can consider the e-Participation system to be made up of a client component enabling citizens to use the platform, a participation platform providing the different user services, and analytic components for analysing contributions. Models supporting the mechanistic view will enable the functional specification and decomposition of an e-Participation socio-technical system.

- *Formism* – the root metaphor for this view is a similarity. It can be understood as an entity- or forms-based view. In this view, the perception of any event involves two aspects – the character and the particularity. Character refers to the qualities and relations that are tied to a given object. For example, a citizen may have a quality like being rational and have a relation of having a certain political ideology. A given character may have an infinite number of particulars. Here, we take the notion of character to be synonymous with "classes" and that of a particular to the notion of "objects". In our framework, this view represents entities associated with e-Participation.
- *Organicism* – the root metaphor for the third view is the process of organic development. Organic development is described by staged-growth, maturity or level-based models. The assumption underpinning the process of organic development is that the final stage represents the ideal aimed at by the progressive steps. In addition, changes from one stage to another are guided by sets of rules. In the context of e-Participation, participation levels (information, consultation and active participation) described in (A. Macintosh, 2004) present a staged growth perspective of e-Participation.
- *Contextualism* – the root metaphor for this view is an ongoing act. Two basic concepts are central to contextualism. The first concept "quality" represents the experienced nature of the act. The second concept "texture" refers to the details and relations that make up the quality of the act. This view contends that our knowledge about the world is not final and thus is

subject to changes at future points in time. Overall, this view presents a relativistic view of reality, implying that two different observers may have potentially different interpretations of the same act. For example, an evaluation of an e-Participation experience by two different citizens could be completely different due to their different contexts, for instance, due to the time and subjective interpretation of an experience.

In the context of e-Participation, Pepper's Views enable the specification of: e-Participation goals to be realised through some staged models (Organicism); the description of different entities involved in realizing a specified e-Participation goal (Formism); the different functions, processes and systems required to produce desired e-Participation outputs or outcomes (Mechanism); an indication and evaluation of the experience of actors and observers of the e-Participation system (Contextualism).

4.2 Defining an e-Participation Ontological Space

We define here an ontological space that captures the three perspectives of e-Participation identified in the literature (democratic, project platform) and the four canonical aspects elaborated in this section. This space provides 12 aspects or "Facets" for organising models and knowledge on e-Participation. In this work, we adopt this space for mapping and aligning existing e-Participation models.

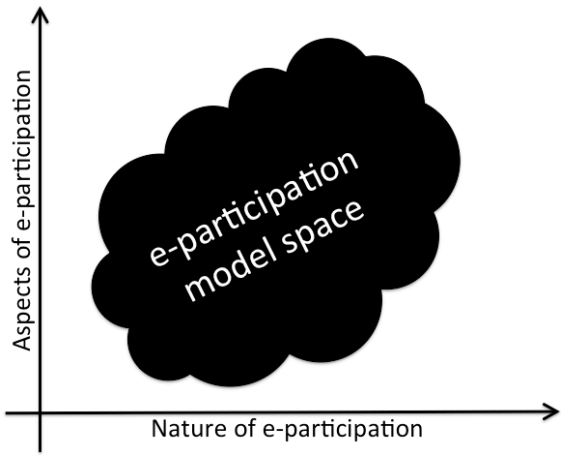

Figure 2: e-Participation Space

We elaborate further how the e-Participation ontological space depicted in Figure 2 can be used as an analytical tool and at the same time a knowledge integration tool.

4.3 Methodology

In this section, we map the twelve e-Participation models elaborated on in the Background section of this dissertation, to the thematic areas described in Part II, as a basis for harnessing the complementarity of related models, and to identify model gaps as candidate areas for future research. Specific questions for our inquiry include:

- R1 How can the selected models be aligned to generate new knowledge and what challenges are there in achieving this?

- R2 How well do existing models cover the identified e-Participation thematic areas?

- R3 Which aspects of e-Participation are relatively under-studied in terms of availability of models?

Answering these questions is contingent on mapping and organising the e-Participation models and frameworks selected into the twelve themes. We briefly describe below how models were selected, mapped and aligned.

- *Mapping Models:* Mapping each of the 12 models to specific e-Participation types entails determining which of the three perspectives of e-Participation (democratic, project or socio-technical) and which of the four generic aspects of e-Participation (derived from Pepper's views) are supported by the models. In general, a model may be mapped to one or more thematic areas.
- *Aligning or Integrating Models* – After mapping models, models mapped to the same thematic areas can be analysed for alignment and integration opportunities. To align a set of models, we first determine a *pivoting* model; the most established and mature model in the set. Next, we consider how other models (peer models) can extend or refine the pivot model based on their constructs. For example, constructs available in peer models but missing in the pivot model could be considered for inclusion in the pivot model.
- We argue for the reliability of our mapping based on the results of "*inter-observer*" and *"test-retest"* reliability tests (Bernard, 2000). By establishing the *"content validity"* of our Integrative Framework, we show that its 12 facets adequately structure e-Participation.

4.4 The Integrative Framework

4.4.1 Description

This section describes and relates the two major dimensions of our framework – e-Participation perspectives and e-Participation aspects. The framework is characterised by three e-Participation perspectives – the democratic, project and socio-technical perspectives, with the ontological relationship among these perspectives depicted in Figure 3.

We briefly elaborate on these three perspectives below:

- *Democratic Perspective* – this refers to all the aspects of e-Participation concerned with the democratic context. The construct is oriented on putting e-Participation into a wider democratic context. Therefore, the construct is dependent on political factors such as political utility, political impact, representation, transparency, political equality, and goals. It is a democratic activity that creates and sustains an e-Participation initiative project. Before any e-Participation project starts there has to occur a particular democratic activity that would form a relevant policy, secure sufficient funds and identify participation areas.
- *Project Perspective* – this represents e-Participation from the initiative perspective. This perspective characterises e-Participation as common to governmental and business projects. Therefore, this construct is highly dependent on criteria from the project management domain such as mission, stakeholders, change management, deliverables, outcomes, results, impact and evaluation. The project creates and sustains a socio-technical system in an iterative way. The project officers, administrators and developers collect feedback (while running a socio-technical system), maintain and apply necessary improvements to the system.

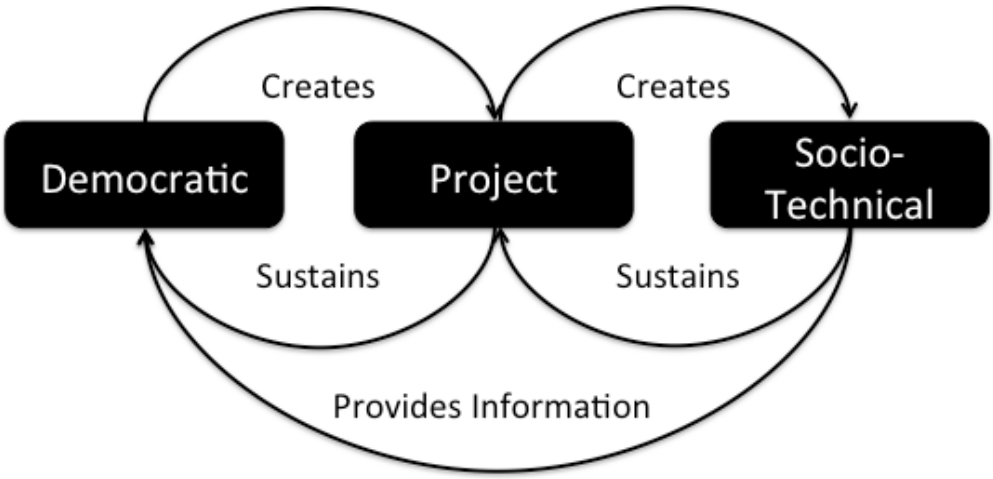

Figure 3: e-Participation perspective views

○ *Socio-Technical Perspective* – we understand that there is a broad range of platforms for e-Participation. The main function of the socio-technical perspective is to provide information to the democratic activity. This information can have the form of purely statistical data about the usage of a socio-technical system or perhaps about higher levels of participation, e.g. citizen questions and contributions to policy making.

The properties of each of the perspectives can be divided by purpose aligned to the second dimension – "aspects". The four canonical aspects of e-Participation include Mechanism, Formism, Organicism, and Contextualism.

The relations among the four views are as follows: The Mechanism view specifies operations and actions to achieve goals specified in the Organicism view. The Formism view specifies entities and forms that participate in operations and actions specified in Mechanism view. Similarly, entities and forms specified in the Formism view define different contexts in the Contextualism perspective which contribute to the Organicism view. These relations are shown in Figure 4.

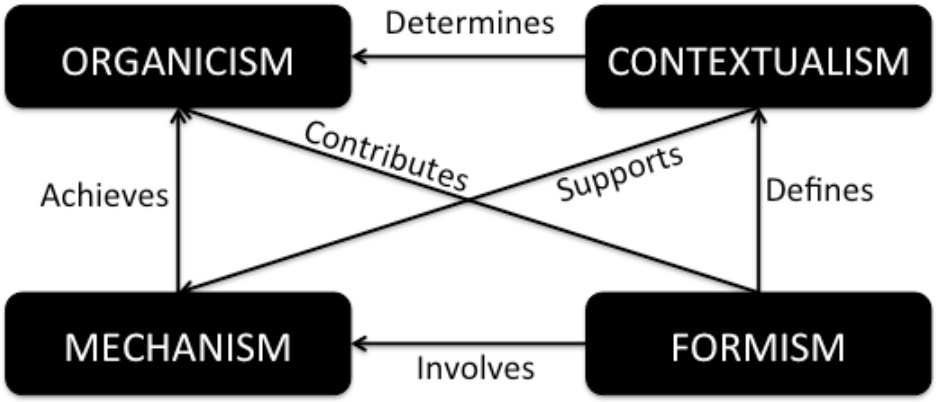

Figure 4: e-Participation Views of the World

The 12 facets characterising our e-Participation ontological space are described below (See Table 3):

1) *Democratic Entities and Forms* – refers to all the concepts related to e-Participation as a democratic activity. This includes actors, resources, participation areas and all the policies regarding e-Participation.

2) *Democratic Activities* – this facet refers to all e-Participation activities within the democratic process. This includes activities responsible for creating and sustaining e-Participation (all related to policy making), and also initiatives within participation areas such as informing citizens and consulting with or probing citizens on particular policies.

3) *Democratic Impact* – refers to the desired e-Participation impact on policy making such us citizen policy acceptance supported by increased citizen awareness, as well as a policy change, the creation of new legislation or a release of a citizen-co-contributed policy.

4) *Evaluation of the Democratic Side of e-Participation* – refers to the performance of the e-Participation initiative as a democratic tool. Evaluation provides a success rate for the overall impact of e-Participation on policy making.

Table 3 e-Participation Views and Sub-views

Generic Views	e-Participation Perspectives		
	Democratic View	Project View	Socio-Technical View
Formism	Democratic Entities and Forms	Project Entities and Forms	System Entities and Forms
	Entities in e-Participation as a democratic activity	Entities in e-Participation as an initiative	Entities in e-Participation as an ST system
Mechanism	Democratic Activities	Project Activities	System Features and Services
	Activities involved in e-Participation as a democratic activity	Activities involved in e-Participation as an initiative	Functions and operations of e-Participation as an ST system
Organicism	Democratic Impact	Project Goals	System Goals
	Desirable goals of e-Participation as a democratic activity	Goals of e-Participation as an initiative	Goals and properties of e-Participation as an ST system
Contextua-lism	Evaluation of the Democratic Side of e-Participation	Project Evaluation	System Adoption and Use
	Evaluation of e-Participation's impact on democracy	Evaluation of the e-Participation project	Adoption and usability of an e-Participation system

5) *Project Entities and Forms* – refers to all the concepts defining the e-Participation project. This includes stakeholders, resources, techniques, tools and technologies related to e-Participation project management at all levels, from setting up the project, maintenance, through to late project sustainability.

6) *Project Activities* – this facet refers to the actual project tasks that lead to a particular goal. Therefore, related concepts would include promotion, information dissemination, consultation, feedback generation, information aggregation and sustainability efforts.

7) *Project Goals* – this facet refers to the purpose of the creation and mission definition of an e-Participation initiative. The goals include the delivery and sustainability of a socio-technical platform.

8) *Project Evaluation* – refers to the classic project evaluation process. The evaluation investigates whether the goals set for the project have been achieved and to what extent. Also proper measurements of project management performance are considered here.

9) *System Entities and Forms* – the facet is related to all the concepts, classes, and properties that describe the system structure and the system environment. This can refer to actors, components, resources, techniques, tools, technologies and particular configurations leveraged by the system.

10) *System Features and Services* – refers to all the services offered and functions performed by the socio-technical system. This may refer to functions such as deliberation space features, consultation features, e-information or e-learning features, information sharing or information collection (survey).

11) *System Goals* – the facet refers to the expected socio-technical system goals like fast and effective information dissemination, user opinion mining or citizen-driven policy-making support.

12) *System Adoption and Use* – this facet refers to the actual adoption of the particular socio-technical platform by users. The facet is a measure of success and can be subject to evaluation. The facet may refer both to user acceptance of the technology as well as the general activity of citizens on the socio-technical system (determined by factors like ease of use and availability).

The relations between the elements of the framework dimensions determine the relations between the 12 facets. As an example, the System Entities and Forms define the socio-technical system. In this, the e-Participation deliberation platform can be identified by key components, users,

deliberation tools (like chat or forum) or information technologies. Those Entities and Forms are the input, output, and controller for all the System Features and Services. In other words, every concept identified has to be aligned to some role in the system where the role is clearly identified by System Features and Services. For instance, users (which are one of the entities) leverage the chat feature to express their opinions and share ideas on new policies. The socio-technical system is created and runs for a particular purpose. This purpose is a set of goals fulfilled by particular System Features and Services running according to the identified System Entities and Forms. One of the goals of a hypothetical deliberation platform is to crowdsource opinions from citizens on certain new policy ideas. This goal is supported by chat and forum features where users share their ideas on new policies. The system runs in a particular context that is also defined by System Entities and Forms. The whole context of the system with all the entities, features, goals, results and the timeframe is a subject for the evaluation of the system.

4.5 Mapping Models

Here we show how the e-Participation models presented in Part II map to the 12 facets of our framework. The mapping is done by determining the perspectives of e-Participation adopted by the model, followed by the aspects of e-Participation supported. We consider that a model supports one or more of the four views if it provides some prescriptive or descriptive information (process, staged model, discrete ordered values, etc.) on the views. In particular, we use the information in Table 1 as input for the mapping.

We assign all the models related to levels of participation and levels of engagement (Levels of Participation DESA 2005, Ladder of Online Participation Li 2007, Behavior Chain Fogg 2007 and Social Participation Preece 2009)

directly to "*System Goals"* as the resulting or desired citizen engagement is one of the key goals of a socio-technical system. We map the Exploitation Framework Phang 2008 to *"System Entities and Forms"* since in principle the model identifies the tools satisfying e-Participation system features. The Process Framework Tambouris 2007 is mapped to *"Project Activities"* as well as *"Project Entities and Forms"* as the framework tackles the fact that an e-Participation initiative activates at multiple levels of a process aligned to project concepts. The model 7Ps Islam 2008 is assigned to the *"Project Activities"* facet as in principle it identifies key e-Participation initiative activities. We map the Stakeholder View Saebo 2011 to "*Project Entities and Forms"* as the model describes the stakeholder as a key component of an e-Participation initiative.

Table 4 e-Participation Models Mapping

Generic Views	e-Participation Perspectives		
	Democratic View	Project View	Socio-Technical View
Formism	-	Dimensions of Participation Macintosh 2004 Process Framework Tambouris 2007 Stakeholder View Saebo 2011	Exploitation Framework Phang 2008
Organi-cism	-	-	Levels of Participation DESA 2005 Ladder of Online Participation Li 2007 Behavior Chain Fogg 2007 Social Participation Preece 2009
Mechanis m	-	Process Framework Tambouris 2007 7Ps Islam 2008	
Contextual -ism	Evaluation Frameworks: Macintosh 2008 Aichholzer 2009	Evaluation Frameworks: Macintosh 2008 Aichholzer 2009 Assessment Framework Tambouris 2007	Evaluation Frameworks: Macintosh 2008 Aichholzer 2009

The Evaluation Framework Macintosh 2008 is assigned to the entire Contextualism level as it defines in detail concepts related to the evaluation of e-Participation as a whole, from e-Participation as a democratic activity, through the project to the socio-technical platform. Assessment Framework Tambouris 2007 and Evaluation Framework Aichholzer 2009 are mapped to the *"Project Evaluation"* facet as the core of these models defines key measures for an initiative evaluation, addressing direct project performance

as well as management quality and effectiveness. Table 4 shows the resulting mapping.

We will show further how the models assigned to the facets can be aligned.

4.6 Aligning Models

We show here possible relations between the models and how a relatively mature and grounded model (i.e. the pivot model) could be extended with peer models belonging to the same facet. From Table 4, there are four facets presenting opportunities for model alignment. These are considered in turn below.

Project Entities and Forms Facet - the pivot model is the Dimensions of e-Participation Macintosh 2004 which presents many of the project-related concepts. The Stakeholder View Saebo 2009 could be used to extend the pivot model with the detailed conceptualization of project stakeholders. The "participation areas" construct in Process Framework Tambouris 2007 could generalize the "stage in the policy model" specified in the pivot model. We depict this alignment in Figure 5.

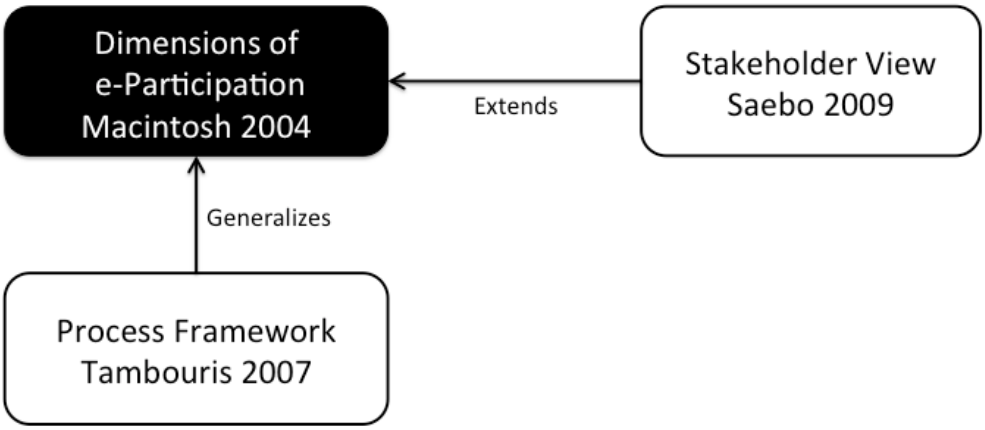

Figure 5 Project Entities and Forms Facet

Project Activities Facet – Figure 6 describes the alignment between the Process Framework Tambouris 2007 (pivot model) and 7Ps Islam 2008 (peer model). The latter could extend the pivot model by going beyond strictly e-

Participation processes to include sustainability-related activities including promotion and post-participation analysis.

Figure 6 Project Activities Facet

System Goals Facet - The scenario in Figure 7 presents two major alignment steps. The first step involves relating alternative Participation Level models as sub-models of a more general Participation Level model. The second stage of the alignment involves linking of the "e-Participation Platform Maturity" model with the generic "Participation Level" model.

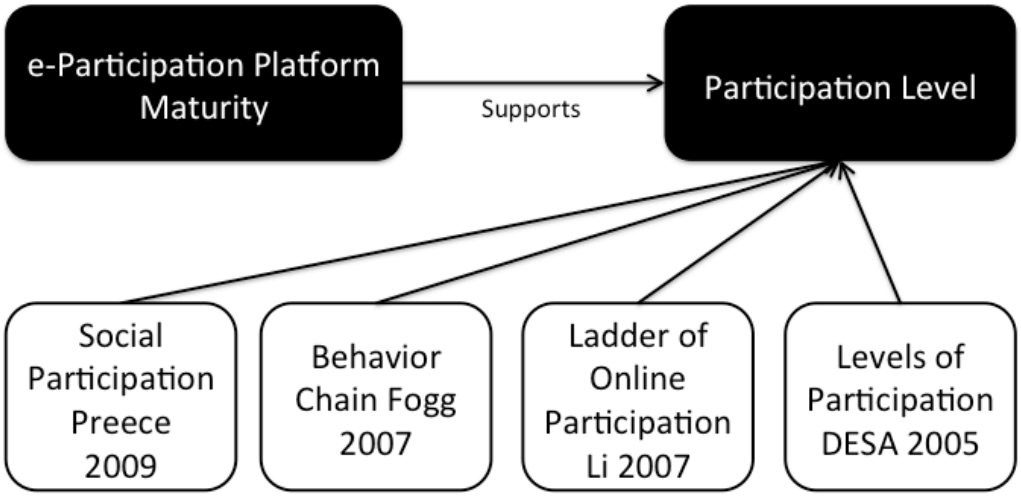

Figure 7 System Goals Facet

This linking involves the participation levels prescribing concrete requirements for the stages in the platform maturity model. This is reflected as the support relation in Figure 7.

Project Evaluation Facet – Figure 8 presents the relations between the Evaluation Framework Macintosh 2008 (pivot) and the Evaluation Framework Aichholzer 2009 (peer) and Tambouris's Assessment Framework Tambouris 2007 (peer). Both peer models provide details on the specific aspects of the

Macintosh' Evaluation Model in the form of detailed evaluation criteria and additional detailed project-related process constructs.

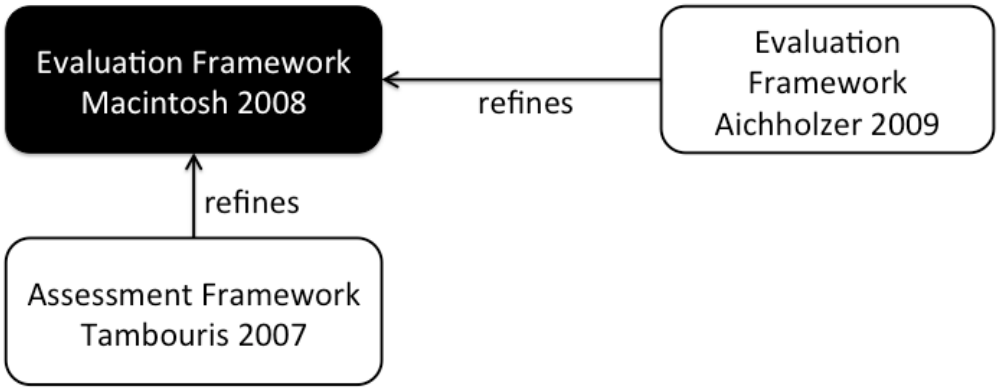

Figure 8 Project Evaluation Facet

We summarize results from the use of our framework for mapping and aligning models in the next section.

4.7 Results and validation

4.7.1 Results

We summarize results answers the five questions posed about the models of e-Participation.

R1. How can existing models be aligned to generate new knowledge and what challenges exist in achieving this?

We have provided a simple procedure inspired by the traditional alignment process in which possible contributions of domains to be aligned are sought. We have used the concept of the pivot and peer models to indicate the required direction of support desired – from "peer to pivot model." Four examples of how models in the same facet could be aligned were presented. A major challenge in aligning models is the lack of information on conceptual underpinnings for these models.

R2. How well do existing models cover the identified e-Participation thematic areas?

The socio-technical and project perspectives of e-Participation are relatively well covered in terms of availability of models. Given the popularity of participation-level related models, the System Goals Facet is the most active facet (with four models).

R3. Which aspects of e-Participation are relatively under-studied in terms of availability of models?

The democratic perspective is the least studied perspective in the e-Participation domain in terms of model development. Beyond Macintosh's and Aichholzer's models described in (Ann Macintosh, 2008a) and (Aichholzer & Westholm, 2009), there are no models to describe entities and forms, processes and goals associated with the democratic perspective of e-Participation.

4.8 Validity of Results

Here we argue for the validity of the above results by showing that our framework is expressive enough to capture all the important aspects of e-Participation. We also argue that our mapping and alignment procedures are reliable.

Content Validity of the Framework – Our arguments for the content validity of the integrative framework are based on the established adequacy of Pepper's World Hypotheses or Views (Pepper, 1957) for describing a world or system and the possibility of mapping Pepper's Views to other popular canonical enquiry tools such as Aristotle's Four Causes and journalistic questions (5W1H (Yates & Orlikowski, 2002)) as shown in Figure 9. In addition, we have successfully mapped the 10 dimensions identified by Macintosh in (A. Macintosh, 2004) into the 12 facets.

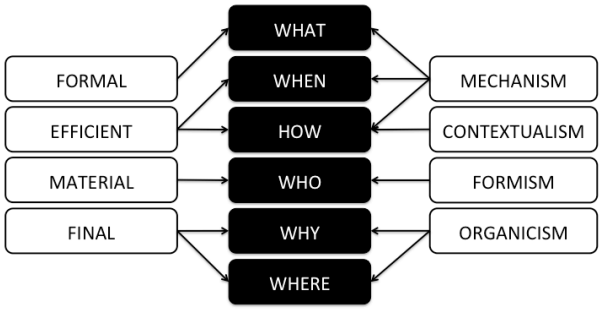

Figure 9: Mapping 5W1H, Aristotle's Four Causes, and Pepper's Views

Reliability of Mapping and Alignment Exercise – To guarantee the reliability of the mapping exercise, two reliability strategies were adopted. The first is the test-retest strategy in which each author repeatedly mapped the models a number of times and compared results across sessions. The second is the inter-observer test in which the authors independently mapped the models into the 12 facets noting reasons for their decision and later comparing results to reconcile differences in mapping.

4.9 Discussion

This work provides good evidence to support the claim of increased fragmentation of e-Participation research as raised by (Ann Macintosh et al., 2009b) and also confirm a lack of rigour in e-Participation research in the area of model development. For instance, only in rare cases (such as (Sæbø et al., 2011)) did models offer a clear conceptualisation of e-Participation or a theoretical underpinning for their model. These two observations may indicate a young and maturing field.

On the one hand, one could argue that given the less-than-a-decade history of e-Participation research and practice (albeit with practice dating back to 1960's (Arnstein, 1969)), such a level of development in the e-Participation models research domain is expected. On the other hand, lessons can be drawn from the parent discipline of e-Government (Heeks & Bailur, 2007), (Rana, Williams, Dwivedi, & Williams, 2011) which suffered and continues to

suffer from the same symptoms after well over a decade of research and practice. Given the less complex nature of e-Participation initiatives compared with traditional e-Government projects and a large number of e-Participation and social participation initiatives, there is a good opportunity for harnessing data (a challenge in the parent e-Government discipline (Heeks & Bailur, 2007)) from such initiatives for carrying out more rigorous qualitative and quantitative research in e-Participation. This may suggest that the more specialised e-Participation domain may offer examples of how to move up the "knowledge ladder" from model-based research towards theory-based work.

In our opinion, developing a unifying framework such as the Integrative Framework presented in this work and providing a robust conceptualisation of the e-Participation phenomenon is a necessary condition for ascending the knowledge framework ladder. Apart from (Cantijoch & Gibson, 2011), we are not aware of any other attempts at explicitly conceptualising e-Participation. While there have been past efforts, aiming to scope e-Participation (Tambouris, Liotas, Kaliviotis, et al., 2007) and elicit its core dimensions (A. Macintosh, 2004), the lack of information on the theoretical basis for these works makes them difficult to evaluate in terms of coverage. These two models have been mapped into specific facets of our framework.

Despite claims by Pepper and the wide application of his world hypothesis and views in different domains, we cannot claim "absolute completeness" of these views with respect to e-Participation (Hoekstra, 1945).

4.10 Conclusions

Motivated by the need to provide the necessary steps towards knowledge consolidation in e-Participation, we have presented an integrative framework for organising, mapping, and aligning existing e-Participation models. Results from our work show immediate opportunities for consolidating work on

existing models and at the same time the lack of models to support a better understanding of the democratic context for e-Participation.

5 The Integrated model for e-Participation

In this section, we tackle both the first and the second research question posed in this thesis. We, first deliver a theoretical framework to address the e-Participation research gaps identified in the section before. Then, we leverage the framework to construct a comprehensive, integrated model for e-Participation to address the key obstacles for e-Participation.

5.1 Theoretical Framework

e-Participation employs a deliberation process having a particular structure and properties within a particular context. The base requirement for a social system (here linked to the collaboration process) can be defined as a dialog of at least two personal systems or people in their roles (Parsons, 1991). Therefore, in line with the definition, the act of interaction between citizens and decision-makers together with their related concepts should be considered a social system. In order to leverage social system theoretical lens for e-Participation analysis, it is necessary to enact first the fundamental and comprehensive e-Participation conceptualisation.

5.1.1 Structuration Theory

The social system perspective on e-Participation led us directly to the Structuration Theory (ST) proposed by Giddens (Giddens, 1984) dealing with the creation and reproduction of social systems. This well-grounded theory is often leveraged for the analysis of relationships between agents and structure. According to Giddens, the agency can be understood as the

capability of individuals or groups to make free decisions or act, while the structure is defined as a patterned influence or limitation derived from rules and resources available to individual or group actions. In this context, the theory describes the *duality of structure* in which structure is both a medium and an outcome of the social system reproduction process. Therefore, the rules together with resources are drawn from social actions, which are at the same time responsible for the social system reproduction and refinement of structures. Giddens further asserts that the constitution of agents and structures are not independent but act in a synergy represented by the duality. Considering the collaboration between agents, the key principle of ST is the recognition of knowledgeability of the agents (also referred to as knowledgeable citizens) who leverage the resources provided to change social practices imposed upon them by the structure (state, municipality, etc.). In line with Giddens view on the knowledgeability, it is essential to recall works by Orlikowski who, in this context, puts particular emphasis on the importance of material artifacts (for instance resources such as platforms, tools and communication channels) facilitating the acquisition of the knowing by agents (Orlikowski, 2005). In short, the ST considers knowledgeability as the agents' awareness of their actions and reasons for these actions and is composed of three so-called memory traces: Domination (power) derived from authoritative resources – being enable to control people and allocate resources – to enable the control of material objects; Signification (meaning); and Legitimation (norms) which can be referred to as the rules through which the recourses are obtained. The knowledgeability of agents is realised through a *reflexivity* process, which is described as a constant monitoring of actions. Reflexive monitoring is a process that is dependent on factors such as time, space as well as the rationalization of the human agents and tools. Chitnis (Chitnis, 2005), in particular, employed ST in participatory communications to analyse the duality between agents and institutions, as well as to understand

the role of power and empowerment in social change. The author argues that participatory communication constructs such as conscientization, empowerment and power could be framed directly with the constructs from the ST such as knowledgeable agents, the dialectic of control and power and domination. Chitnis raises an argument that in the participation process, all actors gain from each other through sharing of political and economic power and subsequent structural changes leading to redistributing of the power.

We believe that Structuration Theory provides a suitable framework for the analysis of the citizen-participation from the agency and structure perspective. In particular the key assumption of knowledgeability of human agents, here citizens, reflects well the state of current tech-enabled, information savvy society. To support this statement, some studies showed that it is common that politically knowledgeable citizens acquire their knowledge from trusted sources (trusted media) and inform (with influence) the less knowledgeable citizens, hence acting as a knowledge mediator (Miller & Krosnick, 2000).

However, as the Structuration Theory explains well the shaping and re-production of the social system supported by knowledgeable agents, it does not supply fine-grained view on the nature of the capabilities required to support and sustain the social processes (here citizen-to-government collaboration). Moreover, ST does not illustrate how the internal and external competencies should align to the organizational rules and routines. This gap can be addressed by complementing ST with the Dynamic Capabilities Theory (Wang, 2007) which enables more detailed analysis of capabilities and resources required for social and organizational changes.

5.1.2 Dynamic Capabilities Theory

The Dynamic Capabilities Theory (DCT) (Wang, 2007) has been originally developed for the corporate business domain and evolved from the Resource Based View (RBV) (Wernerfelt, 1984) referring to the organisational

competitive advantage drawn from tangible or intangible resources. RBV framework although well-grounded lacks the means to address the issue of fast organisational reconfiguration in rapidly changing conditions. The DCT, in particular, extends the RBV theoretical framework with the acknowledgment of high dynamics of the market environments (Teece, Pisano, Shuen, & Shuen, 1997). Unlike in 'static' RBV where basic capabilities allow organizations to draw from resources to produce results, the dynamic capabilities are intended to integrate constantly, re-create and reconfigure its resources as well as the basic capabilities (Wang, 2007). The constant refinement enables the organization to adapt itself to fast changing environment (Cepeda & Vera, 2007). The DCT distinguishes three core types of the dynamic capabilities with regards to change of the operational routines: 1) adaptive capability – organisation's ability to capitalize on emerging opportunities through aligning resources and capabilities with environmental changes, 2) absorptive capability – ability to recognize and assimilate knowledge, 3) innovative capability – ability to develop new services and markets. Additionally, (Connor, 2008) defines a set of principles for dynamic capabilities under conditions of high uncertainty and high market velocity which in fact reflect well the dynamics found in politics as well: 1) the primacy of the goal of the actions over the methodology, 2) the need for creation of situation-specific knowledge (quick experimental actions and frequent iteration), 3) parallel consideration and partial implementation of multiple options, 4) unique skill set requirement (partnership and information sharing), 5) persistence in ensuring the capabilities.

We argue that this particular extension of market practices to human practices is relevant in the specific context of e-Participation. We believe the case of e-Participation in many aspects (especially when it comes to stakeholder engagement and user, here citizen, relationship management) can be related to customer service in the enterprise sector. In particular, it has

been shown in the literature that there is a correlation between human practices and sales growth in customer service (Batt, 2002). Companies put a lot of emphasis on connecting directly with the customer, exploring newest communication channels, recently especially popular Social Media platforms (Baird & Parasnis, 2011). The efforts and challenges with CRM (Customer Relationship Management) faced by the management of the large companies show many similarities to the issues that the governments needs to deal with today.

5.1.3 Structuration and Dynamic Capability Model of e-Participation

This section develops our integrated ST and DCT based analysis of e-Participation. We present structuration analysis of government-led e-Participation. Then we present a DCT-based analysis of the duality of e-Participation. We conclude this section with the integrated ST and DCT based analysis of the duality of e- Participation.

Structuration Analysis of e-Participation Government-Led Participation

The government-led participation (GleP) is a common model exploited by the contemporary e-Participation solutions and driven by three main principles: inform, consult, empower (DESA, 2005a; Ann Macintosh, 2004; OECD, 2001b) GleP leverages an approach where the government 'educates' and mines citizens' opinion through dedicated e-Participation platforms. Although the approach acknowledges citizens' input (whenever government seeks citizens' opinion); substantial powers remain domicile with the government as it owns the process. The supremacy of government's power in this context is implied by the insufficient resources appropriated to citizens. In Figure 10 we show a general overview of the GleP. The figure presents the pool of resources and rules (i.e. the structure) that are available to the government and citizens to run and transform e- Participation.

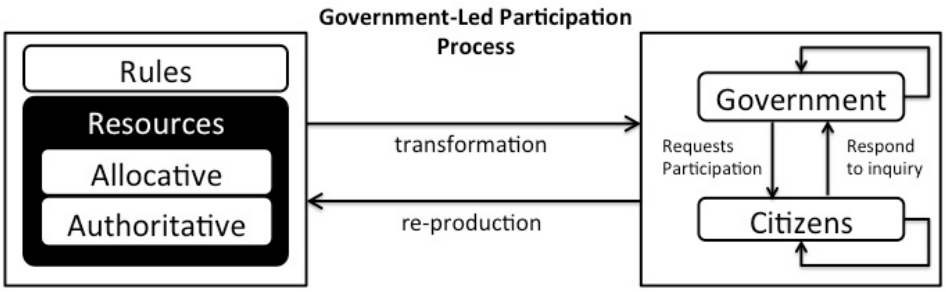

Figure 10: GleP overview

Although citizens indeed are provided with allocative resources in a form of available e-Participation tools, their capability to draw from the authoritative resources is significantly limited. Therefore, citizens are unable to implement their own ideas or resist the government's decisions. In addition, the government decides what is important for policy making (signification). Furthermore, government alone shapes the system rules (full legitimation), which drive the system. Here, it is apparent, that the notion of the *dialectic of control* is weak. A major implication of this scenario is that government may largely miss the knowledge of real needs of citizens, leading directly to the lack of engagement and ultimately lack of sustainability of e-Participation initiatives. Finally, GleP solutions designate the information and consultation as the two key, base levels for e-Participation (OECD, 2001b). Lastly, in the GLeP approach, there is an implicit assumption that citizens' knowledgeability is limited. Figure 10 presents a model for GLeP allowing for the reconfiguration of the power relationship between government and citizens as well as the empowerment of citizen and government agencies over time-based on the interaction between government and its citizens. Next, we describe how CLeP can facilitate the re-distribution power between government and their citizenry over time.

Citizen-Led Participation

By CleP, we understand an approach where the citizens explicitly drive the e-Participation agenda under the based on that government's recognition of

citizens' knowledgeability. Macintosh et al. (Ann Macintosh et al., 2009a) identify the lack of the exploration of the political discussions spontaneously conducted by citizens on ubiquitous social networking sites as one of the key gaps of e-Participation. In response, a salient principle of CleP is that the government continually attempt to reach out to citizens on media of their preference, such as the less formal social networking platforms rather than on dedicated e-Participation solutions. In particular, we operationalize CleP to proceed in three main steps: listen, shape and empower. The government continuously monitors (*listens*) citizens' deliberation on popular 'citizen owned' social media platforms (as shown in Figure 11) for policy suggestions, and if necessarily *shapes* the discussion. Here, Government acts as an expert in the domain and enriches the discussion based on the domain expertise. As a result of this process, resources distribution and system rules are continuously updated and reproduced based on the citizens' contributions. In other words, in this model, citizens can effectively exercise the agency to change the structure. Thus, they are *empowered* in the decision-making process.

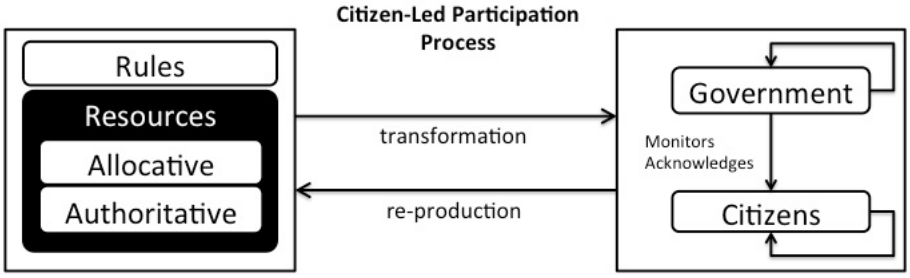

Figure 11: CleP Overview

Integrating Government and Citizen-Led e-Participation

Macintosh et al. (Ann Macintosh et al., 2009a) describe the duality of e-Participation as the integration of the disjoint ubiquitous, spontaneous citizen-driven participation and the government-led discussions. We attempt to operationalize this notion of e-Participation duality by offering an

integrated approach to e-Participation, which combines both government- led as well as a complementary citizen-led e-Participation. In the integrated model, the government can continue on traditional e-Participation routine while continuously monitoring the public opinion for guidelines and feedback on the new policies. The two pillars of GleP and CleP work in a synergy addressing the duality of e-Participation (Figure 12). The salient element of the synergistic model is that the government acknowledges citizens' contributions and while acting as the domain expert, shapes the discussion in order to make it more legitimate. The citizens' discussions help decision-makers to understand better the issues and focus their agenda on the most important problems.

As shown in the Figure 13 there are two alternative modes of e-Participation available for the citizens' input. By default, government continuously explores CleP element and in case, the government does not find enough input a new dedicated, the more structured discussion can be opened through the GleP element. Unlike in the traditional GleP, the integrated approach allows both relevant allocative resources as well as the authoritative resources to be assigned to the citizen through the recognition of citizens' knowledgeability. This approach, therefore, facilitates direct citizen input to the policy making process. Since citizens are given enough authoritative resources, they are empowered to exercise the agency and resist not-satisfactory decisions (i.e. resist domination by the government). The integrated approach also promotes greater government transparency and ensures freedom of information along with truly guaranteed democratic rights of citizens expressed in direct policy-making influence. Our analysis of the integrated structuration model for e-Participation leads to following propositions:

P1) The integration of citizen-led participation leads to better value outcomes for citizens when compared to traditional government-led participation.

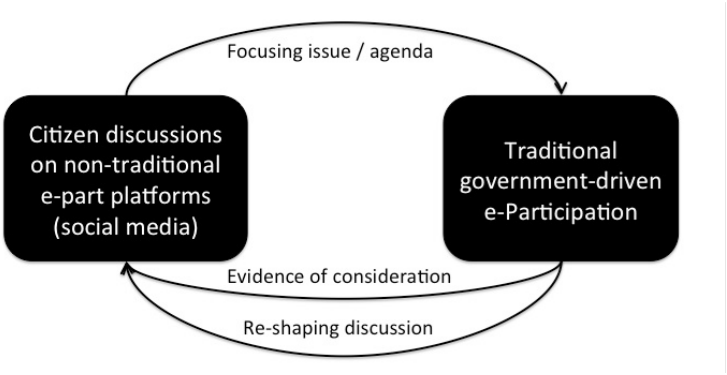

Figure 12: Integrated approach to e-Participation

P2) Deliberation that has a potential impact on government programs carried out over citizens centric media leads to a better sense of empowerment by citizens.

P3) CleP requires the acquisition of special capabilities by governments.

P4) Adoption of CleP as legitimate basis for government actions, requires the legislative and regulatory updates.

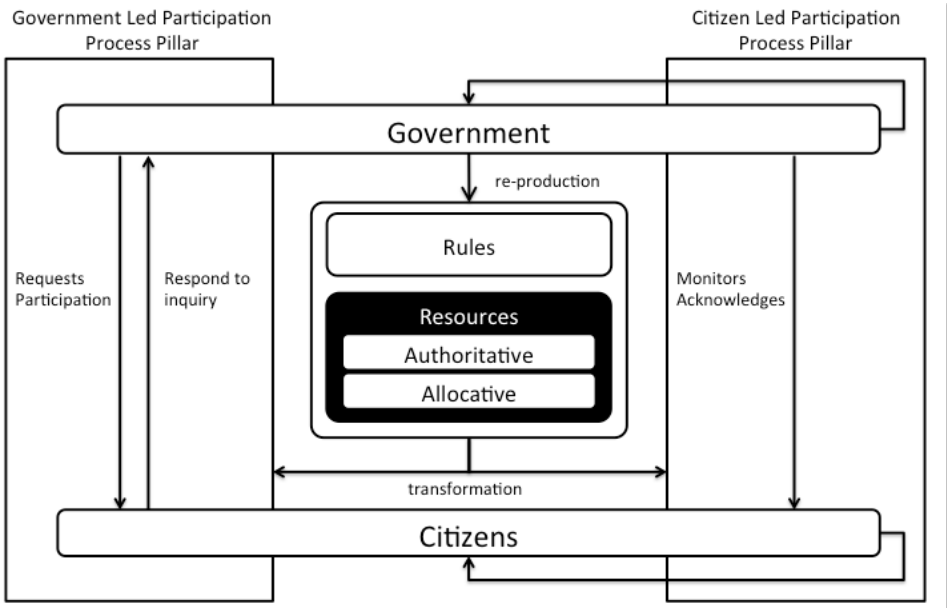

Figure 13: Dual e-Participation Model

5.1.4 Dynamic Capabilities Model for e-Participation

According to Wang et al. (Wang & Ahmed, 2007), dynamic capabilities are intended to integrate constantly, re-create and re-configure its resources as well as the capabilities. We demonstrate a specific adoption of DCT to e-Participation by considering continuous e-Participation re-production as an integral part of the e-Participation process. In order to effectively leverage e-Participation the government needs to harness the citizens' input and transform it into policies while continuously re-constructing the e-Participation process itself to ensure relevant stakeholders empowerment. The demonstrated approach demands high adaptivity to the dynamics of the social system environment. To conceptualize e-Participation capability requirements, we frame the dynamic capabilities constructs directly with the relevant e-Participation components and processes (Figure 14). The adaptive capability (AD) can be linked to the e- Participation resources rebalance and rules updates required for sustainable e- participation. In particular e-Participation requires AD capabilities like *dynamic resources acquisition and distribution* (both allocative and authoritative resources) based on the current participation demand, e-Participation *rules re-production and reformation processes* based on participation process required improvements.

The absorptive capability (AC) can be seen as the knowledge exchange synergy between knowledgeable citizens and the government, learning from each other. In particular e-Participation requires an AC-like *continuous monitoring process that is* intended to act as a seamless, rich source of information for the policy-makers agenda, a *participation shaping process* necessary to ensure legitimate contributions, and *citizen information services* guaranteeing freedom of public information and government transparency.

Innovative capability (IC) can be expressed in the possible expansion of e-Participation reach and constant improvement of the e-Participation process.

In particular e-Participation requires an IC-like *flexible monitoring process* – citizen-opinion monitoring process independent from the socio-technical platform, capable of expanding to the newly created participation places, and *ubiquitous e-Participation* – e-Participation available to citizens via multiple channels of their choice (variety of hardware and software platforms).

e-Participation initiatives run in an environment of high dynamics and uncertainty. Therefore, the building capabilities required by e-Participation should follow the principles such as the creation of situation-specific knowledge (AC) that may involve invitation of domain experts from citizens as well as parallel consideration and partial implementation (AD and IC) of suggested ideas followed by routinised citizens feedback (AC). More importantly, the clearly defined, well-announced goals and persistence of the government in constant re-production of e-Participation capabilities is required in order to ensure sustainable citizen-decision-makers cooperation.

To summarise, we have identified the following dynamic capabilities: 1) adaptive capabilities including dynamic resources distribution and acquisition, rules re- production and reformation process; 2) absorptive capabilities including continuous monitoring process, participation shaping process, citizen information services; and 3) innovative capabilities including flexible monitoring process, ubiquitous e- Participation.

The presented dynamic capabilities model structures the way the e-Participation is reshaped in the dual process (Figure 13). Next, we present and integrated model for e- Participation and then we apply this theoretical lens, to analyse an e-Participation case study in a city in Ireland.

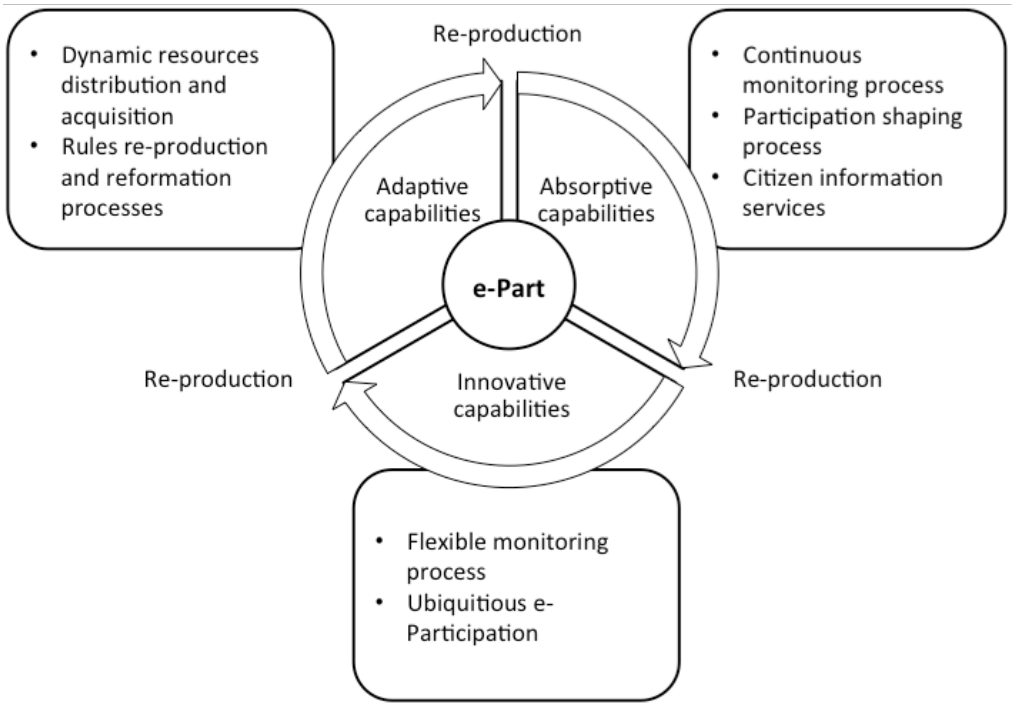

Figure 14: Dynamic Capabilities Model for e-Participation

5.2 Integrated Model for e-Participation

The Integrated Model for e-Participation (IMeP) presented in Figure 15. has been derived from the theoretical lens combining Structuration Theory with the complementary, Dynamic Capabilities Theory in a single e-Participation social system model. IMeP leverages two approaches to e-Participation: classic, Government-led e-Participation and the new, Citizen-led e-Participation. The two channels are exploited simultaneously to support the dynamic distribution of allocative and authoritative resources between citizens and decision makers in the context of decision or policy-making. Citizens given appropriate resources (material and legislative) obtain knowledge and exercise their agency to participate in the social system re-production. The legitimacy and significance of citizens' contribution to policy making are strengthened directly by government's acknowledgment, consideration, and subsequent (partial) adoption. We have identified the following types of essential capabilities for realising such an integrated e-Participation framework: 1) adaptive capabilities including dynamic resources

(re-) distribution and acquisition, rules re-production and reformation process; 2) absorptive capabilities including continuous monitoring process, participation shaping process, citizen information services; and 3) innovative capabilities including flexible monitoring process and ubiquitous e-Participation.

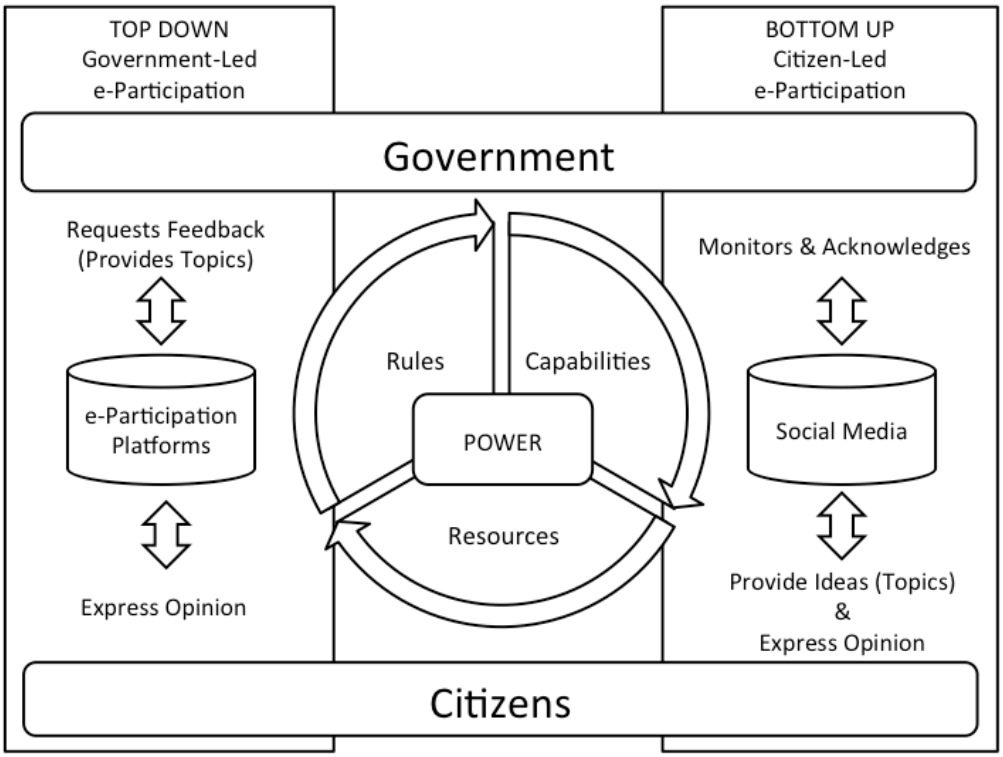

Figure 15: Integrated model for e-Participation

Now we are going to describe shortly the three distinguishable types of capabilities from the perspective of government-to-citizen dialog:

The *adaptive capabilities* reflect the ability of the government to use available resources implicitly in a form of finances or directly by using available tools to constantly adapt the existing government structures and rules to fast-changing citizen needs as well as to dynamically adjust the resources distribution (both financial, material and authoritative) for possibly best social system (state structure) efficiency. This involves, openness and significant exploitation of a wide range of communication channels for more precise, faster and more efficient government-internal and government-to-citizen

information exchange that would ensure improved (faster and more relevant) structure-adaptation. Moreover, government ensures that the change is driven bottom-up, hence is triggered by the need to respond better to fast changing environment.

The *absorptive capabilities* in the context of e-Participation deal with the capability of the government to manifest listen and shape citizens-discussions through expert opinion in order to respond to citizens' needs faster and in the more relevant way. Government monitors discussions to acquire the knowledge drawn from the wisdom of the crowd, in order to identify the key, important issues in the fast-changing dynamics of citizens' discussions. This enables more agile policy alignment without taking the risk of "guessing" or running extensive expensive surveys. Moreover explicit acknowledgment of citizens contributions increases government transparency perception, hence actively supports the improvement of citizen trust in government. This consequentially ensures continuous reflexive dialogue and dialectics among citizens and between citizens and decision makers respectively characterizing the dual-nature e-Participation process. This way, the highly dominant role of the government is transformed into the role of a facilitator, expert, and executor for citizens' policy needs.

The *innovative capabilities* reflect the ability of the government to keep up with the fast-changing space of communications, information technology but most of all - the rapid changes in the mindset of the society, who acquires new skills and expertise while adopting new means of communication and knowledge acquisition. This refers mainly to investigation and adoption of the newest Internet and mobile technologies that citizens use in their every life as well as the necessary adjustment to implicit citizens' behavioral and daily routine changes in order to align them and leverage them for government purposes. Therefore, the government can meet citizens "where they are" rather than forcing citizens to use dedicated yet not always convenient tools.

In next section we elaborate on how the Integrated model for e-Participation can be leveraged to analyse an e-Participation initiative. In particular we show how our model can support e-Participation analysis.

5.2.1 Case Study

We leverage a case study to explain the usefulness of the integrated model for e-Participation. The case study involves a transportation e-Participation initiative (Forum) established in 2011 as a volunteer initiative in Galway, Republic of Ireland, to identify a range of implementable, short-term traffic measures that will help alleviate some of the current city-transport difficulties. The core idea behind the solution has been to address the participation barriers, especially in context of social inclusion and impact on policy- making. The project involved most major local transportation stakeholder groups, ranging from government officials to ordinary citizens. The diverse group of stakeholders includes: the mayor, chamber of commerce, local development authorities, representatives of the enterprise sector, academia (especially civil engineering, social science and computer science), along with independent volunteers and finally the citizens.

The Forum has been considered relatively successful, although our analytical lens points out a number of issues that may pose a serious threat to the sustainability of the e-Participation solution. The Forum, as indicated, has been initiated and managed by the mayor of the city; thus considered a GleP platform. The role of the e-Participation solution has been to increase local government awareness of the citizens needs regarding the transportation in the city as well as to ensure greater ownership of the key transportation decisions by citizens. Thus, based on GleP approach, the basic assumption of the project is to bring citizens over from many distributed spontaneous discussion places, and gather them on one platform to deliberate on the issues in a structured way. The solution offers multiple communication channels such as e-mail, digital forum, social media extensions (rich allocative

resources), nevertheless the digital and paper surveys have been designated and recommended as the main contribution channel for citizens (what has been expressed in dissemination materials and reflected by the Forum design). The surveys have been designed with no input from citizens and have been shaped to answer very particular questions on transportation in the city. These facts imply that the citizens' contributions are very limited and actually 'censored' through narrow structure of contribution (Rose & Sæbø, 2010)with low level of significance assigned to citizens suggestions. Moreover one-way communication through mainstream media has been favored by the government, strengthening the image of the government's ownership of the initiative. What has been indicated on the platform, one of the key goals of the initiative has been to deliver a combined report, gathering together citizens' contributions that are handed over to the local transportation authority (LTA). Nevertheless, in the absence of any assurance that the ideas and solutions suggested would be implemented, citizens using the Forum are given very little authoritative resources, demonstrating the dominant position of the government. Moreover, LTA has been active on the Forum platform only on volunteer bases without taking full ownership of the solution which implies a lack of legitimacy assigned to citizen's contributions. Although citizens' contributions are very constraint due to fixed topics and questions, as the experience of this study shows, decision makers are surprised by many ideas proposed in the report. This supports the hypothesis that the government is not fully aware of the real needs of citizens. The experience showed also that the LTA finally did not acknowledge the suggestions presented in the report and followed their own agenda regarding the changes in the city (no signification power assigned to citizens' contributions). Without feedback from government to citizens on the extent of adoption of their contributions, citizen engagement on the platform systematically dropped. The LTA's inadvertent weak recognition of citizens' knowledgeability; its

reliance only on their internal expertise, supports the observation of the existing gap between citizens' ideas and proposed improvements in the city. This has continued to cause growing public disappointment. Nevertheless, lack of significant authoritative resources or supporting system rules on citizen's side indicates that the citizen are not sufficiently empowered (i.e. no legitimation power). To conclude from the dynamic capabilities perspective the initiative misses absorptive capabilities by not taking into consideration the knowledgeability of citizens. The innovative capabilities have been rather missing apart from the multichannel communication, failing to provide citizens with seamless, ubiquitous e-Participation. The adaptive capabilities are not really present in the initiative as the initiative operators limited their actions only to minor fixes and improvements to the technological platform without any e-Participation re-production process in place.

The Forum initiative has been intended to address the common e-Participation issues. Nevertheless, with the consideration of the duality of e-Participation, the solution has been missing clear guidelines on structure of the process. Therefore we would like to discuss the propositions regarding CleP that could help to alleviate the current issues of the e- Participation solution. Considering the proposition that CleP leads to better value outcomes than GleP alone (P1), we believe that CleP, promoting the open-structure of contributions, could help to avoid the mentioned aspects of 'censorship' that are present on the current platform, hence ensuring greater and richer source for deliberation. Moreover, citizens enabled to participate from their own social spaces would be given a better sense of empowerment. Therefore CleP would certainly help the Forum to bring more ownership of the e-Participation process to citizens and that should have direct implication in greater citizen engagement (P2). To ensure quality contributions in CleP the government is an active deliberation participant and shapes the discussion as a domain expert, thus again, regarding the better value outcome, the ideas

and suggestions generated by CleP would have more legitimacy and better quality than in the current solution (P1). Nevertheless, as pointed out in the propositions before, these changes would require the government to generate new capabilities, especially the absorptive capabilities such as continuous monitoring and discussion shaping as well as innovative capabilities in a form of ubiquitous e- Participation and flexible input capability which are all rather very limited or non- existent in the current solution (P3). As the experience of the Forum shows, the weak legitimacy of the contributions in absence of authoritative resources has been the key obstacle for the initiative to fully succeed. This situation demands new rules and regulations to be set up, re-produced and routinized by the local government in order to provide enough legitimacy to citizen contributions, hence supporting the sense of empowerment of citizens (P4 and P2).

5.2.2 Discussion

Results from our theoretical work provide good evidence to support the claim of poor structuration of popular (GleP) e-Participation initiatives (Ann Macintosh, 2004), ultimately leading these initiatives to fail. The application of the combined ST and DCT-based theoretical lens exposes important e-Participation issues related to not recognising citizens' knowledgeability and an imbalance of resources, while providing solid guidelines for future research in the field. It is apparent from this work that the common understanding of citizen-empowerment (Rose & Sæbø, 2010) (Tambouris, Liotas, Kaliviotis, et al., 2007) (D. Lee et al., 2011) is incomplete. In particular, our findings expose the fact that an e-Participation approach where citizens are given only limited, allocative resources in the absence of signification and legitimation power is not sufficient and demands deep refinement. One could argue that given the less than a decade history of e-Participation research and practice, such level of development of the e-Participation domain is expected. Nevertheless in our

opinion, developing a framework such as the integrated e-Participation model presented in this work and providing a robust conceptualisation of the e-Participation process is a necessary condition for e-Participation sustainability. The case study analysis presented confirms our observations. The framework proposed captures the key dimensions of participation, answering questions about why initiatives often seem to lose citizen engagement even though many complementary 'traditional efforts' have been made (such as extensive media campaigns). The framework highlights key improvements required and provides guidelines for initiative designers that could help to ensure e-Participation sustainability. One of the key improvements is to extend the existing GleP approach with CleP and introduce the integrated e-Participation model as presented. We believe that CleP is a visible option for local government although due to limited resources for processing citizens' opinions the monitoring would have to be supported by relevant technologies.

Well-established social networking platforms are ubiquitous and witness far more engagement than any e-Participation solution. Moreover many people have incorporated them into everyday activities as they are very easy to use (Lane & Coleman, 2012) and indeed they can become a spontaneous place for many political discussions. Therefore, we believe the duality of e-Participation is a fact, and there is a great challenge as well as a significant opportunity to leverage the potential of social media for participation purposes.

Apart from (Chitnis, 2005), we are not aware of any other significant attempts at applying Structuration Theory to the social participation domain. Moreover, we have not found any approach that tries to combine and apply in particular both ST and DCT to e-Participation. While there have been past efforts aimed to scope e-Participation (Tambouris, Liotas, Kaliviotis, et al., 2007) and elicit its core dimensions (Ann Macintosh, 2004), these studies present a very general view on e-Participation with a lack of information on the theoretical

basis for these works and providing low granularity level in regard to the structuration of participatory communication (or the focus on technology), making it difficult to evaluate them in terms of coverage and relevance.

Despite claims by (Giddens, 1984) (Chitnis, 2005) (Wang, 2007) and the wide application of ST and DCT in different social system-related domains, we cannot claim "absolute completeness" of the presented approach with respect to e-Participation.

5.2.3 Conclusion

Motivated by the need to provide necessary steps towards the structuration of e-Participation, we have presented an integrated theoretical lens for analysing and improving existing e-Participation methodologies. Results from our work show immediate opportunities for consolidating social systems related theories and application to the democratic context for e-Participation.

The further part of this document explains the translation of the Integrated Model for e-Participation (along with all the structuring and capabilities described) into a comprehensive set of e-Participation requirements.

6 Social Software Infrastructure

The presented Integrated Model for e-Participation structures the citizen-to-decision-maker communication and identifies the key e-Participation process capabilities required to combine both government-led and citizen-led e-Participation. In this section, we leverage this model as a basis for the design of a relevant technical infrastructure to support the analysis of the duality of e-Participation. In particular, our goal is to apply state-of-the-art information technologies and knowledge management capabilities to develop a Social Software Infrastructure Design for combining and processing information derived from social-media-based political deliberations, relevant information input from classic government-led political discussions, and external e-Government sources.

6.1 Related work

The last decade showed many examples of the use of social software as an infrastructure for realising particular aspects of e-Participation. Social software is usually referred to as Web 2.0 software or Web 2.0 platforms, enabling social networking, i.e. offering capabilities for people to contact and interact with each other (Reuter & Marx, 2011). The main principle of Web 2.0 is that of collective intelligence (the wisdom of the crowds), which is collaborative content creation and linking by a user (in our case the citizen) who contributes towards common knowledge (O'Reilly, 2007). Many e-Participation projects such as eMPOWER[1], EUROPETITION[2],

[1] EMPOWER http://www.ep-empower.eu/ 10.07.13

[2] EUROPETITION http://www.europetition.eu/ 10.07.13

HUWY[3], U@MARENOSTRUM[4], VIDI[5], WAVE,[6] VOICES[7], WEGOV[8], Puzzled by Policy[9], IMPACT[10], COCPIT[11], OCOPOMO[12], PADGETS[13], SPACES[14], NOMAD[15] and EPOLICY[16] have employed Web 2.0 tools such as digital forums, blogs, wikis and live chat to provide a dedicated e-Participation environment where citizens can express and discuss their needs and concerns. Those highly structured platforms, though well designed towards specific e-Participation needs, in principle suffer from a lack of engagement by citizens. In contrast, the incredibly popular sub-group of social software that is social media is widely used by citizens for spontaneous political discussions, though without a direct link to the formal e-Participation process (Ann Macintosh et al., 2009a).

Kalbe et al. (Bouman et al., 2008) argue that the success of a particular social software design is determined not by the functionality but by the sociality support from the social software system; where sociality is understood as the enjoyment of companionship and social activities. Therefore, the design of social software should focus on the means of

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[3] HUWY http://www.huwy.eu/vi 10.07.13

[4] UMARENOSTRUM http://www.uatmarenostrum.eu/ 10.07.13

[5] VIDI http://www.vidi-project.eu/ 10.07.13

[6] WAVE http://www.wave-project.eu/ 10.07.13

[7] VOICES http://www.give-your-voice.eu/ 10.07.13

[8] WEGOV http://www.wegov-project.eu/ 10.07.13

[9] PUZZLED BY POLICY http://join.puzzledbypolicy.eu/ 10.07.13

[10] IMPACT http://www.policy-impact.eu/ 10.07.13

[11] COCPIT http://www.cockpit-project.eu/ 10.07.13

[12] OCOPOMO http://www.ocopomo.eu/ 10.07.13

[13] PADGETS http://www.padgets.eu/ 10.07.13

[14] SPACES http://www.positivespaces.eu/ 10.07.13

[15] NOMAD http://www.nomad-project.eu/ 10.07.13

[16] EPOLICY http://www.epolicy-project.eu/node/ 10.07.13

pursuing such sociality. Kalbe et al. show that a designer of social software has to address all issues of enabling practice, mimicking reality, building identity and actualizing self.

The best examples of popular, successful platforms, where social software designers got an excellent grasp on sociality, would be the well-known and globally used social networking tools such as Facebook and Twitter, also referred to as social media. These well established platforms are ubiquitous and witness far more engagement than any e-Participation solution. Moreover many people have incorporated them into their everyday activities as they are very easy to use (Lane & Coleman, 2012). The significant advantage of popular social media over other means of electronic communication so far (from an e-Government perspective) has been primarily in decreasing the digital divide and improving accessibility to information, hence increasing citizen trust and government transparency (Bonsón, Torres, Royo, & Flores, 2012). This spans directly from the ease of use and ubiquity of popular social networking platforms (Magro, 2012). In particular, as it has been shown that successful social media campaign can affect political popularity, and hence can have a significant impact on the results of elections, many decision makers and governments have employed social media as an important communication channel with citizens (Effing, Hillegersberg, & Huibers, 2011; Moreira & Ladner, 2009). Thus, as an outcome of this improved communication, citizen coproduction through social media emerged as a viable possibility (Linders, 2012). Another important social media use from an e-Participation context is improved, social-media-supported disaster and crisis management, and policy development derived from a social-media-facilitated citizen reporting capabilities (Ashley, Corbett, Jones, Garside, & Rambaldi, 2009; Kuzma, 2010). In particular, social media have been playing an increasing role as rapid crowdsourcing and

rapid response tools, especially in the event of crises (including political crises) (Makinen & Wangu Kuira, 2008) and natural disasters (Gao, Barbier, & Goolsby, 2011).

The social-media applications for e-Participation, in the cases mentioned previously, focus on the use of popular social media platforms directly as a citizen communication tool in a specific domain and to solve a particular problem (like gaining more electoral votes). Moreover, most of the attempts to harness social media as a well-structured infrastructure for e-Participation tend to address only very particular aspects of e-Participation. Therefore, a solution that would try to comprehensively consolidate classic e-Participation channels and complement them rigorously with structured social media exploration and a fast-feedback approach has yet to be developed.

6.2 Approach

A major goal of the work presented in this section is to elicit the requirements and develop a design for the technical infrastructure needed to support the analysis of Duality of e-Participation. In particular, the technical infrastructure – a Social Software Infrastructure, will capture, process and analyse citizen-led political deliberations on social media and integrate results with those produced by traditional government-led e-Participation platforms and processes.

6.2.1 Methodology

This section describes the methodology used for designing the e-Participation Social Software Infrastructure. In our methodology we follow the Design Science Research Framework – DSRF (March & Smith, 1995) as the core approach. We adopt the DSRF to the specific needs of e-Participation Infrastructure design.

The design of the Social Software Infrastructure consists of the following steps:

S1) *Identifying the Infrastructure Requirements* – based on our Integrated Model for e-Participation described further, we elicit the requirements for the Social Software Infrastructure. This is achieved in two sub-steps. The first sub-step involves determining the required socio-technical and organizational capabilities for provisioning such infrastructure while the second consists of refining these capabilities into specific systems requirements.

S2) *Gap Analysis Based on Mapping of Related Social Media Technologies* – we investigate existing practices and technologies that could support the implementation of the requirements defined in Step 1. Following the mapping, we elaborate on particular gaps identified with respect to the realization of the Social Software Infrastructure.

S3) *Creating the Social Software Infrastructure Design* – based on the requirements and gaps identified in Steps 1 and 2, we develop the key design constructs for the SSI. The resulting model addresses both government- and citizen-led e-Participation as a synergic process.

S4) *Validating the SSI Design* – the final step involves the validation of the constructed design. To demonstrate the use of the developed infrastructure design, we present a real-life scenario where both citizen-led and government-led participation are integrated into a single e-Participation process.

6.3 Theoretical Framework

In this section, we elaborate on the key theoretical paradigms leveraged as a base for designing the Social Software Infrastructure. In particular, we

consider theories of social systems, social system structuration, and capabilities required to sustain a social system, combined in a single model for e-Participation.

The base requirement for a social system can be defined as a dialog of at least two personal systems or people in their roles (Parsons, 1991). Therefore, in line with the definition, the act of interaction between citizens and decision-makers together with their related concepts can be considered a social system. In order to leverage a social system theoretical lens for e-Participation analysis, it is necessary to enact first a fundamental and comprehensive e-Participation conceptualization. In order to conceptualize the e-Participation processes, we have constructed the Integrated Model for e-Participation.

6.4 Infrastructure Design

6.4.1 Requirements

We elicit the requirements for the Social Software Infrastructure based on the elaboration of the Integrated Model for e-Participation. The key building elements are the two pillars: one representing the government-led e-Participation (GLeP) and the second representing the citizen-led e-Participation (CLeP). The GLeP infrastructure, as we will exemplify further, is already available and is widely implemented in the form of dedicated e-Participation platforms, where the decision makers request feedback from citizens on some particular topics of interest. In this channel, citizens are assigned the allocative resources (providing means for execution of citizen agency) in a form of specialized e-Participation tools that can be employed by citizens to express their opinion. Here, the core improvement tendency is to ensure ubiquitous, accessible e-Participation (hardware and software independent participation). Although attempts to process citizens' feedback from sources other than dedicated e-Participation platforms exist, the full CLeP infrastructure, as defined, is yet

to be fully articulated. Currently, CLeP has mainly a form of spontaneous, loosely structured, political discussions on various, widely accessible social media. This kind of wisdom of the crowds is difficult to comprehend due to information overload and the varying quality of contributions. Thus, it is essential for e-Participation designers to harness the potential of effective discussion monitoring. Hence, governments could observe citizens' debates and acknowledge constructive suggestions, giving recognition to citizens for their contributions and by including the deliberations' results in their agendas. In the case of the current e-Participation solutions, the governments may consider the results delivered by them, although in principle there is a missing acknowledgment of citizens' opinions and lack of a mechanism implementing the explicit inclusion of citizens in the policy-making process. In order to ensure that citizens' contributions are recognized by the government and then processed and leveraged in a constructive way, relevant absorptive capabilities including continuous monitoring and participation-shaping processes as well as personalized citizen information services need to be developed. This requires extra capabilities for dealing with information quality and other information overload issues common when managing vast amounts of social media content. Moreover, the infrastructure must support adaptive capabilities where citizens are explicitly included in the policy making a loop at the agenda formation stage. This can be provided by giving citizens enough allocative resources in the form of a platform, but, more importantly, salient authoritative resources (legislative rights or privileges) to support them with their democratic rights (citizens have to be provided with an explicit feedback channel that confirms explicit consideration of their contributions by the government). Citizens have to be given a possibility to discuss current political decisions as well as discuss and shape the

process of e-Participation itself. This demands essential capabilities such as the rules' reproduction and formation process. Finally, the infrastructure has to support innovation by monitoring multiple, also new, emerging, deliberation platforms and through this enable citizens to participate by using the hardware and software of their choice rather than enforcing the use of one particular platform. To summarize and structure the SSI requirements, we have gathered a comprehensive grid of e-Participation infrastructure requirements as shown in Table 5.

Table 5 Social Software Infrastructure Requirements

Aspects of e-Participation		Dynamic Capabilities		
		Adaptive	**Absorptive**	**Innovative**
	Empower	R.22 Government needs to provide tools that would enable citizens to influence directly policy making	R.23 Government needs to build an approach where citizens' suggestions are reflected directly in the policy-making agenda	R.24 Government should constantly seek for new ways of involving citizens in policy-making processes
CLeP	**Process**	R.19 Government needs tools that would facilitate the processing of the vast social media participation data	R.20 Government should analyse the spontaneous citizens discussions and recognize valuable contributions	R.21 Government should harness new technologies for better and faster citizen input processing
	Shaping	R.16 Government needs tools to interact effectively with citizens and shape discussions on deliberation platforms	R.17 Governments should analyse citizens' discussions and provide frequent feedback to guide the discussions (expert opinion)	R.18 Government should harness new technologies enabling faster and more relevant interaction with citizens
	Listening	R.13 Government needs tools to monitor social media and similar places of spontaneous citizens'	R.14 Government needs to recognize and acknowledge the social media-mined citizen opinions.	R.15 Government needs to ensure support for technology-agnostic (desktop, mobile), ubiquitous e-Participation on multiple social media

		deliberation		platforms
GLeP	**Process**	R.10 Government needs tool that would facilitate the processing of the participation data	R.11 Government should analyse citizens' discussions	R.12 Government should harness new technologies for better and faster citizen input processing
	Acknowledge	R.7 Government needs tools to provide feedback to citizen's contributions	R.8 Government needs to be responsive to citizens' ideas (recognize valuable contributions and provide constructive feedback)	R.9 Government should seek new ways of rewarding citizens for their contributions
	Stimulate	R.4 Government needs tools for dissemination and reaching wide audience to stimulate and sustain e-Participation	R.5 Government should give recognition to citizens contributing significantly to the discussions	R.6 Government should explore new ways for citizen-engagement
	Request Participation	R.1 Government needs a platform to invite people to participate and discuss issues	R.2 Government should request participation on topics drawn from citizens expectations	R.3 Government should explore new ways of e-Participation dissemination

The two axes of the table represent consequentially first, the key aspects of e-Participation (divided by GLeP and CLeP means of e-Participation) and the corresponding dynamic capabilities essential to be implemented by the government. Consequentially, requirements IDs (R.XX) are ordered

progressively from the most basic government-led e-Participation requirements, through to citizen-driven e-Participation and citizen-empowerment as the highest level of e-Participation.

6.4.2 State of The Art Coverage

In this section, we present the state of the art coverage of the Social Software Infrastructure requirements. We use the requirements scoped in **Table 5** as a grid to align the relevant e-Participation processes and technologies. The specific mapping of the state-of-the-art onto our analytical grid presented in this section has been based on the reviewed e-Participation literature including in particular (Charalabidis et al., 2010; Gowda & Gupta, 2010; Ann Macintosh, 2007; Ann Macintosh et al., 2009a; Panopoulou et al., 2010; Sabo et al., 2008; Sæbø et al., 2011; Sæbø, Rose, & Nyvang, 2009; Sanford & Rose, 2007; Scherer, Neuroth, Schefbeck, & Wimmer, 2009; Scherer & Wimmer, 2010; S. Smith & Commission, 2008; Susha & Grönlund, 2012; Taylor-smith & Lindner, 2009), as well as exploring in detail recent e-Participation projects as elaborated upon briefly in the Related Work section. In particular, our mapping has been based on the information extracted from the sources mentioned and combined in a common knowledge space. In **Table 6**, we present the state of the art coverage of the identified requirements. We apply colour coding for the gap representation: white colour is reserved for the areas which are well covered; we distinguish two shades of gray to indicate visually the partial coverage (light gray) or no coverage (dark gray) of particular areas. From the emerging grid we can observe that the weakest areas of e-Participation appear to be referring to Listening and Shaping along with the Empower aspect of the Citizen-led e-Participation approach. On the other hand, it can be noticed that although the government-led participation requirements are covered to some extent in the area of Participation Request and Acknowledgement, nevertheless

there is a significant gap in deliberation content Processing and citizen engagement - Stimulation.

Table 6 e-Participation State of the Art Coverage

Aspects of e-Participation		Dynamic Capabilities		
		Adaptive	**Absorptive**	**Innovative**
	Empower	Lack of tools to enable citizens to influence policy making directly (Greg Power, Karl Wilding, 2007)(Kamal, 2009)	Lack of an approach where citizens' suggestions would be reflected directly in the policy-making agenda (Bonsón et al., 2012)(Kamal, 2009)	Governments are reluctant to seek for new ways of involving citizens in policy making process. Slow e-Participation policy progress (Bonsón et al., 2012)
CLeP	**Process**	Lack of effective, dedicated tools available to facilitate the processing of the vast social media political deliberation data, mostly manual processing or simple topic detection/trending – many general purpose business solutions available (Ann Macintosh et al., 2009a)	Lack of relevant processes to analyse the spontaneous citizens discussions and recognize valuable contributions. Limited recognition of citizen suggestions on social media (Ann Macintosh et al., 2009a)	Governments are reluctant to harness new technologies for better and faster citizen input processing (Bonsón et al., 2012)
	Shaping	Lack of validated, available, dedicated tools to interact effectively with citizens and shape discussion on social media platforms (information overload) – only	Governments do not analyse citizens' political deliberations on social media nor provide frequent feedback to guide the discussions	Governments are slow to harness new technologies enabling faster and more relevant interaction with citizens (Bonsón et al., 2012)

		general purpose business solutions available (Ann Macintosh, 2007; Ann Macintosh et al., 2009a)	(Chen, 2006)	
	Listening	Lack of validated, dedicated, available tools to monitor and analyse citizens' political deliberation on social media (information overload, low-quality contributions) – only general purpose business solutions available (Chen, 2006; Ann Macintosh et al., 2009a)	No official recognition or acknowledgement of social media-mined citizen opinions (Chen, 2006)	Little support for technology-agnostic (desktop, mobile) or ubiquitous e-Participation on multiple social media platforms (Bonsón et al., 2012; Charalabidis et al., 2010)
GLeP	**Process**	Mostly manual processing and reporting on deliberation data, lack of highly specialized tools (Chen, 2006; Panopoulou et al., 2010)	Insufficient interest from decision makers to analyse citizens' suggestions (Ann Macintosh et al., 2009a)(Scherer & Wimmer, 2010)	Governments are slow to apply new technologies for information processing and decision support. Manual processing is considered satisfactory (Rose & Sæbø, 2010)
	Acknowl-edge	Feedback through Web 2.0 Web portals, discussion forums, digital surveys, online chat and consultation forms (Chang, 2008; Panopoulou et al., 2010; Phang & Kankanhalli, 2008a; Rose & Sæbø, 2010)	Rare government participation and feedback on dedicated platforms (Ann Macintosh et al., 2009a; Scherer & Wimmer, 2010)	Government are reluctant to seek new ways of rewarding citizens for their contributions (Greg Power, Karl Wilding, 2007)(Susan B Rifkin & Kangere, 2001)

	Stimulate	Lack of highly customized, dedicated dissemination tools. Mostly manual advertising or widget technologies (Puzzled by Policy, WEGOV, PAGETS) on social media (Taylor-smith & Lindner, 2009)(Charalabidis et al., 2010)	Government does not give recognition to Citizens (Ann Macintosh et al., 2009a; Scherer & Wimmer, 2010)	Governments are reluctant to explore new ways for citizen engagement. Limited encouragement initiatives on social media (since government have limited control over this channels) (Greg Power, Karl Wilding, 2007) (Ashley et al., 2009)
	Request Participation	Dedicated e-Participation Platforms or manual social media advertising (Panopoulou et al., 2010)(Phang & Kankanhalli, 2008a)(Gowda & Gupta, 2010)	Governments usually rely on their own expertise and agenda in forming the e-Participation discussion topics with exception for loud general public topics (Coleman et al., 2001)	Limited, advertising on social media. Lack of significant innovative dissemination beyond the e-Participation platforms and governmental portals or mainstream media (Taylor-smith & Lindner, 2009)

The dominant e-Participation methodologies are directed from top-down, an approach where decision makers directly, or indirectly create new discussion topics, post them on dedicated e-Participation platforms and enable citizens to comment on particular issues (Chang, 2008; Ann Macintosh et al., 2009a). However, these approaches do not ensure at any stage that decision makers are going to engage in discussion with citizens. In fact, the experience shows that decision makers are very reluctant to engage in the e-Participation process (Ann Macintosh et al., 2009a; Scherer & Wimmer, 2010).

e-Participation platforms are mostly implemented in the form of standalone Web 2.0 digital forums (for all the e-Participation projects

reviewed), some of them with support for popular social media (Facebook or Twitter) publishing and post feed integration (in rare cases, two way content exchange is available) (Chang, 2008; Panopoulou et al., 2010; Phang & Kankanhalli, 2008a; Rose & Sæbø, 2010). Others offermore advanced solutions such as that presented by PADGETS (Charalabidis & Loukis, 2011) which performs an injection of special widgets into social media. These solutions do not address the issue of content volume, nor the quality of contributions (Agichtein, Castillo, Donato, Gionis, & Mishne, 2008), and this does not ensure sufficient innovation to support the dual e-Participation observed by Macintosh et al. (Ann Macintosh et al., 2009a). We are aware of attempts to leverage the potential of spontaneous discussions on social media, such as the innovative approach presented in the WEGOV project (Claes, Sizov, Angeletou, Taylor, & Wandhoefer, 2010). Nevertheless, the methodology tackles the importance of social media without deep consideration of the synergy between current government-led solutions and citizen-led participation. Moreover, the approach focuses mainly on technical aspects and challenges of e-Participation without consideration of the need for dynamic capabilities or reproduction and reshaping processes, making it insufficient to address the duality of e-Participation. Finally, we have identified a number of relevant, generic social media analytics tools available (discussed in the implementation part), but to our knowledge these tools have not been explicitly explored by governments for e-Participation purposes.

Table 7 SSI Technology Requirements

Aspects of e-Participation		Dynamic Capabilities		
		Adaptive	**Absorptive**	**Innovative**
	Empower	Collaborative **Policy-making Agenda Creation Tool**	Collaborative **Policy-making Agenda Tool (**explicit, citizen direct input inclusion support)	Collaborative **Policy-making Agenda Tool** (Monitoring Log, Feedback and Improvement support)
CLeP	**Process**	**Multi-source Knowledge Extraction and Management Tool** (Filtering, Clustering, Linking, Content Recommendatio n)	**Multi-source Knowledge Extraction and Management Tool (**political discussion detection and analysis support)	**Multi-source Knowledge Extraction and Management Tool (**Monitoring Log, Feedback and Improvement support)
	Shaping	**Discussion Control Tool (**topic tracking, user tracking, trends detection/predict -tion)	**Discussion Control Tool (**political discussion analysis and direct engagement support)	**Discussion Control Tool (**Monitoring Log, Feedback and Improvement support)
	Listening	**Discussion Exploration and Analytics Tool** (leverages **Multi-source Knowledge Extraction and Management Tool**)	**Discussion Exploration and Analytics Tool (**citizen opinion mining and tracking support)	**Discussion Exploration and Analytics Tool (**Monitoring Log, Feedback and Improvement support with assurance of new platforms discovery)

GLeP	**Process**	**Knowledge Extraction and Management Tool** – (can be realized as a subcomponent of CLEP Process)	**Knowledge Extraction and Management Tool** – (discussion analysis support)	**Knowledge Extraction and Management Tool (**Monitoring Log, Feedback and Improvement support)
	Acknowledge	**Mission Control Tool** (e-Participation promotion and feedback dissemination, targeted dissemination)	**Mission Control Tool** - (support for recognition of valuable contributions and constructive feedback delivery)	**Mission Control Tool –(**Monitoring Log, Feedback and Improvement support)
	Stimulate	**Discussion Control Tool (**topic tracking, user tracking, trends detection/predic-tion)	**Discussion Control Tool (**political discussion analysis and direct engagement support)	**Discussion Control Tool (**Monitoring Log, Feedback and Improvement support)
	Request Participation	**Mission Control Tool** (e-Participation promotion and feedback dissemination, targeted dissemination)	**Mission Control Tool – (**support for participation topics based on citizens' input)	**Mission Control Tool –** (Monitoring Log, Feedback and Improvement support)

6.5 Design

In this section, following our infrastructure construction workflow further, we conceptualize the essential SSI design components derived from the e-Participation design requirements. We align the defined building blocks to the determined SSI requirements matrix (Table 7)

Governments need technological tools to realize the essential absorptive requirements and innovate the e-Participation process. The components elicited in the table have been mapped to the Social Software Infrastructure design presented in Figure 16.

The presented comprehensive design has been constructed through a detailed analysis of the SSI requirements table. The names of the building components have been shortened for improved clarity of the model. We divided the design space into two areas: the information processing space, and the information mining and publishing space to clearly separate the knowledge retrieval functions from knowledge exploitation.

The Black and White components represent the tool containers while arrows represent the interfaces. The Citizen Interface is given a separate representation as it represents a set of ubiquitous interfaces available (both mobile and the web), offering mediated access to social media and dedicated e-Participation platforms.

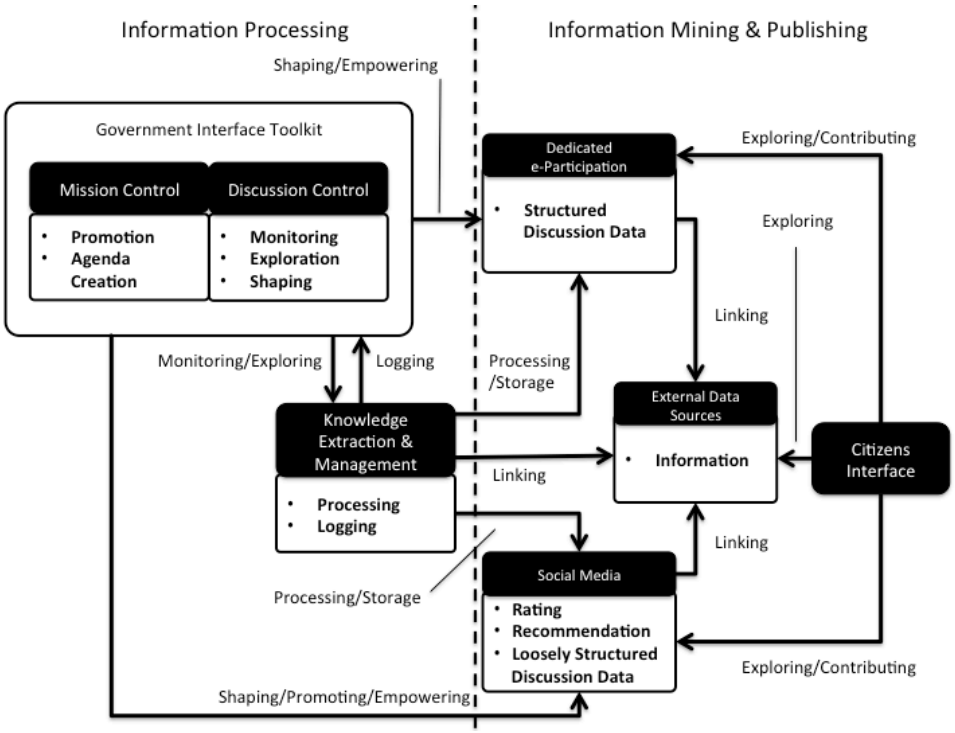

Figure 16: SSI - Design

We have grouped and aligned the proposed components according to the performed actions and their position in the dual e-Participation process. We incorporated the Policy-making Agenda Creation Tool under Mission Control Tool since the mission of the components is complementary to the Promotion by active citizen engagement derived from acknowledgement and recognition of citizens' contributions. Similarly, the Discussion Exploration and Analytics tools have been incorporated with Discussion Control (DC) as the tools deliver a subset of the key functions of the DC, therefore, can be implemented as a sub-component. The heart of the design is the data analytics component that we refer to as the Knowledge Extraction & Management (KEM). This component is primarily responsible for all e-Participation related data and metadata processing within SSI. The input data can be mined from social media and dedicated e-Participation platforms via standard APIs available, which can be considered in this case as a basic tool for structured information retrieval. Depending on the source, and input data structure, additional metadata can be retrieved for the analysis such as Ratings and Recommendation Links. The same APIs are used by the KEM to publish data on citizen-led and government-led platforms. Therefore, KEM implements the main gate for information gathered, processed and published. In principle, however, the component analyses the data, i.e., posts, user profiles, discussion topics, threads and performs continuous data quality improvement by filtering and linking related concepts as well as linking data from external sources such as other e-Participation systems, governmental portals or any other places holding valuable e-Participation information. The secondary function of the component is to create and maintain logs and service feedback for all the other infrastructure components and perform analysis on the log content. This way the Knowledge Extraction & Management component can contribute to better understanding of the processes and future system re-

shaping and reproduction through the application of relevant improvements. To visualize better the information circulation in the design, additionally, we present information flow model in Figure 18. In this model, we divide the space again by the e-Participation approach: GLeP and CLeP. The flow of information starts from citizens generating spontaneous, loosely structured deliberation content on multiple social media platforms, as well as on the dedicated e-Participation platform holding more structured data in the form of hierarchical forum data or argumentation tree data. The information is mined and processed by the Information Processing Component (IPC) encapsulating all the tools responsible for Discussion and Mission Control as well as KEM – which refers to the Information Processing part of SSI design. Governments explore the content leveraging the IPC and stimulate the participation by frequent feedback to active contributors and deliberation shaping by engaging in selected discussions. Finally, the decision makers incorporate the best, most constructive solution within an official collaborative policy-making agenda and provide it to citizens in the form of particular acknowledgement to citizens' work.

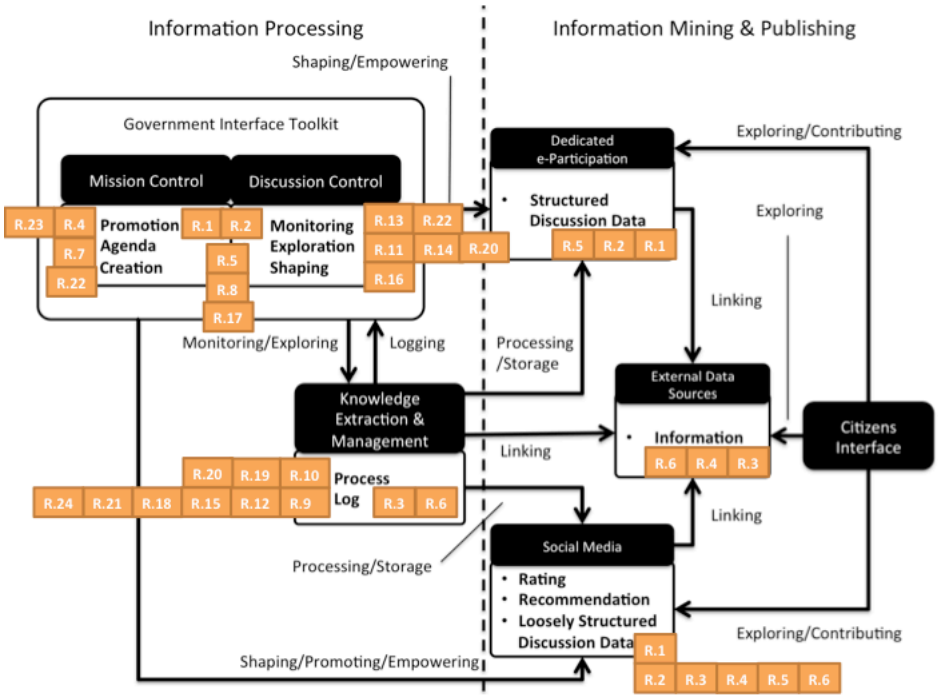

Figure 17: SSI Requirements Alignment

Both dedicated e-Participation platforms and social media channels work in synergy, by exchanging the deliberation data and combining the results. Given that the SSI design was generated from duality-based e-Participation requirements, the question of whether the model answers the requirements specified is satisfied, i.e. the model is "correct by design". Nevertheless, in Figure 17 we now show explicitly how the particular requirements correspond with the key SSI design components.

In the next section we present implementation suggestions that can realize the presented duality-based e-Participation approach.

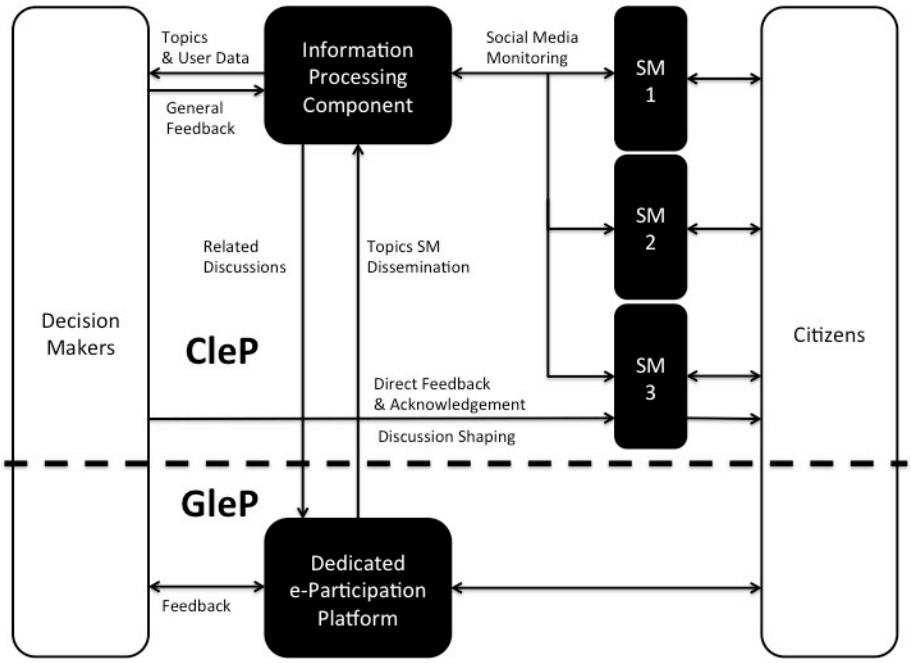

Figure 18: SSI Information Flow

6.6 Implementation

In this section, we discuss an example implementation for the Social Software Infrastructure design. We elaborate how SSI design components are supported by existing technologies and how the new tools can be leveraged to support uncovered areas and improve existing processes. The Mission Control and Discussion Control components, as we observed, are currently covered by mostly manually maintained, Web 2.0 forums and consultation tools (Rose & Sæbø, 2010). The government's request and stimulate participation through the dedicated e-Participation platforms themselves, through the government portals or through governmental social media accounts. This area can be significantly improved first, by applying targeted

participation advertising (such as the Facebook targeted Ads[17] mechanism or Promoted Tweets[18] on Twitter). Next, RDF[19]-based Linked Data[20] technologies should be used for more descriptive metadata and more effective information inference with detailed information on the origin and authorship of the contributions. In this way, decision makers can easily reach the most valuable contributions and reward particularly active citizens by relevant personal acknowledgement, thereby stimulating further participation. This can be ensured by referral to their specific account name (like a social media pseudonym or avatar) or by referring to their real name if provided. Information processing can be also significantly improved by applying automatic or semi-automatic content summarization tools such as Open Text Summarizer (OTS)[21], MEAD[22] or natural language processing tools such as NLTK[23] or Stanford Core NLP[24]. Citizen-led e-Participation requires analytical tools (Discussion Control and KEM) operating in the sphere of social media. Currently, there are a number of technological solutions available enabling effective, simultaneous processing of multiple social media channels such us SocialMention[25], HootSuite[26] or BuzzEquity[27]. Nevertheless, in the context of e-Participation, it is far more important not only to simply 'scan' the social

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[17] FACEBOOK ADS https://www.facebook.com/about/ads/ 10.07.13

[18] TWITTER ADS https://business.twitter.com/products/promoted-tweets-self-service 10.07.13

[19] RDF http://www.w3.org/RDF/ 10.07.13

[20] LINKED DATA http://www.w3.org/standards/semanticweb/data 10.07.13

[21] OTS http://libots.sourceforge.net/ 10.07.13

[22] MEAD http://www.summarization.com/mead/ 10.07.13

[23] NLTK http://nltk.org/ 10.07.13

[24] STANFORD CORE NLP http://nlp.stanford.edu/software/corenlp.shtml 10.07.13

[25] SOCIAL MENTION http://socialmention.com/ 10.07.13

[26] HOOTSUITE https://hootsuite.com/ 10.07.13

[27] BUZZEQUITY http://buzzequity.com/ 10.07.13

media scope, but also to engage directly with citizens and therefore, to shape the online discussions and engage deliberation (Mission Control). For this purpose, a number of tools are available such as Bottlenose[28], SproutSocial[29], UberVU[30], Visible[31], NetBase[32] or NUVI[33]. Moreover, again Linked Data technologies can help to structure the online discussions on multiple platforms and combine them into one knowledge base. Therefore, decision makers could engage directly with users, the authors of valuable contributions. The knowledge base should be hosted and made accessible to the public for exploration. This can be implemented through one of the data graph-based RDF store solutions such as Virtuoso[34], SESAME[35] or the popular Apache Jena TDB[36] (KEM). Here, SPARQL[37] endpoint technology should facilitate easy knowledge graph querying to ensure easy, standardized access to the data.

We emphasise on the fact that full Monitoring capability implementation demands more than common topic detection, trend prediction or direct messaging to contributors capabilities but in particular, it implies the need for a deep understanding of spontaneous citizens' political discussions and fast incorporation of the constructive suggestions into a policy-making agenda. This should be again supported by structuration offered by Linked Data

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[28] BOTTLENOSE http://bottlenose.com/ 10.07.13

[29] SPROU http://sproutsocial.com/ 10.07.13

[30] UBERVU http://www.ubervu.com/ 10.07.13

[31] VISIBLE http://www.visibletechnologies.com/ 10.07.13

[32] NETBASE http://www.netbase.com/ 10.07.13

[33] NUVI http://www.nuviapp.com/ 10.07.13

[34] VIRTUOSO http://virtuoso.openlinksw.com/rdf-quad-store/ 10.07.13

[35] SESAME http://www.aduna-software.com/technology/sesame 10.07.13

[36] JENA TDB http://jena.apache.org/documentation/tdb/ 10.07.13

[37] SPARQL http://www.w3.org/TR/rdf-sparql-query/ 10.07.13

technologies, specifically driven by dedicated ontologies such as the SIOC Ontology[38] enriched with its Argumentation extension, created for the particular context of deliberation combined with content summarization tools like OTS as an input. In particular, Linked Data technologies will ensure interoperability of the infrastructure, acting both as a structuration tool as well as the information exchange and storage medium (Heath & Bizer, 2011).

6.7 Case Study

EU Immigration e-Participation Initiative (Assessment of Practical Application)

The case study considered in this section refers to the European e-Participation project funded under FP7 framework – PuzzledByPolicy[39]. The project aims to reconnect citizens with politics and policymaking in the context of immigration in Europe. The multinational project gathering partners from Ireland, Greece, Slovenia, Italy, UK, Portugal, Netherlands, Spain and Hungary contributes to the increase of public awareness on many aspects of immigration and to deliver relevant, objective information in the presence of many confusing and politically biased opinions. The initiative leverages a Web 2.0 platform with digital discussion forum and a policy profiler tool helping citizens to identify their political stand. The communication with citizens is carried mainly on the platform and is supported by dissemination strategy realised through sharing of special Web Widget (embeddable on any website), and basic social media campaign, by sharing information on the project on popular social networking platforms (focused on Twitter). Part of the evaluation report of the project included

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[38] SIOC http://www.w3.org/Submission/sioc-spec/ 10.07.13

[39] PUZZLED BY POLICY http://www.puzzledbypolicy.eu 10.07.13

stakeholder-reported issues regarding the e-Participation experience. The issues referred mainly to information overload and difficult navigation through the content as well as the lack of interoperability with other, similar immigration forums and services while missing strong social media integration.

The SSI design covers most of the issues identified in the report. In particular, the large quantities of forum posts and threads can be effectively summarized by leveraging a KEM component with a text summarizer like OTS. In order to improve navigation and data interoperability, it is recommended to leverage Semantic Web for data representation stored in an RDF store. Finally, relevant social media Monitoring should be exploited to extend the content available with spontaneous contributions on social media.

In this use-case, we received permission from the project consortium to proceed with a basic showcase prototype implementation; therefore, we were able to assess practically the relevance of the application of SSI to the e-Participation initiative. The experimental, simplified prototype implementation has been developed as a lightweight extension of the PuzzledByPolicy portal, with the core execution components written mainly in JavaScript[40]. The implementation leverages JENA TDB RDF store as a backend for the discussion data stored in RDF graph. The RDF data is processed via the KEM pipeline including text summarizer – OTS and topic detection supported by OpenCalais[41] as well as relevant visualization tool - D3[42] to present data in the user-appealing form and enable effective navigation. Finally, the implemented SSI-based extension applied social media integration through

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[40] JAVASCRIPT http://www.ecma-international.org/publications/standards/Ecma-262.htm 10.07.13

[41] OPEN CALAIS http://www.opencalais.com/ 10.07.13

[42] D3J http://d3js.org/ 10.07.13

extraction and inclusion of posts from social media into the PuzzledByPolicy platform. The data obtained from social media is joined to the common discussion RDF knowledge graph and run through the same KEM pipeline.

From the first presentation to the stakeholders it has been apparent that the included improvements are of interest to decision-makers as well as the common users (citizens) who welcomed the SSI designed prototype with enthusiasm and while expressing positive feedback, they pointed out on specific benefits of easier information exploration and richer information derived from relevant data integration (social media). The tentative results showed satisfactory performance considering the content structuration and summarization (user verified). In our small evaluation (20 participants representing project stakeholders), users confirmed that the clustered synopsis of the large amounts of information within particular discussion threads reflects well the overall message and intention of the contributors, while the new navigation capabilities enabled fast exploration of many threads. Therefore in the case of the PuzzledByPolicy extension, the prototype SSI implementation generated significant interest and increased awareness of possible future improvements that could be applied to the currently running platform.

6.7.1 Discussion

Following our methodology stratified in four basic steps: S1) we have investigated the requirements for an e-Participation infrastructure to cover a comprehensive set of e-Participation aspects both for government-led and citizen-led initiatives; S2) we aligned e-Participation state-of-the-art to the structured list of requirements and we pointed out areas that lack particular methodological and technological support; S3) based on the requirements and gap analysis, we suggested specific technological requirements and

constructed Social Software Infrastructure Design; and S4) we validated it against the initial requirements.

In particular, with respect to the first and the second objective, our analysis indicated that e-Participation is still in its infancy, lacking relevant methods and tools in many areas. The key challenges identified refer to citizen discussion monitoring, citizen contribution acknowledgement, government expert feedback (discussion shaping) as well as the lack of explicit policy-making process integration and leaving citizens contributions beyond a government's agenda. Moreover, although there have been attempts to incorporate citizen-led discussions into the e-Participation process, the state of the art approach so far is very limited in this regard. e-Participation platforms embed micro-blogging feeds and posts from social media, without significant effort put into an actual understanding of how to undertake spontaneous political discussions (regardless of the tool that hosts the discussion) and how to make them valuable to decision-makers and then incorporate them into the policy-making process. Moreover, most of the solutions seem to adopt common off-the-shelf social software infrastructure without careful consideration of e-Participation principles or any particular support for e-Participation specific processes, being rather a single mode and single purpose public consultation tool.

In this context, considering the third objective, we identified the core components required to ensure sufficient tool coverage, and we supplied a Social Software Infrastructure design that implements the essential components identified. The key challenges associated with implementing the SSI components appear to oscillate mainly around structuring the information streams, textual data summarization and visualisation. In particular, social media streams exhibit a large amount of data of varying quality that require it to be filtered, structured, summarised and visualised in a way that will be understandable to the end users – citizens and decision makers. In this

context, state-of-the-art tools do not cover well the areas indicated. Most of the dedicated e-Participation solutions focus on the structured form of discussion (debate forums) without much attention given to the deliberation data analytics. The social media-enabled e-Participation platforms implement simple information extraction via dedicated APIs and basic analyses based on specific keywords or tags. To solve some of these issues, we suggested and aligned specific Semantic Web, Natural Language Processing and social media analytics tools that can be leveraged to build the dedicated SSI. Based on the infrastructure analysis (we aligned the requirements to the specific, corresponding infrastructure components), we argue that the infrastructure designed enables a comprehensive analysis of the duality of e-Participation. Nevertheless, we claim limited universality for the application of the infrastructure created. In particular, the infrastructure has been built on the analysis of contemporary, dedicated e-Participation platforms and the most popular citizen-controlled e-Participation spaces – Facebook and Twitter. Therefore, we claim moderate compatibility of the solution with new specific types of participation tools equipped with more sophisticated capabilities. Nevertheless, we claim a better-aligned approach is advancing the e-Participation state-of-the-art. In fact, we designed our infrastructure (especially the KEM component) to be agnostic with regard to communication tools leveraged as information input. Thus, the core model is flexible enough to benefit potentially from information exchange between digital channels that may gain significant popularity in the near future. Considering the implementation discussed, to ensure the compatibility with the diverse set of platforms (and also those yet to come), all the information inputs are translated and structured (using the state-of-the-art W3C data standard RDF) into a common, easy to operate and analyse knowledge graph. RDF represented data is ready to be published as Linked Data. Therefore, the SSI enables support for ubiquitous, Internet Of Things paradigm-based platforms

(like highly distributed mobile platforms and citizen-sensing-based tools). Therefore, the SSI design presented, though of relatively limited core purpose, is ready to be refined and improved in future by implementing relevant extensions.

In regard to the fourth objective of the work, the presented SSI design has been verified against identified infrastructure requirements. The solution covers both the GLeP and CLeP aspects of e-Participation including all the essential components related to e-Participation creation and dissemination, debate information mining, processing, exploring, promotion and dissemination as well as citizen empowerment, discussion stimulation, shaping and incorporation into policy-making. Moreover, the design supports constant e-Participation re-shaping and reproduction capabilities. The design-science-based approach applied, and solid theoretical background ensures a high validity of the presented infrastructure as a solution to study government-led – and citizen-led e-Participation mutual re-shaping processes. We have tentatively confirmed the practicality and usefulness of the infrastructure presented by prototype implementation and initial deployment of SSI for an existing EU immigration e-Participation platform (PuzzledByPolicy project). However, we cannot claim absolute validity of the solution until a fully-fledged implementation is deployed, followed by a large-scale evaluation. Though we cannot claim the absolute completeness of the presented infrastructure, our solution has been designed from the bottom-up and gradually around the goal of studying the duality of e-Participation, starting from the scientifically supported thesis and going towards the dedicated architecture. Therefore, we claim better alignment of our infrastructure to an e-Participation process' needs. We are not aware of any significant attempts at analysing the duality of e-Participation by employing a combination of social media analytics, Semantic Web and NLP. Moreover, we

have not found any approach that would try to apply a similar, scientifically rigorous infrastructure design process.

Due to the scope of this thesis, we do not elaborate on ethical and moral considerations, beyond citizens' motivations to participate. Future work demands a deeper investigation into the ethical aspects of e-Participation, whether in regard to political campaigns and intentional political propaganda or citizen privacy issues and seeding users' influence on social media.

6.8 Conclusion

Motivated by the need to provide the necessary step towards improving the e-Participation process, we have presented a Social Software Infrastructure design to study the phenomenon of Duality of e-Participation. The infrastructure brings a specific bridge solution to the hitherto dichotomy of government-led and citizen-led e-Participation discussions. In particular, the results from our work contribute towards a better understanding of e-Participation socio-technical needs, by delivering a comprehensive, structured e-Participation requirements list and state-of-the-art coverage map. We indicated the key gaps and suggested possible solutions represented as infrastructure components. Finally, we presented the comprehensive integrated infrastructure. The suggested infrastructure implementation shows an immediate opportunity for consolidating the structured knowledge extraction, text analytics tools and visualisation, and straightforward application to the democratic context for e-Participation. We have demonstrated briefly the usefulness and practicality of the SSI with the experimental, simplified, prototype implementation and deployment for an EU Immigration e-Participation initiative. We elaborated upon the key challenges with implementing the SSI for an existing e-Participation. Some of the main technological challenges relate to the precision and relevance of automatic text summarisation and insufficient metadata about the content and about the authors of the contributions analysed. These factors have a

significant impact on the overall quality of the output results delivered by the solution.

6.9 Ontology for e-Participation

In this section, we present an ontology for e-Participation, an important element to support the full SSI design implementation. In particular, the ontology plays the key part in structuring the e-Participation information I one knowledge graph essential for the Knowledge Extraction & Management Component of the SSI Infrastructure.

6.9.1 Related work

Now we elaborate shortly on existing, most prominent ontologies for e-Participation that our conceptualization builds upon.

Ontology for an e-Participation Virtual Resource Centre (Wimmer, 2007): The main purpose of the model is to structure the e-Participation research for a virtual centre of excellence as an entry point for the domain knowledge for various stakeholders. The model identifies key e-Participation constructs along four dimensions of e-Participation- 1) Participation areas (constructs: Information Provision, Community building/Collaborative Environments, Consultation, Campaigning, Electioneering, Deliberation, Discourse, Mediation, Spatial planning, Polling, Voting; 2) Stakeholders involved (constructs: NGO's, Government/Executive, Elected representatives, Industry, Political parties, Politicians, Citizen groups), 3) Levels of engagement (constructs: e-Informing, e-Consulting, e-Involving, e-Collaborating, e-Empowering) and 4) Stages in Policymaking (constructs: Agenda setting, Policy formulation, Decision making, Policy implementation, Policy evaluation) leaving e-Participation Tools and Technologies as additional, important branch linked to Participation areas, though beyond the e-Participation research and application dimensions space. The conceptualization is formally modelled as an executable ontology to be used by e-Participation community to ease finding and sharing e-Participation knowledge resources. The work was

carried as part of IST DEMO-net[43] project an EC-funded Network of Excellence within the 6th Framework Program of the EC to investigate the e-Participation field of research and practice.

A Domain Model for e-Participation (Kalampokis, Tambouris, & Tarabanis, 2008): The model was built to identify and describe the most significant aspects that characterize e-Participation domain. The design distinguishes three general e-Participation sub-domains along with basic constructs and sub-constructs: 1) Participation Process (constructs: Scope, Area (11 sub-construct Areas), Technique, Activity, Level (5 levels), Outcome, Policy Cycle Stage (5 stages), 2) ICT Tool (constructs: Channel (3 channels), Technology (5 technologies), Tool Category (8 Categories) 3) Stakeholder (Elected representative, Government Executive, Political Party, NGO/CSO, Citizen Group, Academia Research, Industry) / Role (constructs: Owner/initiator, Moderator/Facilitator, Decision Makers, Input Provider). The conceptualisation has been modelled using UML (Universal Modelling Language) standard as a way to structure the e-Participation domain for easy domain exploration and to be leveraged to develop reference ontology for e-Participation information systems. The work was carried as part of IST DEMO-net project.

Evaluation Framework for e-Participation (Ann Macintosh, 2008b): The purpose of the model is to demonstrate a range of perspectives and methods to evaluate e-Participation initiatives. The framework distinguishes three perspectives on e-Participation evaluation along with relevant criteria: 1) Democratic criteria (Representation, Engagement, Transparency, Conflict and consensus, Political equality, Community control), 2) Project criteria (Engaging with a wider audience, Obtaining better informed opinions, Enabling more in-

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[43] http://www.uni-koblenz-landau.de/campus-koblenz/fb4/iwvi/agvinf/projects/demo-net

depth consultation, Cost effective analysis of contributions, Providing feedback to citizens), 3) Socio-technical criteria (Social acceptability – *Trust and security, Relevance and legitimacy*, Usefulness – *Accessibility, Appeal ,Content clarity, Responsiveness,* Usability – *Navigation and organisation, Efficiency and flexibility, Error recovery*). The framework also distinguishes targeted actors (Citizens, Councillors, Engagement Managers, Project managers and technologists, Moderators and administrators). The final set of constructs includes a range of six methods for e-Participation evaluation. The work stemmed from the UK Local e-Democracy National Project.

All three models discussed to present a significant level of granularity when describing e-Participation aspects, dimensions and constructs. The first two models (spawned from the same project – DEMO-net) have been designed to structure the e-Participation domain for knowledge exploration purposes. The purpose of the last model has been explicitly the evaluation of e-Participation initiatives nevertheless all the models share some basic constructs. The most common component appears to be the set of Stakeholders with a relatively similar range of actors identified. The DEMO-net models focus on e-Participation Areas, Levels of Engagement/Participation and specific types of Tools and Technologies leveraged by particular e-Participation initiatives while the last model puts emphasis on three basic views of e-Participation (process, project, platform) and key aspects and requirements to be satisfied for each of the views. The domain view offered by the DEMO-net models brings sufficiently detailed, yet superficial view on e-Participation initiatives with very specific lists of categories, types and methods (appears quite 'static' and bound to example projects studied – less flexible) while the UK Local e-Democracy National Project spawned model delivers more fundamental constructs dealing with basic concepts of social systems, user engagement and user technology acceptance requirements. The wider perspective in the last model considering fundamental purpose of e-Participation makes the

model more universal, hence providing constructs more applicable to future e-Participation developments.

In the following sections, we describe our attempt to combine the aspects of e-Participation considered by the models discussed and to augment these aspects with concepts related to social-system principles and properties characteristic to citizen-discussions on Web 2.0 platforms and spontaneous citizen participation on social media. In particular, by delivering the model we tackle e-Participation aspects related to evaluation and e-Participation initiative maintenance (user-engagement and sustainability) as well as aspects important from the perspective of e-Participation knowledge storage, interoperability and knowledge exploration.

6.9.2 e-Participation Conceptualization

This section is intended to deliver a comprehensive e-Participation conceptualization with particular acknowledgement of Duality of e-Participation.

We elicit a set of relevant e-Participation Competency Questions as a view on e-Participation base methods from the Integrated Model for e-Participation and then align the questions to the twelve distinct themes of the Integrative Framework for e-Participation. The questions are generated by following the information flow along with the stakeholders and tools (or instruments of execution) involved at each stage of e-Participation process in the Integrated Model while considering the concepts attached to a particular aspect of e-Participation covered by the model in the context of dimension considered, drawn upon the Integrative Framework.

We present the aligned question-space in Table 8. For better clarity, every competency question has been given a unique identifier indicating the particular e-Participation view axis assignment. Here CQPL prefix refers to competency questions on sociotechnical platform view; CQPR refers to the project view, and CQDP indicates questions related to the e-Participation

democratic view. Accordingly to the generic view axis, the questions referring to e-Participation entities are represented by the Formism row. The Mechanism row defines the questions on the e-Participation key functions and operations. Organicism refers to e-Participation goals and properties while Contextualism considers matters of adoption, usability and evaluation.

We elicit the key e-Participation concepts from the questions defined. The concepts are defined based on subject, entity or action that the particular question refers to. The concepts are combined with contextual information to relate it to other elicited concepts accordingly to the type of the 5W1H question: What, When Who, Why, Where and How. The concepts are divided by the e-Participation view and grouped in three separate tables structured as followed: the first position represents the unique identifier of the question, next the corresponding concept name followed by the relations between the elicited concepts.

Consequentially Table 9 lists the concepts derived from the questions with CQPL prefix, Table 10 from CQPR and finally Table 11 lists concepts elicited from CQDP type of questions. These conceptualizations are essential for the Modelling stage of the Thalheim's workflow-based e-Participation model design. The concepts and relations (the base for methods) are presented in the way they can be directly mapped to the classes and properties of the end model. The concepts presented are possibly generic to ensure clean and universal e-Participation model design.

Table 8: e-Participation Competency Questions

Generic View	e-Participation Perspectives		
	Sociotechnical system view	Project view	Democratic view
Formism	CQPL.1 Who are the e-Participation actors? CQPL.2 What are the e-Participation tools? CQPL.3 What are the deliberation topics? CQPL.4 What level of user-engagement is supported? CQPL.5 What type of communication is supported?	CQPR.1 Who are the e-Participation project stakeholders? CQPR.2 What are the e-Participation channels leveraged? CQPR.3 What is the e-Participation project area? CQPR.4 What is the e-Participation project funding?	CQDP.1, Who are the e-Participation democratic process stakeholders? CQDP.2 What are the e-Participation democratic process instruments? CQDP.3 What is the e-Participation problem domain? CQDP.4 What level of stakeholder engagement is supported?
Mechanism	CQPL.6 How is the e-Participation platform maintained? CQPL.7 How discussions are monitored? CQPL.8 How discussions are summarized? CQPL.9 How is user-feedback supported? CQPL.10 How user-engagement is supported?	CQPR.5 How the e-Participation project is disseminated? CQPR.6 How the e-Participation project stakeholders are motivated? CQPR.7 How the e-Participation project is managed?	CQDP.5 How is the e-Participation democratic process started? CQDP.6 How is the e-Participation democratic process executed? CQDP.7 How is the e-Participation democratic process incorporated with the policy-making process?

Organicism	CQPL.11 What is the aim of the deliberation? CQPL.12 What is the start time of the deliberation? CQPL.13 What is the end time of the deliberation? CQPL.14 What is the result of deliberation?	CQPR.8 How much the e-Participation project costs? CQPR.9 When the e-Participation project starts? CQPR.10 When the e-Participation project ends? CQPR.11 What is the aim of the e-Participation project? CQPR.12 What are the e-Participation project results?	CQDP.8 Why the e-Participation democratic process is performed? CQDP.9 When the e-Participation democratic process starts? CQDP.10 When the e-Participation democratic process finishes? CQDP.11 What is the e-Participation democratic process result?
Contextualism	CQPL.15 How the e-Participation platform technical performance is evaluated? CQPL.16 What is the technical performance of the e-Participation platform? CQPL.17 What is the level of Adoption of e-Participation platform? CQPL.18 What is the user-ranking of the e-Participation platform?	CQPR.13 How the e-Participation project is evaluated? CQPR.14 What is the performance of the e-Participation project?	CQDP.12 How the e-Participation democratic process is evaluated? CQDP.13 What is the performance of the e-Participation democratic process?

Table 9: e-Participation Platform Conceptualization

Question ID	Concepts	Relation
CQPL1	Actor	**e-Participation has Platform**
		Platform has Actor Actor is a subclass of Person Actor has subclass Citizen Actor subclass DecisionMaker Actor has subclass Facilitator
CQPL2	Tool	Platform has Tool
CQPL3	Topic	Platform has Topic Topic has Discussion
CQPL4	User-Engagement Level	Platform implements UserEngagementLevel
CQPL5	Communication Type	Platform implements CommunicationType
CQPL6	Platform Maintenance	Platform has Maintanance
CQPL7	Discussion Monitoring	Platform has DiscussionMonitoring
CQPL8	Discussion Summary	Platform has DiscussionSummary
CQPL9	User-Feedback	Platform has UserFeedback UserFeedback has UserFeedback Direction
CQPL10	User-Engagement	Tool supports UserEgnagementLevel
CQPL11	Deliberation Aim	Discussion has Goal
CQPL12	Deliberation Start Time	Discussion has StartTime
CQPL13	Deliberation End Time	Discussion has EndTime
CQPL14	Deliberation Result	Discussion has Result
CQPL15	Technical Performance Measure	Platform has TechnicalPefromanceMeasure
CQPL16	Technical Performance	TechnicalPefromanceMeasurehas TechnicalPerformanceValue
CQPL17	Adoption	Platform has AdoptionValue
CQPL18	Ranking	Platform has UserRanking

Table 10: e-Participation Project Conceptualization

Question ID	Concepts	Relation
CQPR.1	Stakeholder	**e-Participation has Project**
		Project has Stakeholder Stakeholder is a subclass of Person Stakeholder is a subclass of Organisation
CQPR.2	e-Participation Channels	Project has e-ParticipationChannel
CQPR.3	Domain	Project has Domain
CQPR.4	Funding	Project has Funding
CQPR.5	Dissemination	Project has Dissemination
CQPR.6	Stakeholder Motivation Strategy	Project has StakeholderMotivationStrategy
CQPR.7	Management	Project has Management
CQPR.8	Cost	Project has Cost
CQPR.9	Start Time	Project has StartTime
CQPR.10	End Time	Project has EndTime
CQPR.11	Goal	Project has Goal
CQPR.12	Result	Project has Result
CQPR.13	Evaluation Measure	Project has EvaluationMeasure
CQPR.14	Performance	Project has PerformanceValue

Table 11: e-Participation Democratic Process Conceptualization

Question ID	Concepts	Relation
CQDP.1	Stakeholder	**e-Participation has Democratic Process**
		Process has Stakeholder Stakeholder is a subclass of Person Stakeholder is a subclass of Organisation
CQDP.2	Instrument	Process has Instrument
CQDP.3	Domain	Process has Domain
CQDP.4	User (Citizen) Engagement Level	Process enables UserEngagementLevel
CQDP.5	Trigger	ProcesTrigger
CQDP.6	Execution Procedure	Process has ExecutionProcedure
CQDP.7	Policy Making Handle	Platform has PolicyMakingHandle
CQDP.8	Goal	Process has Goal
CQDP.9	Start Time	Process has Start Time
CQDP.10	End Time	Process has End Time
CQDP.11	Result	Process has Result
CQDP.12	Evaluation Measure	Process has EvaluationMeasure
CQDP.13	Performance	Process has PerformanceValue

6.9.3 e-Participation Model

In this section, we present the e-Participation model based on the concepts and relations defined previously. First, we present a generic conceptual model for e-Participation (Figure 19) showing the overall scope and dependencies of the intended end-model. The three major e-Participation views are represented with most descriptive concepts – at this tentative presentation level, we omit concepts that complement the particular e-Participation view. It is clear from the elicited concepts that the e-Participation Platform is dependent on Project, and the Project is linked closely to a Democratic Process. The semantically overlapping concepts include Stakeholder, Result, Domain and, more importantly, Constraints like Time, Performance or Goal. However, the understanding of these concepts from a particular view's perspective should be distinct. To highlight the strong implicit dependencies,

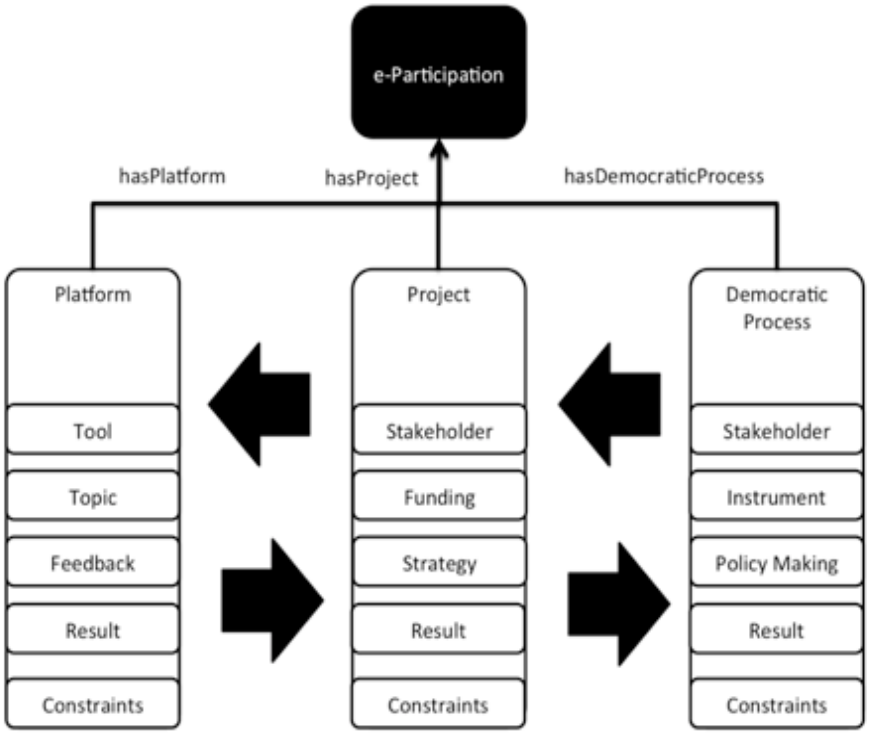

Figure 19: e-Participation Generic Conceptual Model

it is important to mention for example that the process domain influences the project focus area, and that generates particular demand on the platform's main topic. On the other hand, the platform's results and performance influence the project outcomes, which finally shape the democratic process' overall performance. This, however, does not imply that in the model the concepts should create a hierarchy, as each one of them should be considered separately in the scope of the particular view.

The relations between the three different views of e-Participation are explained in more detail. Following the construction workflow on Figure 20 we present the full e-Participation model.

6.9.4 e-Participation Model Mission

The main purpose of the model is to provide e-Participation creators, managers and champions with a relevant tool for structured representation of key e-Participation aspects. This will help e-Participation initiatives to be described in a more comprehensive way, and therefore, will contribute directly to better e-Participation knowledge representation, exchange and integration. Moreover, the unified, standardised, machine-readable representation (RDF) will enable more coherent evaluation and comparison of e-Participation initiatives', facilitating transparency through a rich, Open Data-enabled format. The model supports coherent e-Participation design with an emphasis on the key aspects essential for citizen-to-decision maker dialogue sustainability and iterative e-Participation re-production. In particular, the model explicitly addresses the Duality of e-Participation through the acknowledgement of Web 2.0 discussions in an e-Participation process, and in particular spontaneous citizen contributions on social media, therefore significantly supporting citizen engagement as a key factor for an e-Participation initiative's success. Here it is important to emphasise that the model has been intentionally designed as a core model in order to ensure

possibly universal applicability with details left to be specified on a case-by-case basis – with refined, sub-domain-specific ontologies (such as a deliberation ontology).

As discussed, the state-of-the-art literature does not provide an e-Participation Ontology that would comprehensively cover e-Participation as an initiative contingent on three main e-Participation aspects, with an explicit link to the Duality of e-Participation.

6.9.5 e-Participation Model Architecture and Implementation

In order to achieve maximum clarity of expression and a sufficiently explicit model representation, enabling more comprehensive visualisation, we incorporated the modelling stage and realisation stage of Thalheim's construction workflow (the conceptual model and the implementation of the model) in a single step. We represented the model using RDF[44] – Resource Description Framework and OWL[45] – The Web Ontology Language. For the particular model implementation, we leveraged the NEOLOGISM[46] and PROTÉGÉ[47] tools for the ontology's design, description and visualization. NEOLOGISM is a *vocabulary publishing platform for the Web of Data, with a focus on ease of use and compatibility with Linked Data principles*. Neologism is free and Open Source. As NEOLOGISM supports RDF/OWL and enables direct ontology publishing, a full ontology representation can be provided as required.

PROTÉGÉ is a well-established platform described as *a free, open-source ontology editor and framework for building intelligent systems.* In this

[44] http://www.w3.org/RDF/

[45] http://www.w3.org/2001/sw/wiki/OWL

[46] http://neologism.deri.ie/

[47] http://protege.stanford.edu/

particular work, we used NEOLOGISM to build our ontology, and then we leveraged PROTÉGÉ tool to validate the model and to populate it with relevant data.

The RDF technology used for the e-Participation model implementation has been explicitly designed and developed to supply interoperability for information on the Web (Decker, Harmelen, & Broekstra, n.d.). Connected, structured data on the Web is called Linked Data (Bizer & Berlin, n.d.). RDF information can be stored in the form of an interconnected knowledge graph in an RDF store (such as JENA TDB[48] or SESAME[49]), which provides a standardised way of querying the graph – via a SPARQL endpoint utilising the SPARQL[50] query language. The RDF semantic interoperability layer leverages ontologies as a means of describing the information. The RDF-represented concepts defined follow best practice for ontology creation and explicitly express the key aspects of the e-Participation domain. e-Participation Model includes dependencies and deployment constraints.

In this section, we discuss how the relations between the three distinct views of e-Participation: Platform, Project and Process are reflected in the model design. We use capitalised concept names to link the considered content with the model presented in Figure 20. The full description of the vocabulary can be found under the following link[51].

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[48] http://jena.apache.org/documentation/tdb/

[49] http://www.openrdf.org/

[50] http://www.w3.org/TR/rdf-sparql-query/

[51] http://porwol.me/neologism/epart

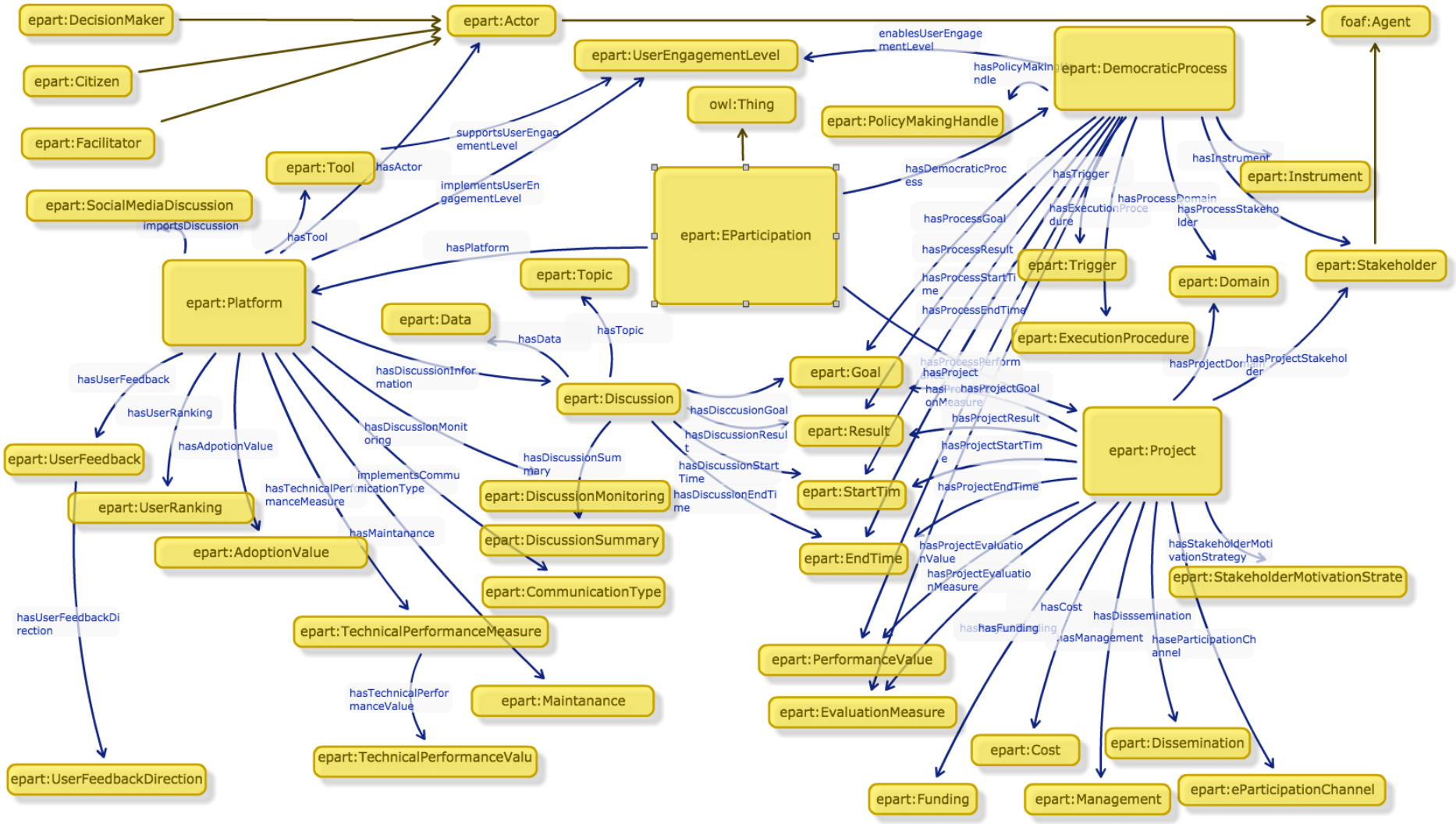

Figure 20: e-Participation Ontology

First, ideally, the Democratic Process should initiate and drive the e-Participation initiative. It is the Democratic Process that should define the mission (Policy Making Handle), key actors responsible (Stakeholder - can be a person as well as an organisation), execution (Execution Procedure), basic Instruments of execution (such as relevant legislation, resources and tools), the scope (Domain), the expected outcomes (Result) and the initiation of e-Participation (Trigger). The basic process definition and formal declaration are used to spawn a relevant e-Participation project within particular constraints of Cost/Funding and timeframe (Start Time, End Time), executed by a particular consortium of Stakeholders, with an expectation of a comprehensive outcome (Result). The project demands sufficient marketing and Dissemination efforts within defined constraints in order to maximise the project impact. Here the expected impact has to be defined as an Evaluation Measure and aligned to the defined Goal, and will be finally expressed through Performance Value. The project uses the resources assigned to realise e-Participation, facilitated by the project Management team. The common realisation of the e-Participation Channel is a particular e-Participation platform where the Maintenance is entrusted to the project team who designs the platform or delegates the platform development to external service providers. The platform is built with available Tools enabling fast and easy citizen-to-citizen and citizen-to-decision maker (depending on the User Feedback Direction) communication (User Feedback), in the form of structured Discussion on a particular Topic within the initiative Domain. Here the Communication Type provided can be synchronous (for instance, a live chat) or asynchronous (forum, blog, etc.). The Discussion information is stored as Data and can be shared between different e-Participation platforms and systems. Therefore, the Data component is particularly important, considering the interoperability of e-Participation platform and discussion information

processing. This component can be further refined with relevant discussion data models, accordingly to the specific context and Domain of specific e-Participation initiative. Additionally, the discussion on the platform is extended with deliberation on social media through relevant spontaneous citizen-discussion Monitoring services that filters, analyses, shortlists and links related bottom-up citizen-generated content. The Monitoring process can leverage multiple Tools to incorporate various social media channels into the platform, and enable backlinks to original social media content as well as facilitating communication with the content creators – social media users. This extended information can be also incorporated and linked to local discussion Data on the platform. Platform performance is evaluated according to Technical Performance Measures defined and expressed by a particular Technical Performance Value. Finally, in order to deal with information overload and facilitate information exploration, the Discussion is summarised (Discussion Summary) either in an automatic or manual manner and published in the form of a platform discussion Result along with citizen-satisfaction expressed in a User Ranking. The Result, together with User Ranking and the Technical Performance Value, are important elements of the e-Participation project outcomes' reporting, and finally the overall e-Participation Democratic Process performance is decided as a part of the e-Participation re-production effort.

6.9.6 e-Participation Model Use-Cases

In this section, we will discuss and example use of the presented ontology for two different real world e-Participation initiative cases. The first case study involves a transportation e-Participation forum established in 2011 as a volunteer initiative in Galway, Republic of Ireland leveraged in the former part of this dissertation to explain the usefulness of the Integrated model for e-Participation.

In this part of the document, we show how we used our e-Participation Ontology to represent information about the Transportation e-Participation initiative as means of e-Participation model evaluation.

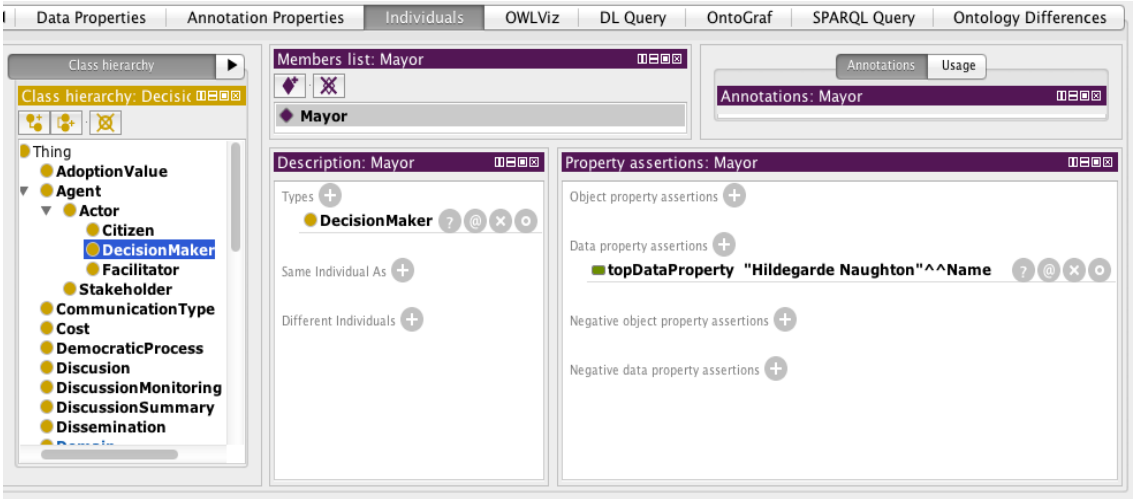

Figure 21: Platform Actor Example

In order to generate the dataset discussed, we uploaded our ontology into the PROTÉGÉ tool and leveraged the provided interface to populate the ontology with relevant data accordingly to the schema defined. Considering the limited space of this document, we restrict ourselves to show just a few representative examples of the ontology-based description creation. Nevertheless, it is possible to request a full RDF description of the initiatives presented.

Figure 21 presents the PROTÉGÉ interface with the ontology tree expanded on the left-hand side along with a particular individual – here the platform Actor – expanded. The particular Actor is of type Decision Maker, and it is the Mayor of the City where the transportation deliberation is taking place. On the right-hand side, we can see the name of the mayor specified. This simple example enables us to conclude that the platform has an active user, here a decision maker, the mayor of the city, whose participation is of great value when considering citizen engagement on the platform.

Figure 22 presents a view on the Dissemination individuals set, which includes Online, Press and Radio dissemination. As can be learnt from the figure, the Press Dissemination efforts for the transportation e-Participation initiative involved local newspapers such as the Galway Advertiser and the Galway Independent. This is an important fact considering that these two positions

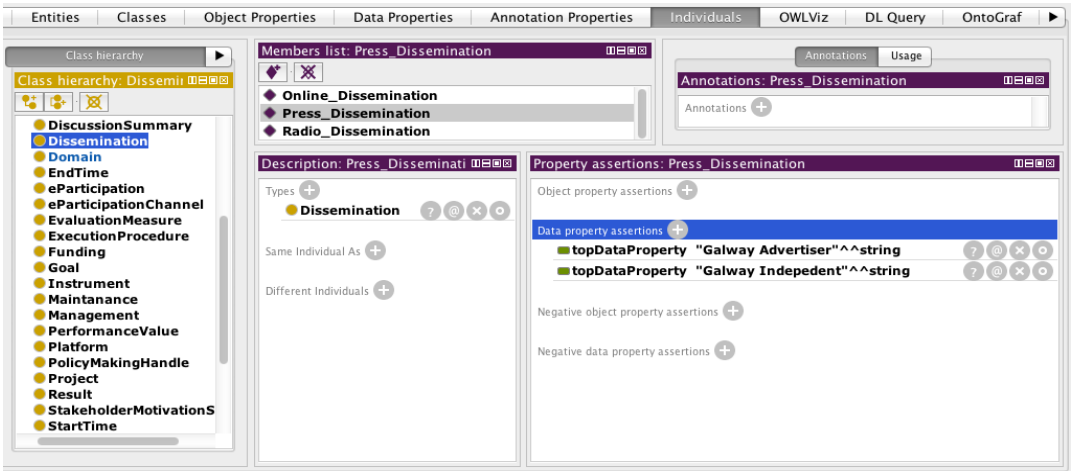

Figure 22: Project Dissemination Example

are the most popular press in Galway City area and are important communication channels reaching most of the local population.

The examples presented highlight the base structure of the use of the e-Participation Ontology for the transportation initiative in Galway. What can be observed immediately, is that the data recorded has a very rigid, typed format, which can be machine processed directly, and this facilitates easy data exploration and management. For instance, the individual's data on Press Dissemination in Figure 22 is represented as a topDataProperty of type string. This indicates explicitly (to the human or machine exploring the data) the way in which the particular content can be extracted and processed. In a similar manner to the example presented, we have described the whole transportation e-Participation initiative accordingly to the defined ontology. The result has the form of a publishable RDF file that can be uploaded to any website or can be stored as queryable knowledgebase and exposed on the

Web via a SPARQL endpoint for full information transparency in line with the Open Data principle. The e-Participation initiative description, represented and stored in this particular, highly standardised form, can be easily published, shared and compared against similar initiatives, therefore, contributes towards more effective analysis, and hence facilitating the elicitation of success factors and generation of detailed recommendations and best practice guidelines.

In order to verify the universality of the model we used our ontology to describe another e-Participation initiative (this time at European level), funded under the FP7 EU framework – PuzzledByPolicy. The project aims to reconnect citizens with politics and policymaking in the context of immigration in Europe. The multinational project has gathered partners from Ireland, Greece, Slovenia, Italy, UK, Portugal, the Netherlands, Spain and Hungary, and contributes to an increase of public awareness on many aspects of immigration by delivering relevant, objective information in the presence of many confusing and politically biased opinions. The platform provided by the project in the form of a digital discussion forum has been expanded upon with a dedicated profiler tool to help citizens to identify their political standing.

We elaborate very briefly how we described the Puzzled by Policy content. In Figure 23 we show how the Goals of the initiative are specified, in particular, the goal to improve EU immigration policies has been highlighted with details recorded as a data property (again, on request we can provide an RDF file with a complete, example initiative description).

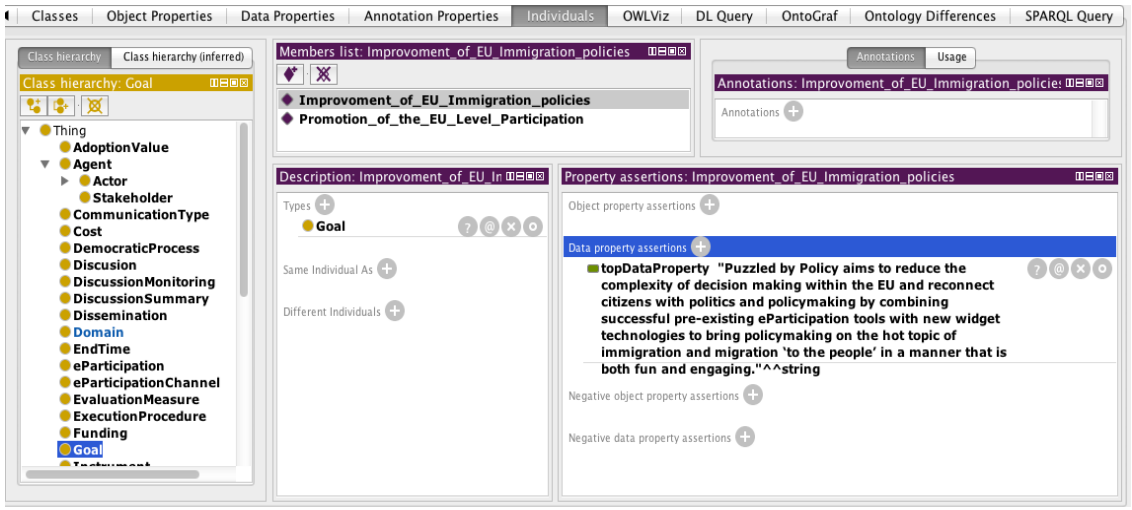

Figure 23: Project Goal Example

From the application of the ontology to the context of this initiative we have learned that particular pilots differ significantly in the engagement of local authorities. For instance, the Spanish and Greek pilots deployment showed far more politicians were engaged than for the Portuguese and Hungarian sites. Moreover, dissemination in the Spanish pilot, in particular, has been supported by mainstream media promotion through local newspapers that has most probably led to an overall better engagement on this pilot platform, in comparison to sister deployments in other European countries.

Therefore even within this particular project, by applying our ontology for describing local pilot initiatives, we were able to ensure more transparency and make basic comparisons that may lead to significant improvements and better stakeholder engagement for e-Participation initiatives in the future.

6.9.7 Validation

In this section, we validate the implementation of the e-Participation ontology. Our first argument for the validity of our ontological model with respect to the competency questions follows from the rigorous Design Science Research Framework-based approach and from the fact that the ontology was generated explicitly from competency questions through Thalheim's construction workflow-based process. Therefore, the question of whether the ontology answers the competency questions is trivially satisfied,

i.e. the ontology is "correct by design". Second, regarding the internal consistency of the e-Participation ontology (expressed in RDF/OWL), we verified that the ontology is coherent or without contradiction by using the PROTÉGÉ Pellet Reasoner tool. Third, the utility's practical relevance and the universal character of the ontology was established through its use in encoding the two case studies of Transportation and EU immigration e-Participation initiatives where were of very different natures and scale. Finally, the reliability of all the mappings has been ensured through "inter-observer" and "test-retest" reliability tests (Bernard, 2000).

6.9.8 Discussion

The e-Participation Ontology presented in this section addresses the need for a comprehensive ontology for next generation e-Participation, extended with direct support for the duality of e-Participation by the integration of classic e-Participation channels with social media. Thus, by explicit incorporation of spontaneous citizen discussions, the model ensures better sustainability and potentially increased citizen engagement. Moreover, the conceptualisation facilitates better alignment of citizen contributions and e-Participation re-production by addressing the need for constant monitoring, contribution acknowledgement and fast feedback.

The resulting ontology covers three distinct views of e-Participation: Platform, Project and Democratic Process. In principle, the model enables better and more rigid e-Participation initiatives' descriptions and therefore supports more coherent comparisons and evaluations as well as facilitating the access, re-use and interoperability of information about the initiatives, as a contribution towards better next generation e-Participation solutions.

The semantic model construction process is rigorous and grounded in a solid theoretical framework ensuring the validity of the presented model. The e-Participation ontology design has been validated both internally and externally, and we have shown the utility of the solution. Like any domain

theory, we cannot claim absolute completeness of the presented semantic model, although our ontology has been designed gradually around the Integrated Model for e-Participation with particular acknowledgement of the issue of Duality of e-Participation, starting from the scientifically supported model and going towards dedicated implementation. Therefore, we claim better alignment of our model to dual e-Participation needs.

As indicated in the related work section, this document acknowledges other significant contributions in structuring and conceptualising e-Participation, in particular works by (Kalampokis et al., 2008; Tambouris, Liotas, & Tarabanis, 2007b; Wimmer, 2007). It expands the set of constructs presented in that research with key aspects related to bottom-up e-Participation reflected by duality of e-Participation, as well as structuring the existing concepts in a more coherent form, hence contributing to structuration of the e-Participation domain.

6.9.9 Conclusions

Motivated by the need to provide the necessary steps towards conceptualising three major aspects of e-Participation in a single model, enriched with a new perspective on the use of social media for e-Participation, we have presented a universal, core e-Participation Ontology for next generation e-Participation initiatives. We have demonstrated theoretically and practically the usefulness of the model. Results from our work show immediate opportunities for consolidating and sharing knowledge about e-Participation initiatives that are important for building new, more effective solutions. Therefore, this work contributes towards expanding and structuring e-Participation domain knowledge

6.10 e-Participation Deliberation Ontology

In this section, we elaborate on the e-Participation Deliberation Ontology developed to complement the e-Participation Ontology and to support our SSI implementation. This ontology enables discussion data interoperability, and therefore, contributes towards effective social data processing by the Knowledge Extraction & Management component. Also, the ontology as an important technical artifact supports the discussion control component by delivering a tool for rich social data description. In the next section, we elaborate on the specific deliberation conceptualisation, and in the sections that follow that we describe the deliberation model and finally the implementation of the executable ontology for e-Participation deliberation.

6.10.1 Approach

This section describes how we conceptualise political deliberation in the context of the citizen-led participation.

Conceptual Framework

Our conceptual framework is comprised of three core elements: 1) Pepper's World Hypotheses defining generic views for a deliberation domain ontological space analysis, 2) Argumentation in Deliberation Theory and 3) our Integrated Model for e-Participation.

While it is common to analyse the conceptual space of a domain by answering common journalistic questions (5W1H) (Yates & Orlikowski, 2002) as a template for generating domain-specific aspects, we intend to use a more fine-grained framework derived from Pepper's World Hypotheses (Pepper, 1957). Our choice is premised on the fact that the Pepper's views are metaphorically richer compared with the journalistic questions (Lombrozo, 2006), as well that the fact that they can be mapped to the 5W1H journalistic questions and Aristotle's four causes. Moreover, there is evidence of the suitability of applying Pepper's hypotheses for structuring and analysing socio-

technical systems (Marca & McGowan, 1993). Pepper identified four different adequate views of the world: Mechanism, Formism, Organicism and Contextualism (Hayes et al., 1988) (Marca & McGowan, 1993) which in the context of e-Participation deliberation, enable the specification of: deliberation goals to be realised through some staged models (Organicism); description of different entities involved in realising a specified deliberation goals (Formism); the different functions, processes and tools required to produce the desired e-Deliberation outputs or outcomes (Mechanism); indication and evaluation of the experience of actors and observers of a deliberation process (Contextualism).

We use the framework to create a theoretical grid (Figure 24) for competency questions that we derive further from the Integrated Model for e-

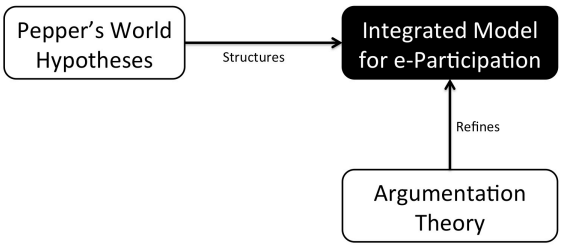

Figure 24: The Theoretical Framework Alignment

Participation, with the deliberation part refined by Argumentation Theory. In 2009, Macintosh (Ann Macintosh et al., 2009a) identified the Duality of e-Participation as one of the key research gaps in e-Participation. The Integrated Model for e-Participation (IMeP) addresses e-Participation duality, and is grounded in Structuration Theory and Dynamic Capabilities Theory. IMeP leverages two approaches to e-Participation: classic, Government-led e-Participation and the new, Citizen-led e-Participation. The two channels are exploited simultaneously to support the dynamic distribution of allocative and authoritative resources between citizens and decision makers in the context of decision or policy making. Citizens given appropriate resources will exercise

their agency to participate in social system re-production. The legitimacy and significance of citizens' contributions to policy making and political deliberation are strengthened directly by a government's acknowledgement, consideration and subsequent (partial) adoption. We have identified the following types of essential capabilities for realising such an integrated e-Participation framework: 1) adaptive capabilities including dynamic resources (re-)distribution and acquisition, rules re-production and reformation processes; 2) absorptive capabilities including a continuous deliberation monitoring process, a deliberation shaping process, and citizen information services; and 3) innovative capabilities including a flexible monitoring process and ubiquitous e-Participation. These capabilities ensure continuous reflexive dialogue and interactions among citizens and between citizens and decision makers respectively, characterizing the dual-nature e-Participation process.

The OECD (OECD, 2004) put forward active participation through deliberation as one of the core e-Participation challenges, while considering argumentation and engagement as key aspects of deliberation. Argumentation theory is grounded in informal reasoning and aims at developing ways of analysing everyday conversation. According to the theory, argument is an attempt to present evidence for a conclusion supported by particular premises (propositions or claims). Argumentative discussion, ideally of low persuasion should not assume particular deliberation results, but the conclusions should rather evolve organically from a constructive discussion where participants convince others to their views (Groarke, 2014). According to Schneider (Schneider, Groza, & Passant, 2011), the arguments need to be identified, resolved, represented and stored, queried and presented to the user. For this Schneider recalls fourteen of the most prominent reference models as a basis for an argumentation representation and exploration framework. We list the models that we consider most relevant to political discussion requirements:

- **Toulmin** – model for legal, scientific and informal conversation arguments. All the claims supported by evidence or rules (warrants which can have a backing) can be qualified regarding certainty or rebutted.
- **IBIS** - Issue-Based Information Systems centres around issues that may have the form of a question. IBIS distinguishes three separate groups: participants in the discussion, experts and decision-makers.
- **Walton's Critical Questions** – defines a set of critical questions aligned with the particular role addressing the points where the argument scheme may break down. For example, some questions defined can be: How credible is E as an expert source? Is E reliable?
- **Speech Act Theory** – a base for many argumentation conversations. Distinguishes five categories of speech acts: assertives (assumption), directives (order), commissives (vows), expressives (sentiment) and declaratives (enact what is said).

Methodology

A major goal of this work is to develop a comprehensive e-Participation Deliberation Model and a corresponding formal ontology. Our approach followed the three-staged Thalheim's construction workflow (Thalheim, 2011) (relevance stage, modeling stage, realisation stage) as a best practice for the model design and implementation process.

In particular, the questions for our enquiry include:

R1. What are the key aspects of political deliberations on e-Participation platforms?

R2. What are the key Competency Questions for a political deliberation conceptualisation or ontology?

R3. How can we ensure the completeness of the Competency Questions?

R4. What concepts can be elicited from the e-Participation Competency Questions?

R5. How can the concepts be consolidated in a comprehensive deliberation model?

R6. How can the model be leveraged for e-Participation deliberation cases?

Answering these questions is based on the following steps:

1. *Knowledge Acquisition:* The Argumentation Theory and the Integrated Model for e-Participation provide a rich source of information on the application domain, essential for the relevance stage of the construction workflow. We followed the key model properties and we aligned them in competency questions according to the four views defined by the Pepper's World Hypotheses.
2. *Deliberation Concepts Elicitation:* Mapping the competency questions to specific political deliberation aspects entails determining which of the four generic views are addressed by the questions. The unique subjects and objects were selected as base concepts. Relations between concepts were defined based on the common knowledge.
3. *Concept to Model Alignment* – After eliciting base concepts and defining the relations, we align the concept to the existing deliberation models.
4. *Ontology Creation* – After aligning base concepts, we use an available tool (NEOLOGISM (Chris Bizer, Richard Cyganiak, 2007)) to graphically represent the concepts and relations in the form of a graph, while re-using matching concepts by importing (referencing) existing ontologies. Finally, we discuss the utility of the model using the case study of an existing e-participation initiative.

We argue for the reliability of our mapping based on the results of "*inter-observer"* and *"test-retest"* reliability testing (Bernard, 2000).

6.10.2 Deliberation conceptualization

This section develops a comprehensive deliberation domain conceptualisation which supports the Duality of e-Participation. We elicit a set of relevant political deliberation competency questions from the Argumentation Theory-based models and the Integrated Model for e-Participation (Figure 15) and then align the questions with the four generic views derived from Pepper's World Hypotheses. For the clarity of the elaboration, we only present a subset of the competency questions in Table 12.

Table 12: Deliberation Competency Questions

Generic Views	Questions
Formism	CQ.3 Who are the deliberation actors? CQ.6 What are the deliberation claims? CQ.8 What are the topic arguments?
Mechanism	CQ.11 How is deliberation monitored? CQ.12 How is deliberation summarized? CQ.19 How qualified are the actors? (credibility)
Organicism	CQ.20 What is the aim of the deliberation? CQ.23 What is the result of deliberation?
Contextualism	CQ.23 What are the deliberation performance measures?

Having identified the key competency questions we elicit the core deliberation concepts presented in Table 13.

Table 13: Competency Questions To Concepts Mapping

Question ID	Concepts	Relations
CQ.5	Topic	Deliberation includes Topic
CQ.6	Claim	Topic has Claim
CQ.7	Keyword	Claim has Keyword
CQ.8	Argument	Claim has Argument
CQ.9	Conclusion	Topic has Conclusion

We list a few example concepts along with corresponding competency questions and relations between concepts. These conceptualisations are essential for the deliberation model design, based on Thalheim's workflow. The concepts and relations are presented in a way that can be directly mapped to the classes and properties of existing ontologies.

6.10.3 Deliberation model

In this section, we show the design and the implementation of the deliberation model, based on the concepts and relations defined. First, we present a conceptual model for deliberation (Figure 25) highlighting the

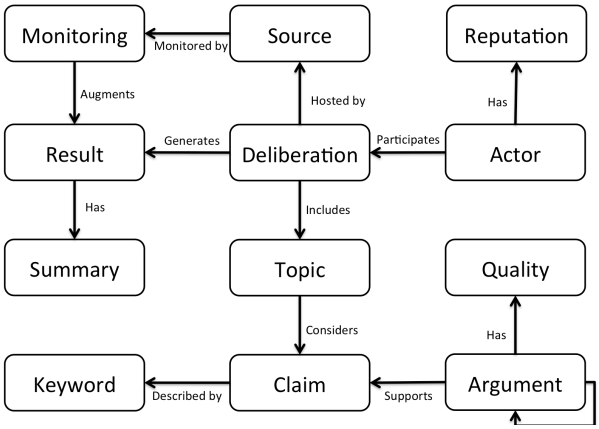

Figure 25: Deliberation Conceptual Model

overall scope and dependencies of the implemented end model. The generic view is presented with the most descriptive concepts only, for easier understanding of the model. It is clear from the elicited concepts that the central point for discussion on e-Participation platforms (or spontaneous political discussions on social media) referred to in the model, and hosted by a Source, is Deliberation. By *Deliberation,* we mean an argumentative discussion where every *Post*, belonging to a particular *Topic*, is considered as having a *Claim* described by particular *Keywords* and should be supported by relevant evidence in the form of an *Argument*. Every *Argument* supplied by an *Actor* of a particular *Reputation* has a particular *Quality* measure (like relevance) assigned to it and can be backed up or rebutted to by other arguments. The *Result* of a *Deliberation* should be summarised to address the

information overload issue and facilitate an easy discussion exploration experience. The discussion Summary is augmented by extra information coming from a Monitoring system, mining and linking related information from external sources (such as other e-Participation platforms and social media) to ensure deliberation re-production and sustainability.

6.10.4 Deliberation Model Mission

The main purpose of the model is to provide e-Participation platform designers and managers with a relevant tool for structured and standardised representation of deliberation data and implicitly to support a better e-Participation experience for deliberation stakeholders. It is expected that more comprehensive data descriptions will contribute directly to better interoperability, easier data exchange and integration of information from various deliberation sources such as current e-Participation platforms as well as social media. Moreover, the unified, standardised, machine-readable representation will enable more coherent deliberation evaluation and comparison. The model supports a coherent deliberation process design with emphasis on the key aspects essential for sustaining citizen-to-decision maker dialog. In particular, the model covers the Duality of e-Participation through the seamless incorporation of spontaneous citizen contributions on social media, and therefore significantly supports citizen engagement as the key factor for an e-Participation initiative's success. To our knowledge, no explicit deliberation ontology exists which comprehensively addresses the Duality of e-Participation. Here we acknowledge the work by Wimmer (Wimmer, 2007) which provides an ontology for e-Participation research structuration, and work by Belak (Vaclav Belak, 2010) whose ontology tackles deliberation as part of e-Participation, but focuses on the political aspects of deliberation with emphasis on a particular case related to elections and political agendas.

6.10.5 Deliberation Model Architecture and Implementation

Our goal is to implement the deliberation model in a formal ontology language such as RDF[52] (Resource Description Framework) and OWL[53] (Web Ontology Language). In line with best practices in ontology development, we attempt to re-use and extend existing and well-established ontologies to support our deliberation model. Thus, we identified key ontologies and aligned them to the deliberation conceptualisation. Among prominent discussion and argumentation ontologies identified by Schneider are: IBIS-RDF (Interoperability in Business Information Systems – Resource Description Framework) (Bouzeghoub, Elbyed, Int, & Fourier, 2006), SALT (Semantically Annotated LaTeX for Scientific Publications) (Groza, Handschuh, & Knud, 2007), DILIGENT (Tempich, Pinto, Sure, & Staab, 2005) (Distributed, Loosely-controlled and evolvInG Engineering processes of oNTologies), the Change Ontology (ChAO) (Noy, Chugh, Liu, & Musen, n.d.), SIOC Argumentation (Semantically-Interlinked Online Communities) (Lange, Boj, Groza, Breslin, & Handschuh, 2008) and SWAN-SIOC (Semantic Web Applications in Neuromedicine) (Passant, Ciccarese, Breslin, & Clark, n.d.). However, only the SIOC Argumentation module (drawing from IBIS and DILIGENT) offers sufficiently generic, domain-independent, yet significant coverage for e-Participation deliberation needs. The base SIOC[54] ontology provides the core concepts and properties to describe discussion information on the Web. The ontology complemented by the Argumentation Module enables comprehensive argumentative discussion coverage for the general discussion case. Therefore, we focus in particular on the SIOC ontology with its

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[52] http://www.w3.org/RDF/

[53] http://www.w3.org/2001/sw/wiki/OWL

[54] http://rdfs.org/sioc/spec/

Argumentation module as the basis and augment it with e-Participation domain-specific concepts.

Table 14: Deliberation ontology alignment (selected examples)

Concept	Ontology	Representing Concept
Deliberation	SIOC	Forum
Source	SIOC	Site
Claim	SIOC_ARG	Statement
Argument	SIOC_ARG	Argument
Conclusion	SIOC_ARG	Position

In Table 14, we present the elicited concepts aligned to SIOC and SIOC_ARG (SIOC Argumentation module) where a conceptual match occurs. The remaining concepts make the conceptual space for our deliberation ontology (DELIB). We do not list all the mappings nor describe in detail the concepts and relations defined by SIOC Argumentation ontology but they can be found at the online repository[55]. The final mapping has enabled us to construct the e-Participation Deliberation Ontology DELIB) (Figure 26) based on web ontology best practice. To ensure clarity of presentation we focus only on DELIB specific concepts, leaving out the concepts and relations covered by the base ontologies. Nevertheless, the full ontology representation is available at

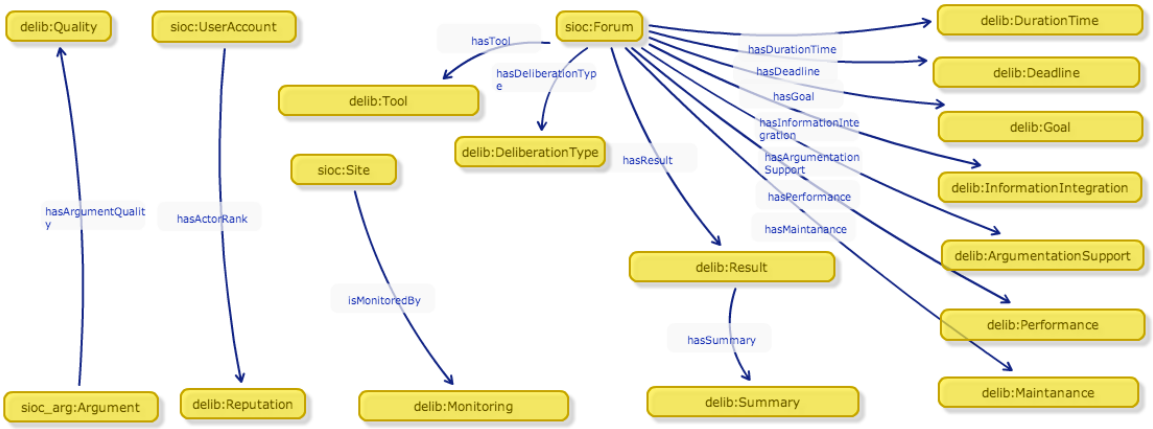

Figure 26: DELIB Ontology (without SIOC concepts)

the online repository[56].

6.10.6 e-Participation Deliberation Model Use-Case

In order to illustrate how the DELIB model can be applied, we employed the ontology created to structure and to describe real discussion data from a transportation e-Participation initiative in an Irish city. Since the data mined from the dedicated Web 2.0 forum does not contain an argumentative discussion structure, the descriptions had to be generated semi-automatically with the manual categorisation of claims and arguments. The ultimate use of the ontology assumes automatic content analysis and structuration accordingly to the DELIB ontology.

6.10.7 Validation

In this section, we validate the implementation of the e-Participation Deliberation ontology. Our first argument for the validity of our ontological model with respect to the competency questions follows from the ontology construction process. As before, given that the ontology was generated from competency questions (through Thalheim's construction workflow), the question of whether the ontology answers the competency questions is trivially satisfied, i.e. the ontology is "correct by design". Second, regarding the internal consistency of the DELIB ontology (expressed in RDF/OWL), we verified using the PROTÉGÉ Pellet Reasoner tool that the ontology is coherent and without contradiction. Third, the utility and practical relevance of the ontology was established through its use in encoding the deliberation information for the case study of a transportation e-Participation initiative.

The DELIB ontology presented in this section addresses the need for a rigorous conceptual model and formal ontology to describe e-Participation deliberation data. The semantic model construction process is rigorous and grounded in a solid theoretical framework, ensuring the validity of the

[56] http://porwol.me/neologism

presented model as a solution for coherent e-participation deliberation conceptualisation and as a tool for relevant, expressive and interoperable deliberation data representation. The rich conceptualisation supports the argumentative nature of e-participation deliberation; the Duality of e-Participation; seamless integration of external social media content; and better alignment of discussion re-production which altogether gives better guarantees towards sustainable deliberation and increased citizen engagement. In principle, the model enables better and more fine-grained deliberation content descriptions, more coherent information linking as well as facilitating the access, re-use and interoperability of the discussion information. The DELIB ontology design has been validated, and we have shown the utility of the solution. We cannot claim the absolute completeness of the presented semantic model, although our ontology has been designed gradually around the Argumentation Theory and Integrated Model for e-Participation starting from the well-established models going towards dedicated implementation; therefore, we claim better support of our model for dual e-Participation needs. As indicated before, we acknowledge the work by Wimmer (Wimmer, 2007) and Belak (Vaclav Belak, 2010), nevertheless we refer to the significantly different purpose of these ontologies in comparison to DELIB and we are not aware of any significant attempts at addressing the conceptualisation of e-Participation deliberation with support for the Duality of e-Participation.

6.10.8 Conclusion

Motivated by the need to provide the necessary steps towards conceptualising e-Participation duality-enabled deliberation, we have presented a Deliberation Ontology for e-Participation. Results from our work show immediate opportunities for consolidating and sharing data from deliberative discourses available on both dedicated e-Participation platforms and social media.

7 Analysis

In this section, we present the analysis of the research work presented in this thesis, materialised in Social Software Infrastructure Design as an instrument to study the "duality of e-Participation" as well as the means to harness the phenomenon of this duality. In particular, we present results from a set of semi-structured interviews with politicians and decision makers. These interviews provide important insights into the nature of duality of e-Participation. Moreover, the interviews deliver an overview of the performance of current e-Participation methods and tools and supply relevant feedback on key challenges. Finally, the respondents inform the perceived effectiveness analysis of the technological solutions proposed.

7.1 The Analytical Model

The model for the analysis has been built upon the theoretical framework developed in this dissertation. Specifically, we elicit key aspects of e-Participation tackled by the research questions and aligned them to corresponding elements of the Integrated Model for e-Participation, which is a theoretical base for the SSI design. This is presented in Figure 27. We map the elements onto the e-Participation space based on the contextual relation of the elements with specific processes in the e-Participation cycle. The nature of the duality of e-Participation can be investigated by analysing the state-of-the-art e-Participation initiatives and the complementary, independent, spontaneous political discussions on social media. The corresponding aspects of e-Participation deal mostly with the current model of decision making: 1) how the decisions are being made, 2) how decision-making process incorporates citizens input, 3) how the background

information and expertise essential for decision-making is currently acquired, and 4) the role of the classic e-Participation platforms in this process. Moreover, the scope of the consideration involves current efforts in including citizen's input and ideas appearing on social media. Regarding the question, how to harness the duality of e-Participation, we discuss: 1) the existence of political discussions on social media, 2) the quality and representativeness of citizens' contributions on social media vs. the volume of the information on social media, 3) the presence of experts and expert opinion on social media, and 4) how do the social media compare with the traditional e-Participation platforms, including common aspects, advantages and disadvantages. Finally, the technological support for social-media-based e-Participation comes in various forms of social media analytical tools and information integration tools propositions. This includes specific solutions for content filtering, summarisation and explanation (visualisation, textual explanations). It also includes specific targeted dissemination and targeted engagement types of tools.

The next step in our analysis is the specific mapping of the key aspects addressed by the e-Participation model onto an e-Participation ontological space created for the e-Participation domain analysis. Figure 28 shows explicitly how the specific aspects correspond to required adaptive, absorptive and innovative capabilities respectively. In particular, the aspects related to the nature of the "duality o e-Participation" describe the adaptive capabilities required by the governments; the means of harnessing the duality falls into absorptive capabilities category and technology corresponds with innovative capabilities.

Finally, in Figure 29 we align specific, fine-grained concepts to relevant aspects of e-Participation. This particular alignment provides theoretical base for constructing initial analytical model for analysis of the interview results.

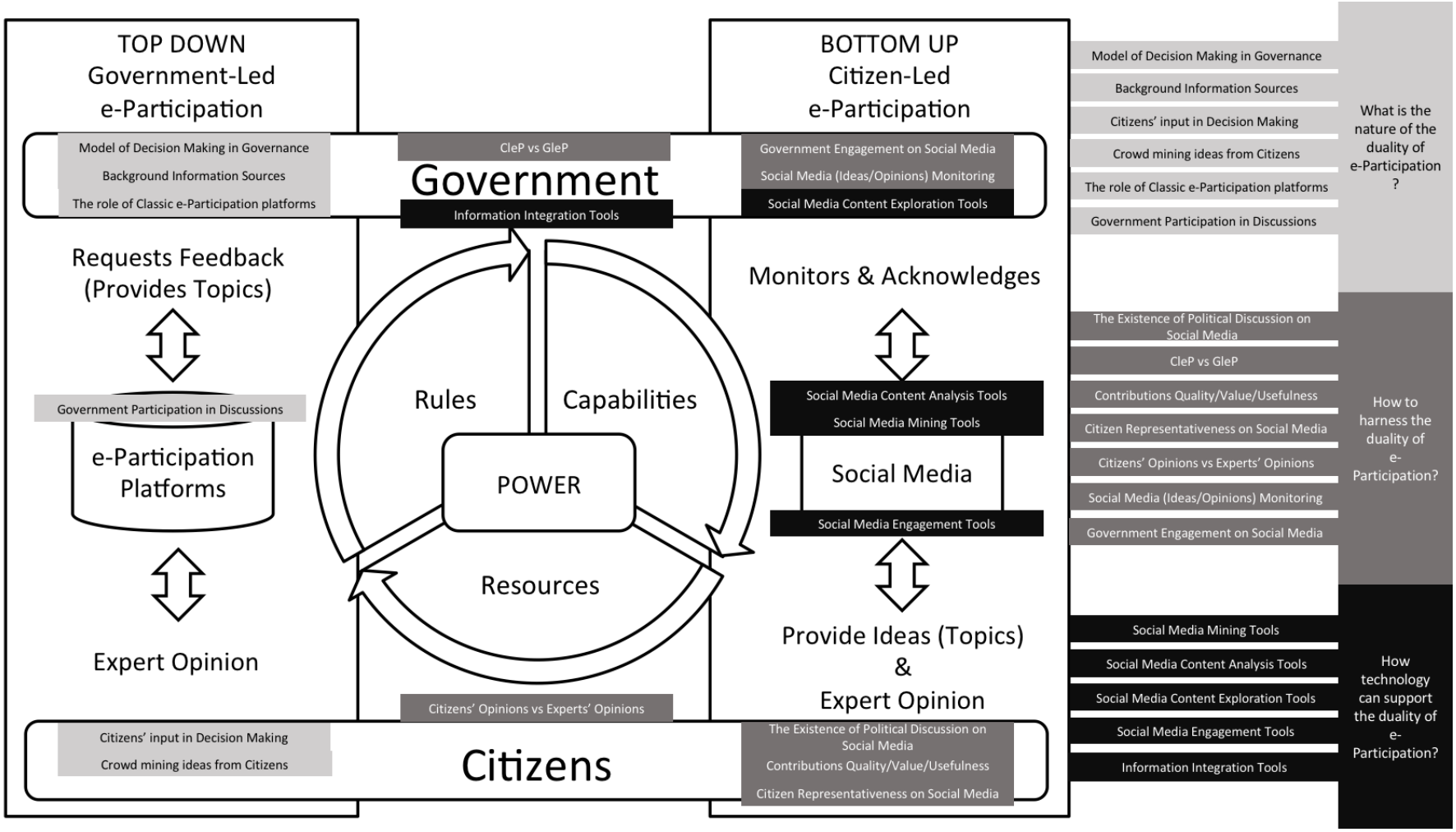

Figure 27: Research Questions Alignment to the e-Participation model

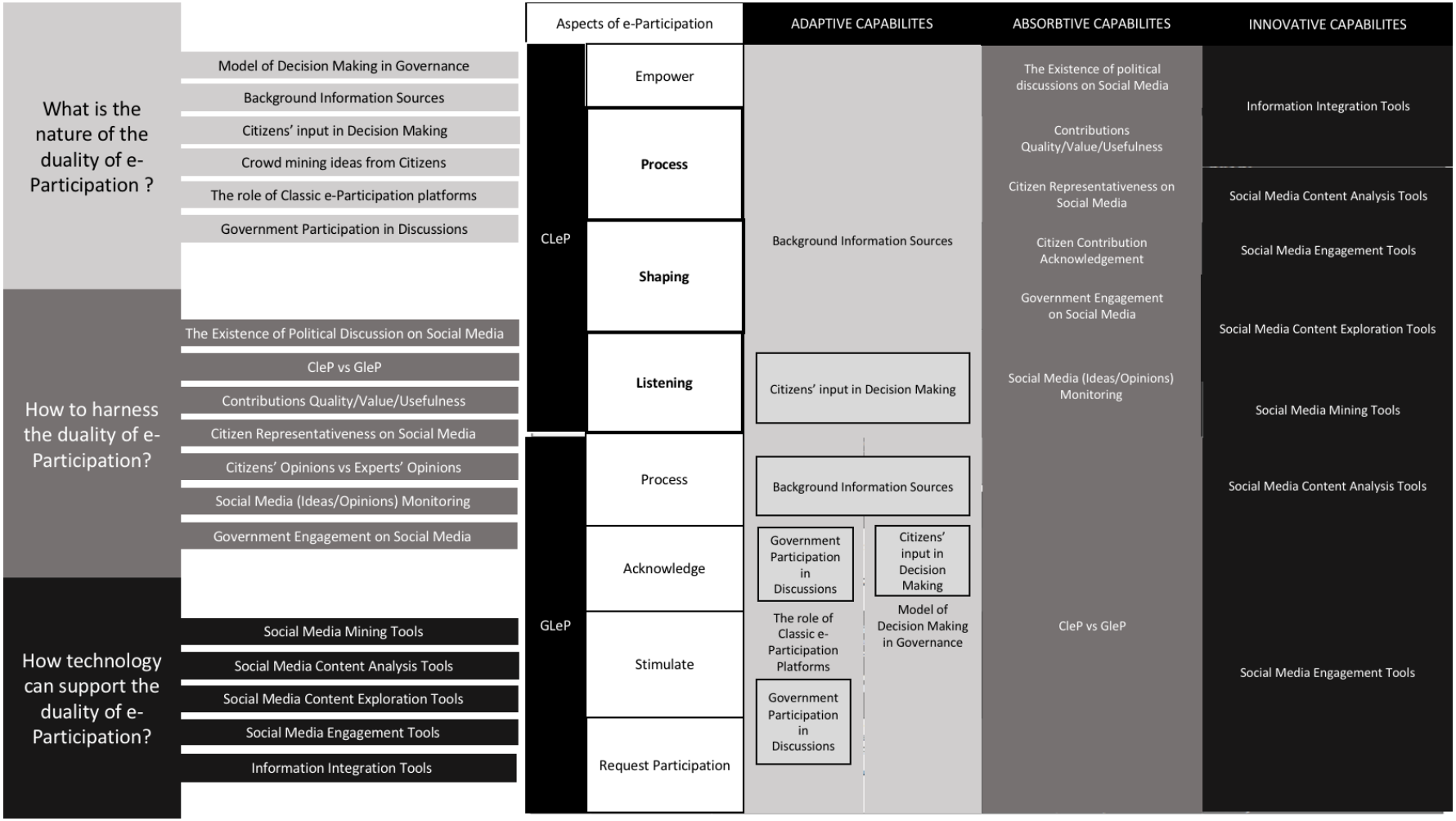

Figure 28: Analytical Model Alignment

What is the nature of the duality of e-Participation ?	Model of Decision Making in Governance	Fixed Policy Model	Internal Policy Making	Policy Dependent Decision Making		
	Background Information Sources	Information from party members	Mainstream Media Information	Face to Face Canvasing	Information Collected at Events	Individual Social Media Exploration
	Citizens' input in Decision Making	Party Membership	Party Meetings	Face to Face Meetings	Mail Communication	Digital Communication
	Crowd mining ideas from Citizens	Lack of crowd mining of ideas	Individual Social Media Exploration			
	The role of Classic e-Participation platforms	Weak Dissemination of e-Participation	Low Supply of e-Participation Platforms	Short-living specialized initiatives	Low Citizen Participation	Low impact of e-Participation Platforms
	Government Participation in Discussions	Low Government Participation	Lack of Feedback from Government	Lack of Motivation of Government		
How to harness the duality of e-Participation?	The Existence of Political Discussion on Social Media	Abundance of Political Discussion on SM	No Clear Statistics			
	CleP vs GleP	Citizen preference of SM over e-Part	Emerging New Topics on SM	Ubiquitous SM		
	Contributions Quality/Value/Usefulness	Low Quality Contributions on SM	Limited Usefulness of Contributions on SM	Information Overload		
	Citizen Representativeness on Social Media	Limited circle of participants on SM	Lack of demographics information on SM	Lack of Location Information		
	Citizens' Opinions vs Experts' Opinions	Importance of general Citizens' opinion	Importance of Expert Opinion			
	Social Media (Ideas/Opinions) Monitoring	Infrequent and superficial SM analysis	Manual SM analysis	Time Consuming SM analysis	Low SM analysis benefit	
	Government Engagement on Social Media	Participatory Policy Making	Lack of time for SM	Mediated Participation – SM Assistants		
How technology can support the duality of e-Participation?	Social Media Mining Tools	Social Media Content Aggregation Tools	Information Sharing and Publishing Tools			
	Social Media Content Analysis Tools	Contributions Filtering Tools	Contribution Summarization Tools	Knowledge Management Tools		
	Social Media Content Exploration Tools	Data Explanatory Tools	Data Visualization Tools			
	Social Media Engagement Tools	Targeted Posting Tools	Demographics Statistics Tools	Social Media Dissemination Tools		
	Information Integration Tools	Content Linking Tools	Integrated Content Publishing Tools			

Figure 29: Analytical Model Concepts Alignment

7.2 The Interviews

A qualitative research approach was employed in analysing the data collected through interviews. The choice of semi-structured form of interviews has been determined by the type of the respondents that the interviews were directed to – politicians and decision-makers. This type of stakeholders is characterised by very limited time for the interview as well as limited availability followed by a unique experience of each of the respondents. However, a common protocol has been used as a base for the interview process with relevant space provided for individual remarks. The interview was conducted with three major groups of stakeholders representing three levels of governance: 1) National Level Politicians bound to a specific constituency, 2) Local Level Politicians, 3) Local Decision Makers. Specifically, the respondents who agreed to take part in the interviews included ten people: five Senators (where two of them are former mayors) of different political affiliations, one independent senator, one local authority manager, and four government consultants and decision makers, members of advisory boards. Most of the respondents are from Ireland. One is a public manager from The Netherlands and another a government consultant from France. The participants from outside Ireland were invited to bring more objective perspective and to determine if there are differences in findings across national political and public administration contexts. The interview was designed to take 45 min to 1 hour. During the interview, the participants were allowed to speak freely without interruption to express their opinion on particular matters. The last stage of interview included a presentation of some of the information gathered on social media (based on the profile of the interviewee and related to their topic of interest) using very early prototype of the SSI design, to provide context for some further conclusions on social media based e-Participation visibility.

The identity of the participants is kept confidential (accordingly to the agreement with the interviewed) and only relevant identifiers are used throughout the results analysis for the research purposes. Now we present the questions used in the interview protocol and provide quick explanation for each of the questions:

1.1 Can you please state what is your official job description and what does it entail?

This question provides contextual information about the interviewee key to understanding the specific perspective presented in the interview.

1.2 Can you please elaborate on what is the model of decision-making you apply?

This question refers to the applied practice of the policy making process. It is a pivotal factor to understand how the government makes the decisions currently; what are the dependencies and principles in policy making.

1.2.1 What are the sources of background information you use for policy making?

This question refers to the both digital and non-digital sources of information commonly used by politicians when requiring knowledge on topic to be debated.

1.3 How do you incorporate citizens' interest in policy making?

This question intends to establish the current practices in involving citizens in policy-making. In particular, the question is aimed at identifying the attitude of politicians towards citizen's interest and mechanisms that are currently adopted for collecting citizens input.

1.3.1 Do you consider citizens' opinions in policy making?

This question relates explicitly to the democratic right of citizens to be listened. In particular, this question addresses the issue of persisting representative inclusion of citizens voice in policy-making.

1.4 Do you crowd-mine citizens' ideas (HOW)?

This question attempts to investigate whether any practice for crowd-mining citizen's ideas exists and if so what are the commonly used means of citizen input analysis.

1.5 Are you aware of any governmental e-Participation platforms where citizens can engage in a discussion with the government?

This question relates to the success of classic e-Participation platforms in reaching politicians. Moreover, the question implicitly evaluates the classic platforms' impact, as it is dependent on relevant feedback and action from politicians and decision makers.

1.5.1 Do you participate (provide feedback) in discussions on these platforms?

This question addresses directly the problem of government engagement on e-Participation platforms. In particular, this question attempts to establish current practices regarding politicians engaging in discussions with citizens and providing feedback on the issues indicated.

1.5.2 How do you perceive the effectiveness of these platforms in connecting with citizens?

This question attempts to provide a better indication of the success of e-Participation platforms from the perspective of politicians and decision makers.

1.6 Do you believe citizens discuss politics on social media?

This question reaches to the core of the duality of e-Participation. The question attempts to establish the government's perception of the existence and acknowledgement of political discussions conducted on social media.

1.6.1 Would Social Media be a citizen's preferred channel over governmental platforms (and why)?

This question attempts to establish if, from a government perspective, social media is an important communication channel.

1.6.2 Do you consider citizens' opinions and ideas on Social Media to be of significant value to policy making (and why)?

This question relates to the usefulness of contributions on social media. In particular, we try to investigate whether the perceived scope of citizen contributions on social media is considered of value for policy making

1.6.3 Do you consider citizens' opinions and ideas on Social Media to be representative?

This question attempts to investigate some common concerns about the misrepresentation of key citizen groups on social media.

1.6.4 How do you perceive the quality of citizen contributions on Social Media?

This question relates to the quality of contributions on social media. In particular, we attempt to investigate whether the perceived quality of contributions is considered sufficient for policy making.

1.6.5 Do you consider expert opinions to be a preferable option over an ordinary citizen's opinions and ideas (and why)?

This question attempts to address the issue of popular opinion vs. technically or scientifically sound expertise in policy making.

1.6.6 Do you monitor citizens' discussions on Social Media regularly? (With what frequency, and do you monitor ordinary citizens or experts?)

This question refers to the current practice (or lack thereof) among politicians and decision makers for monitoring Social Media.

1.6.7 Which Social Media, in particular, do you monitor?

In this question, we attempt to determine which are the preferred social media that decision makers and politicians use for policy making.

1.6.8 How do you monitor Social Media?

(Do you use any specific tools? Does the process require any specific resources? Does the process require any specific capabilities?)

This question aims to establish what are the current practices when analysing social media content.

1.6.9 Do you engage with citizens' on Social Media (and how)?
(Do you try to shape the discussions or act as an expert? Do you bring experts into the discussions?)

This question relates to government engagement on social media. We try to investigate what is the common practice in such engagement.

1.7 Do you find any difficulty in reaching citizens through Social Media?
(What are the challenges? What makes it difficult? Do you find it difficult to comprehend citizens' opinions as expressed on Social Media? Do you face information overload? Is it hard to find meaningful conversations?)

This question attempts to investigate what are the key challenges for politicians and decision makers in using social media for policy making.

1.7.1 Would you consider a topic-driven Social Media exploration a useful tool to comprehend political content on Social Media?

This question relates to the visibility of using topic detection technologies for social media content exploration.

1.7.2 Would you consider citizen's mood information (positive or negative) about particular policies, public services or yourself and your party an important input?

This question relates to the visibility of using sentiment analysis technologies as a means of leveraging social media as a tool for evaluating the popularity of public services and policies, as well as to estimate the influence and popularity of politicians and political parties.

1.7.3 Do you believe that it would be of benefit if information from Social Media was first preselected and summarised (while still allowing the possibility to "zoom-in")?

This question relates to the visibility of using summarisation technologies (both visualisations and text summarisation) for social media content exploration.

The rest of the questions attempt to provide extra disruption in the interview in order to encourage the interviewee to reflect and provide extra conclusions on the topics covered by the questions before.

1.8 Do you believe that you know what are the key issues for people in your constituency? What are the issues?

This question attempts to investigate whether politicians feel confident about the needs of their constituents and whether there is a space for technologies facilitating the mining of insights on citizens' concerns (like topic detection).

1.9 Do you know what is the general mood (citizen perception) about your presence on Social Media?

This question attempts to investigate whether the public opinion of the politician on social media matters to those questioned. In particular, we try to

estimate the need for analysing citizen's contributions using sentiment analysis technologies.

1.10 How do you estimate your connection to your constituency via Social Media (in terms of popularity)?

This question relates to the decision maker's concern about their popularity on social media. In particular, we attempt to estimate the visibility of location-based analytics for social-influence-level indication technologies.

1.11 Do you know what is your best time in terms of Social Media popularity?

This question relates to the decision maker's need for time-driven, targeted participation technologies (e.g. automatic content syndication during "out of office" time)

7.3 Results

7.3.1 The Approach

All the interviews conducted for research purposes, have been voice recorded (with the disclosure of confidentiality) in order to capture as much information as possible from every interview session. Each of the recorded files has been carefully transcribed into a separate text document. We have coded the documents using NVivo[57] – a software platform for qualitative data analysis. We chose that tool as the set of capabilities offered by the solution corresponds well with the qualitative form of our investigation. The coding procedure involves selection of the particular sentence, paragraph or whole section of the text and assignment of this fragment to a specific concept investigated in the analysis. The selected text acts as a reference or evidence for the issues considered (Figure 30). To enable coding, first, a relevant analytical model had to be constructed. The NVivo analytical model has been derived from the concept alignment presented in Figure 29. Therefore in line with this, Figure 31 presents the top-level concepts corresponding to the research questions of this thesis. The expanded view shows more fine-grained concepts that the specific research questions comprise of. Then in Figure 32, Figure 33 and Figure 34 we present the expanded sub-concepts with the key aspects of e-Participation characterising these concepts.

The NVivo tool enables the model to be refined as the analysis progresses. Therefore, the final model presented in the figures below represents a refined version of the conceptualisation referred to before. The reason why the model may expand and change is as a result of decision makers and politicians

[57] http://www.qsrinternational.com/product (Accessed 21.11.15)

indicating new important aspects and issues, not anticipated in the theoretical consideration. The process of re-shaping the model can be considered a validation and verification of the theoretical model presented at the beginning of this chapter. Despite the changes applied, the core of the model has been preserved. Therefore, we claim a correct alignment of our theoretical model to the "on the ground" experiences of politicians and decision makers in the use of e-Participation for policy-making.

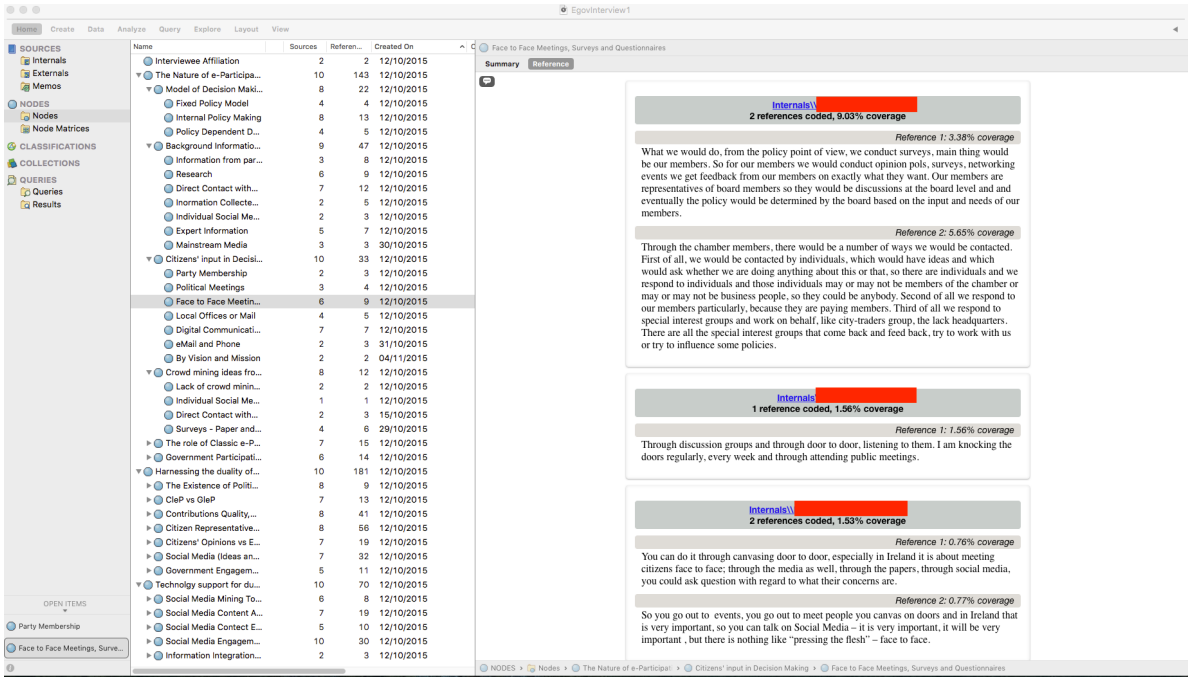

Figure 30: NVIVO tool - coding interview transcripts

7.3.2 The Model

Now we present the final NVivo model after the refinement throughout the analysis process. The figures below show all the aspects of the duality of e-Participation identified. Every aspect is supported by a specific number of references by politicians and decision makers (indicated by the References column). The Sources column indicates how many of the interviewees mentioned a specific aspect of the duality.

Name	Sources	References
The Nature of duality of e-Participation	10	143
Model of Decision Making in Governance	8	22
Background Information Sources	9	47
Citizens' input in Decision Making	10	33
Crowd mining ideas from Citizes	8	12
The role of Classic e-Participation platforms	7	15
Government Participation in Discussions	6	14
Harnessing the duality of e-Participation	10	181
The Existence of Political Discussions on Social Media	8	9
CleP vs GleP	7	13
Contributions Quality, Value and Usefulness	8	41
Citizen Representativeness on Social Media	8	56
Citizens' Opinions vs Expert's Opinion	7	19
Social Media (Ideas and Opinions) Monitoring	7	32
Government Engagement on Social Media	5	11
Technolgy support for duality of e-Participation	10	70
Social Media Mining Tools	6	8
Social Media Content Analysis Tools	7	19
Social Media Contect Exploration Tools	5	10
Social Media Engagement Tools	10	30
Information Integration Tools	2	3

Figure 31: Analytical Model Core Concepts

Name	Sources	References
The Nature of duality of e-Participation	10	143
Model of Decision Making in Governance	8	22
Fixed Policy Model	4	4
Internal Policy Making	8	13
Policy Dependent Decision Making	4	5
Background Information Sources	9	47
Information from party members	3	8
Research	6	9
Direct Contact with Citizen groups	7	12
Inormation Collected at Events	2	5
Individual Social Media Exploration	2	3
Expert Information	5	7
Mainstream Media	3	3
Citizens' input in Decision Making	10	33
Party Membership	2	3
Political Meetings	3	4
Face to Face Meetings, Surveys and Questionnaires	6	9
Local Offices or Mail	4	5
Digital Communication	7	7
eMail and Phone	2	3
By Vision and Mission	2	2
Crowd mining ideas from Citizes	8	12
Lack of crowd mining of ideas	2	2
Individual Social Media Exploration	1	1
Direct Contact with Citizens, Canvasing	2	3
Surveys - Paper and Digital	4	6
The role of Classic e-Participation platforms	7	15
Weak Dissemination of e-Participation	5	5
Low Supply of e-Participation Platforms	4	5
Short-living specialized initiatives	1	1
Low Citizen Participation	0	0
Low impact of e-Participation Platforms	3	4
Government Participation in Discussions	6	14
Low Government Participation	6	6
Lack of Feedback from Government	2	2
Lack of Motivation of Government	5	6
Harnessing the duality of e-Participation	10	181
Technolgy support for duality of e-Participation	10	70

Figure 32: Analytical Model – Nature of duality of e-Participation

Name	Sources	References
The Nature of duality of e-Participation	10	143
Harnessing the duality of e-Participation	10	181
The Existence of Political Discussions on Social Media	8	9
Abundance of Political Discussion on SM	5	5
No Clear Statistics	4	4
CleP vs GleP	7	13
Citizen prefernece of SM over e-Part	4	4
Emerging New Topics on SM	3	6
Ubiquitious SM	0	0
GLep as broadcasting tool	2	3
Contributions Quality, Value and Usefulness	8	41
Low Quality Contributions on SM	6	10
Limited Usefulness of Contributions on SM	7	14
Information Overload	5	6
Biased Opinions, Specific Agenda, Attacks	3	4
Lack of Moderation	2	3
Lack of Focus	1	2
Lack of Structure	2	2
Citizen Representativeness on Social Media	8	56
Limited, anonymous or very specific circle of participa...	8	28
Lack of demographics information on SM	6	9
Lack of Location Information	6	10
Misinformation	4	8
Privacy Issues	1	1
Citizens' Opinions vs Expert's Opinion	7	19
Importance of general Citizen's opinion	6	10
Importance of Expert Opinion	7	9
Social Media (Ideas and Opinions) Monitoring	7	32
Infrequent and superficial SM analysis	5	9
Manual SM analysis	6	11
Time Consuming SM analysis	1	1
Low SM analysis benefits	1	2
Managing Output (Broadcasting) rather than Monitoring	4	9
Government Engagement on Social Media	5	11
Participatory Policy Making	1	1
Lack of time for SM	4	5
Mediated Participation - SM Assistants	4	5
Technolgy support for duality of e-Participation	10	70

Figure 33: Analytical Model – Harnessing the duality of e-Participation

Name	Sources	References
The Nature of duality of e-Participation	10	143
Harnessing the duality of e-Participation	10	181
Technolgy support for duality of e-Participation	10	70
Social Media Mining Tools	6	8
Social Media Content Agregation Tools	6	8
Information Sharing and Publishing Tools	0	0
Social Media Content Analysis Tools	7	19
Contributions Filtering Tools	7	7
Contribution Summarization Tools	5	8
Knowledge Management Tools	3	4
Social Media Contect Exploration Tools	5	10
Data Explanatory Tools	4	4
Data Exploration and Navigation Tools	4	4
Social Popularity Statistics	2	2
Social Media Engagement Tools	10	30
Targeted Posting Tools	4	8
Demographics Statistics Tools	3	4
Social Media Dissemination Support Tools	1	1
Mood (Sentiment) Statistics Tools	9	11
Social Influence Boosting Tools	4	4
Self-Moderation Tools	1	1
Instant Information	1	1
Information Integration Tools	2	3
Data Integration Tools	1	1
Integrated Content Publishing Tools	2	2

Figure 34: Analytical Model Concepts – Technology support for duality of e-Participation

7.3.3 The results

Now we present the observations based on the analysed transcripts from the interviews with the politicians and decision makers. From the figures presented in the section a pattern emerges that most of the comments provided by politicians and decision makers referred to aspects related to harnessing the duality of e-Participation then they described the nature of the duality and finally much less consideration would be given specific technical methods that could support the duality consequentially.

The Nature of Duality of e-Participation

In order to investigate what is the Nature of the Duality of e-Participation we seek for the connections and relations between the political processes, citizen-engagement, communication channels, direct and participation through representation, and e-Participation. We asked politicians and decision-makers what are the decision-making models they apply. We asked what are the main sources of information feeding the process of policy-making and how does the process incorporate citizen's input. We also asked whether live, citizen-discussions monitoring exist and whether governments participate and engage in discussions with citizens.

The Model of Decision Making:

The results show that decision-makers and politicians apply internal policy making paradigm with very moderate consultation with the public. The policy-making agency (the right to form a policy) is drawn upon the mandate given by citizens to the elected representatives, in general, election through voting. Politicians and decision-makers consult mainly the party members and internal stakeholders during periodic, plenary meetings. Also, politicians would align their actions with fixed policy determined by the party and the long-term manifesto or political program set. The lobby groups and individual

citizens are allowed to provide their input, however, it is up to the politicians and decision-makers "on the ground", working in their constituencies (with no formal obligation), whether they lift the issues higher and include them in policy making agenda. For example, one the respondents explained that at all times, Senators in their decision-making are bound by the party policy made at the national level which is updated every couple of weeks:

"All the party policy making is made at the national level. (…) We are tasked to implement the policy of the party. (…) On the interim basis, we have a general council, which can meet on a regular basis every six weeks. (…) So if issues are coming throughout the year they have to make decisions on behalf of the party and the party elected officials and elected representatives are bound by the party policy" – Senator 1

The above was corroborated by another respondent who stresses that politicians are obliged to obey the program presented in general election. In particular, the government members need to fulfil the manifesto set for the term:

"The government is elected by the people in the general election. We set our manifesto for a five-year term, and we set out our policies and then once the election takes place we try to form a government. In the current government there is a coalition with the Labours, so there was a joint program for the government then draw up between Labour and Fine Gael and form the policies that are going to be implemented over the five-year term." – Senator 2 (leading party)

The following respondent describes the process of putting up a bill and reshaping in in the parliament. Again the policy-making involves only member of the parliament:

"Somebody can come out with a bill; they provide an introduction to the bill , that we can have an amendment to the bill at the early stage then it goes to the government. The government can accept or reject the bill and have some time to reshape it." – Senator 3

Another respondent raises the importance of elections and voting as means of influencing policy-making (representative democracy) though again stresses on the fact the decision making happens at the political parties meetings and at political debates in the parliament. The responded also brings up the role of Senators who have a significant impact on politics.

"On the face of it you have votes and the vote decides on specific amendments, but obviously decision-making does not really happen at that level it happens at the level of discussions, at parliamentary parties, at committees, at actual drafting of laws (…) a senator would have a lot input into decisions that are actually made. And quite often decisions are changed to accommodate the various points of it across the senators" – Senator 4

The following respondent, a local decision maker, makes a point that the policy is drafted and the key decisions are made at a board level and determined by the executives:

"Decision model is, Chamber of commerce is run in two layers, first of all, there is a voluntary board and second an executive composed of a general manager and people working full-time. The policy decisions are determined by the board, and the works were determined by the executives" - – Local Government Consultant on Business and Transport

Another local government respondent also indicates the existence of the common plan created by relevant representatives, to be followed in decision-making:

"*All the groups are represented by the project partners so, we have a business plan, we have goals and objectives that have been set out and agreed. They would form the basis for decision making." – Local Government Consultant for Innovation 1*

The Background Information Sources

The internalisation of policy-making is reflected in the way the background information is collected. It is mainly the party or organisation members who would submit information to be included in policy-making process agenda. It is very rare that the governance would include information coming from citizens directly. For example one of the correspondents explained the most of the policy-making would be done based on the party representatives at different levels of governance:

"We would have representatives of the county in the Senate, we also have representatives in the assembly in the north, we also have councillors all over the country, we also have MEPs. We've set up a policy department within the party (…) we would pass motions at general council every year to create our own policy (…), so we would have a group internally in the house which would discuss policies on a regular basis usually once a week. (…) If for example a question comes around we would contact the assembly of our comrades in Belfast around the issue as well, but we also have the European dimension as well, and we have an MEPs" – Senator 1

The statement above is corroborated by the next correspondent who explained that dedicated lobby groups have their direct representatives in the parliament and this way the decision-making should is influenced (again representative democracy):

"We have different groups that would be representing different lobby groups, different sectors of the society doing their own analysis as well as ESRI, who would be very reputable." – Senator 2 (leading party)

This is also confirmed by a correspondent at a local level who stresses on the importance of the lobby groups who are represented by specific project partners:

"All the groups are represented by the project partners so, we have a business plan, we have goals and objectives that have been set out and agreed. They would form the basis for decision making." – Local Government Consultant for Innovation 1

Politicians admit that important source of information would be research in a form of literature and relevant articles. Also, politicians would contact researchers from the specific area where policy is put in place. Moreover, experts, cross-organization meetings and mainstream media would also be the primary source of information. Decision-makers either do the research themselves, study relevant literature, and contact relevant people or leverage the help of assigned assistants who prepare the materials for them.

For example one of the correspondents stresses on the importance of the domain literature and general trends.

"You would certainly go to literature; you look at the general trends and various areas."

– Local Government Consultant on Business and Transport

Another correspondent points to the research published in the specific are as the main source of information:

"We look at the research. We look at the research that is published in the area. (…) For example, for developing housing policy the person who would develop the policy would check the academic literature on those issues and would engage with researchers" – Senator 1

The turn to research is corroborated by the next respondent who talks about mediated acquisition of required information through dedicated research information body in the parliament and dedicated people:

"For the research, we have the Library in Research services, which is based in the parliament. We also use our own resources, our own secretaries and assistants " – Senator 3

The following respondent emphasises also on the importance of the dedicated government organisations (outside the parliament) that gather, analyse and publish information:

"There are a lot of sources of information, obviously government departments provide a lot of information but organisations like the Central Statistics Office would provide information" – Senator 4

In this regard, from the local decision-making perspective, the local government member stresses on the importance of exploration project data, reports and research findings:

"I would look at projected figures, what is research what is hard facts." – Local Government Member

The local decision makers, similarly to the national-level politicians, bring up professional literature and aggregated public data as a good source of information:

"In a sense it is, of course, public data, professional literature and articles on one side, on the other side all sort of data, but more aggregate level." - Local Government Consultant for Employment

Another local decision maker stresses on the need to constantly self-investigating the actions and projects undertaken in other municipalities as a means of gathering knowledge on good practice, innovation and successful policies:

"Our role is to keep updating the city on possible innovation, knowing also what is happening at information innovation at EU level. To ensure that we don't loose occasions or anything that is happening in other cities, one of my roles is to talk with other cities about the innovation and identify things or innovations that might be adapted for our municipality" – Local Government Consultant for Innovation 2

Citizen's input in Decision Making& Crowd mining ideas from Citizens

Citizens' input in decision making would be very limited when considering direct contributions. Those would be mainly committed through opinion polls, surveys, questionnaires, mail and email, but also events and face to face meetings where politicians can be contacted directly. The real impact, however, is rather limited, and usually the input is transferred by representation, meaning by the membership of the party – either directly as a member of the party or by informing or contacting relevant party member. The other aspect of "internalism" is that the well-established public organisations and government bodies would consider that their vision and mission implicitly reflects citizen's input. Therefore, extra interaction is not pivotal for more citizen-need aligned policy-making. Citizens' input is forwarded through the representation of relevant boards and commissions.

The crowd mining largely does not exist in an explicit form. Decision makers build their policies allegedly based on canvassing and face-to-face meetings,

during dedicated events, and by using relevant paper and digital surveys as well as mainstream media. Often though the surveys would be conducted among specific interest group, or carefully selected group of citizens, without broader inquiry for general public opinion on the matters discussed. The contact with citizens has a form of feedback on specific matters raised by decision makers rather than crowd mining for new ideas.

For example one of our correspondents, from local government, indicates that the opinions are collected through polls and surveys but only from specific board members and specific representatives of lobby groups:

"What we would do, from the policy point of view, we would conduct opinion polls, surveys, networking events where we get feedback from our members. Our members are representatives of board members so they would be discussions at the board level and eventually the policy would be determined by the board based on the input and needs of our members. (…) We would also have people coming into us making representation; we have lobby groups (…) And that is one way of getting the mood and getting the feedback, and then we feed that into the policy and the strategy and formulate our strategy and policy in relation to that." – Local Government Consultant on Business and Transport

Another correspondent acknowledges citizen input through surveys but of relatively low frequency. A direct engagement with citizens is emphasised through door-to-door canvasing and attendance in public meeting. The correspondent however did not explain how this input transfers into policy making. Again the citizen influence is by representation:

"I would do a survey, both digital and paper. You don't do that everyday maybe twice a year. Twice a year a paper survey but more frequently a digital survey. (…) Through discussion groups and through the door to door, listening to them. I am knocking the door regularly, every week and through attending public meetings." – Independent Senator 5

This is corroborated by the next correspondent who emphasises on the representative function of the members of the parliament in conveying the message from citizens to the national level accordingly to their constituencies. Again, the canvasing door-to-door is mentioned as an important method for engagement with citizens:

"Like everyone is aware, ministers are aware and prime minister would be aware, they have their own constituencies, their own offices and all hearing this. It is the prime way for the party to put forward issues of concern, what needs to change, how policy needs to change. Citizen's input would be put forward by their representatives. (…) would be through parliamentary party meeting every week and that is a forum for all the TDs and Senators (…) You can do it through canvassing door to door, especially in Ireland it is about meeting citizens face to face; through the media as well, through the papers" (…) "So you go out to events, you go out to meet people you canvas on doors and in Ireland that is very important, so you can talk on Social Media – it is very important, it will be very important , but there is nothing like "pressing the flesh" – face to face." – Senator 2 (leading party)

The next correspondent emphasises the importance of the contact with managers and top officials as relevant representation of citizen interest:

"For the decisions on investments in the local airport I would contact the local managers of the airport, the CEOs to get the regular opinion." – Local Government Member

The following interviewee re-confirms the observations by other decision-makers who emphasise on the importance of face-to-face meetings with citizens.

"One thing which is really important is to be on the ground. I mean to give the application a face, to show that there is someone behind that. (…) That you have various people working, explain through the city lens, explaining what

might be the next step and people would accept more. Otherwise, innovation has a double side" – Local Government Consultant on Innovation 2

The statements made by the correspondents are aligning around the need for face to face meetings with citizens and emphasise their role as representatives of people in policy-making. Nevertheless, the interviewees did not explain how citizen input translates into decision-making.

The role of Classic e-Participation platforms & Government Participation in Discussions

The results from the interview show that there is a limited availability of traditional e-Participation platforms. The platforms are either unknown or their impact is not substantial. The digital environments enjoying reasonable engagement are rather narrow purpose forums with very specific goals and structured conversation with strong moderation rather than general-purpose tools.

The Government largely does not participate in discussions on e-Participation platforms. Politicians explain that they are not aware of the platforms or don't believe in the mission or effectiveness of those platforms. The sceptical attitude towards e-Participation platforms is ubiquitous.

For example the first two correspondents express the lack of awareness of any e-Participation platforms both at national and local level:

"No, no that I am aware of for general purpose, no." – Local Government Member

"Not that I am aware of, I am sure there are, but I would not be aware of people using it on a regular basis. NO, to be honest, no" - Senator 1

Similarly, the next interviewee believes that some e-Participation platforms exist though also admits lack of more detailed knowledge about them:

"There are some, but to be honest with you I don't know them very well, but I know there are some." – Independent Senator 5

This trend is continued by two other respondents who also admit that the platforms may exist though at the same time they express very little trust in effectiveness of these platforms:

"I think it would look good however it is not yet considered strong means to rely on. We don't know yet what is the effectiveness." – Independent Senator 5

"I don't know what would be the effectiveness for Ireland; I don't think that would be high." – Senator 2 (leading party)

The effectiveness of e-Participation platforms is further challenged by another interviewee who emphasise that the issue lies in the lack of proper framework that would structure the way e-Participation platforms operate:

"I mean the reality is that there aren't many examples of the platforms working well right now because they tend to, operate on the ad-hoc basis and they don't tend to be systematically adhered to in the way they were supposed to be so I mean there has to be a system in place to make it work. Framework vs. coming online. I don't know of good examples really working well. " – Senator 4

This is corroborated by the next interviewee who indicates the issue that some politicians may indeed engage with the platforms though only for PR purposes and without any tangible outcomes or impacts for policy-making coming from the engagement:

"I think, what makes me kind of sceptical about these things is, a lot of people pretend they participate and to support the e-Government platforms, but I am not so sure whether they really do it (…) because politicians like to benefit from emerging trends by (allegedly) listening to the public (on the platforms)" – Independent Senator 5

Another interviewee also doubts the effectiveness of the e-Participation platforms and stresses on the importance of direct engagement and representation rather than engaging through specific platforms

" My experience is that for the politician the best way to is to talk to the minister or to the department and make representation, but rather not through any specific platform platform"- Senator 2 (leading party)

This is again corroborated by the next correspondent who relies on personal blog as means of communication rather than any dedicated platform.

"People email me all the time, but I don't use dedicated platforms, I have a website, but I don't use dedicated blogs, I don't know anybody who does." – Senator 3 (leading party)

The Existence of Political Discussion on Social Media vs. e-Participation Platforms

Decision makers and politicians largely acknowledge the presence of political discussions on Social Media. They also appreciate the fast-feedback and the dynamics of the social networks that deliver instant and broad opinion spectrum. Nevertheless, they express limited trust in regard to contributions on social media; especially in the absence of demographics statists and perceived a limited representation of the general population. Most of the decision makers provide rather reserved attitude and orientation towards social media with the major use as a broadcasting tool and the "word of the mouth" in the dissemination of political content.

For example the first two correspondents acknowledge the fact that most of the younger population would use Social Media for politics:

"Yes, I would say Social Media would be preferred channel because it is accessible for a certain demographic. I would say people up to mid-50s. Younger people in general." – Independent Senator 5

*"*Yes, definitely, social media are be used by young people for politics*" – Local Government Member*

The next interviewee believes that only a segment of society uses social media but considers it an important segment and stresses on the importance of social media as a very effective broadcasting tool with often-passive citizen engagement:

"Their views are important, but it is only a segment (social media users), it is an important segment I think a lot of people are not commenting, but they are watching." – Senator 2 (leading party) (…)

"And if it is not related to them, or not affecting them often it is not interesting. Boards.ie, would be for those who are interested in politics is for that, would be the most popular, then there is politics.ie. But I think most people don't go on those they only see those, they would have access to that by somebody sharing it on Facebook. If somebody said something on one of these platforms and someone else shares it because it is of interest, or it is funny or it is very negative. Social Media would be used for broadcasting. And that would go to the friends who are not very political, would not have much interest in politics but they know about some big negative story or positive story or the funny story because it has been shared on Facebook. And people said look at this, watch this, this is hilarious, watch this video, it is the headline, news. So it does not matter whether on which platform it was posted but that it was shared through Facebook or through Twitter, tweet. They might not have many followers; the might have only two followers but one of them is interested in politics and it is interesting what they share, positive or negative and one of the followers tweet it.

" - Senator 2 (leading party)

This is corroborated by the next interviewee who emphasises that social media are the domain of young people and young businesses while traditional people and businesses are rather reluctant to use social media extensively:

"I would it in relation to traditional people, and traditional businesses – NO, in relation to new businesses, starting off – Yes. (social media)" (…)

"Well, I would say that more and more people are doing it on social media but I would say it is, more of the traditional business do not yet, and more of the new modern business, young people who are running them, use it extensively." – Local Government Consultant for Business and Transport

The following correspondent points out to the issue that many accounts on social media are fake therefore it is difficult to consider them legitimate:

"I tend not to because I find that people who are setting account under fake names.(social media)" – Senator 3

In line with former interviewee opinions, the following correspondent acknowledges the power of social media as broadcasting tools derived from the ease of use, though the correspondent emphasise on the actual low impact of the contributions on social media on political decisions.

"I would not say it is preferred channel in terms of effectiveness (social media). But I would say it is important in terms of people sending stuff. It is preferred channel sometimes because it is easy, but politicians do not necessarily take it seriously. Where is when you get a letter or email you would tend to take it quite seriously" – Senator 4

The next correspondent emphasises the importance of social media as a source of information about the mood of citizens around specific issues:

"Social Media then gives you the colour to the story behind that the human stories of what has actually been happened (…) I do think it gives you the sense of the frustration or the anger that people feel. And if an issue is really an issue." - Senator 1

In line with this statement, the next interviewee acknowledges the importance of social media but refrains from claiming the superiority of this channel over other platforms.

"Social Media are really something today that is important, something that people use to communicate then saying whether it is better than other platforms it is hard to say.

" Local Government Consultant for Innovation 2

The next correspondent points to the dichotomy between the discussions on social media and the political events and issues that are being discussed:

"I think if we have anything, we have disjoint between issues and politics. I think you find a lot of people on Social Media talking about issues, but they do not connect it to the political decision that have caused the situation" - Senator 1

The final correspondent points to the lacks of information on the existence of political discussions on social media but emphasises that social media occasionally caused some disrupts in politics:

"Not that I know of, we have had some problems though with social media." Local Government Consultant for Employment

The Quality and Usefulness of Contributions

Decision makers and politicians consider contributions on social media to be of limited usefulness due to rather a moderate-to-low quality of contributions. Decision makers argue that large part of the content is created by very specific circle of an activist who often act accordingly to specific agenda. Therefore, many discussions are biased and do not deliver constructive inputs. Moreover often discussions (sometimes led by anonymous activists) are hijacked by "over-active" individuals and turn into unconstructive argument dismissing the channel as a useful information stream. Lack of moderation and structure emerges as a significant obstacle.

For example, the first interviewee states explicitly that social media contributions are of limited quality and the opinions are biased:

"The quality is not enough, definitely no" (…) "I just find that Twitter users are particularly opinionated and if they have a point that they want to get across" – Local Government member

This is corroborated by the next respondent who emphasises that the quality is not enough for policy-making and the discussions need to be more formalized:

"No, no not enough for policy-making (quality). It needs to be a bit more (…) I would imagine it needs to be a bit more formalized. Needs to be a bit more comprehensive." – Senator 1

The next two interviewees also stress on the biased contributions (including bias related to specific political agenda) and unconstructive compliments:

"Now you have to be able to decipher between very negative people who are just maybe on a rant, sometimes a rant can be (…) there is a purpose to it, there is a reason why someone is abusive|" (…) "I guess you just can't get bogged down on it either, if you have a thousand likes it does not mean you are going to get elected. People can get too obsessed with the amount of likes, but I don't think it means anything because you might have somebody in Mexico liking you and they don't have a vote." – Senator 2 (leading party)

"Going from great to absolutely terrible (the quality). Some people just rant and rave there is no logic to what they do; there is no thought put in, others are quite good and give you quite a good feedback. So, the quality can go from good to very poor." (…) "No, I think just general opinion would be fine but what you tend to see, what you tend to find which will give you a little bit of a skew around the way, is you tend to find some extreme people with extreme view who try to hog it. And they skew the results then." – Local Government Consultant for Business and Transport

In line with the opinions stated by the former interviewees, the next correspondent stresses on the bias and abuse on social media that can take a form of direct bullying of politicians. Finally the issue of anonymity is mentioned:

"Yes, to a degree but people abuse it as well. People who have an agenda tend to go to social media to promote their views; they can be people with extreme views. There are people who have nothing to do but bullying politicians." (…) "The problem is there might be thousand people who see the post, only ten will comment, and you will see their name" – Senator 3

This is corroborated by the next correspondent who points to anonymity, bullying and trolling as a major issue for using social media. Moreover, the correspondent brings up an estimation that 80% of content is rather very low quality while there is no any moderation process used by mainstream media to filter the content:

"The overall quality, I think there is a real problem with anonymous posts because anonymous posts can quite often skew the debate on social media and can quite often be put in, we have trolls on social media. So quite often the debate does not go where they need, the direction." (…) "There are some good quality comments, but there is a lot of mock. It is surrounded by a lot of nonsense. I could throw a guess out of 100, 80 20 – 20 % good quality and 80% nonsense. You know the media like a newspaper does have at least a process to weed out ridiculous opinions where is on social media there is no process at all. " – Senator 4

The next interviewee also points to varying quality of the contributions on social media. In line with former respondents' opinions, the lack of respect in communication between people is mentioned as an issue. Moreover, the correspondent stresses on lack of contextual information that could help to understand the discussion while experiencing significant information overload:

"Some is great, and some is just (…) can be very glib, it varies." (…) "And I would also think there is not the same respect between people. Some are brilliant but (…). Like I don't know the context of the conversations sometimes. Absolutely information overload would be the problem. Lack of valuable contributions too. " – Independent Senator 5

This is corroborated by the next interviewee who again emphasises on the problem of large volume of low quality of information generated as an implication of insufficient contextual information:

"I mean you can have thousands of questions without having a real understanding of the overall picture" – Local Government Consultant for Innovation 2

The next correspondent points to the unproductive nature of social media discussions as major obstacle in leveraging it as a main communication platform. In line with the former interviewee opinions, lack of moderation and lack of structure are considered a blocker:

"I find most leaders somehow reluctant to the subject of social media because it is so morph, it is so difficult to get the direction of it. It tends to explode and array with all kinds of directions. So as a communication platform it might work but has some risk in it because the reactions are not controlled as a policy development instrument we are seeking more direct and effective way of communication with employers (business) and maybe also the employed (citizens) but it would be more in the feedback loop than in the communication loop. Within the leadership, there is this idea that if you have a totally free communication platform you will probably get kidnapped (hijacked) by some group that is using this platform for another purpose." (…) "The rule of a moderator is limited, when go to social media you can't act as a moderator, you can't shut any discussion when there are no rules when it has no focus and

the moderation is only about preserving some ethical course so people would don't wrestle each other but the content wise it tends to float all over the topic" – Local Government Consultant for Employment

Representativeness of Contributions on Social Media

According to the decision makers and politicians, the representation of the general public on social media is limited. Only certain part of the population is active and contributes to political discussions on Social Media. Lack of information about demographics, location or real identity of the users hinders leveraging content from social media as a valuable and useful source of information for policy-making. The common issue appears to lie in the verification of the users. Anonymity causes a lot of distortion and prevents politicians from drawing coherent conclusions (people out of the constituency can contribute in debates on local matters). Fake profiles and biased groups are significant challenges for using social media in policy-making. It is hard to determine whether large volumes of content generated on social media are genuine and produced by a representative group or rather a couple of activist spreading propaganda.

For example, first three correspondents argue that only certain segment of population (young and often IT savvy) engages in political discussion on social media. This is seen as a result of general division of the society where still large part does not use social media on daily basis or refrain from signing up to any major social media platform:

"No, I would say only for a certain section of the population, would use social media to engage with others in political discussions (…) there is a whole section of the society that still don't use social media or engage regularly. They may have an account on Facebook and Twitter, but I don't think they engage as much (…) The main challenge is not everybody is on Facebook or Twitter. So

if you want to get something out there instantly, information on Facebook and Twitter is instant but not everybody is using it. (…) I still think there is a whole section of society that does not engage, regularly on social media." – Local Government Member

"It is just a segment, sometimes you have, " (…) "Then you have people who are not on Facebook either, and that is why going out and knocking the doors, meeting people on the ground is important as you are getting two sides of the story, you are really getting the full picture of your society then. " – Senator 2 (leading party)

"I would say only for certain part of the population, and certain business, more modern, certain character, obviously IT companies, young IT start-ups very representative, whereas for traditional clothing, retailer, not representative." – Local Government Consultant for Business and Transportation

This is corroborated by the next correspondent who elaborates more on the lack of engagement in political discussions as an implication of declining interest in politics by citizens in general. Moreover the interviewee stresses that insufficient background information on citizens (like demographics) makes impossible determining how representative are the statements made.

"Yes they do but I would say: 'some people'. Some people would say I am not interested in politics at all. From Facebook and Twitter you can see people, it is really probably a small group of people but those who do discuss they are very active." (…)We can't tell whether they are representative. We do not have that information. I don't know what is the sample we draw from" – Independent Senator 5

The next correspondent also stress the insufficient information on discussions' participants. In particular, the interviewee emphasises that the lack of information on the origin (location of citizens) is a blocker for deep

consideration of the opinions. That information is essential for politicians often bound to specific constituency. The same correspondent also refers to the non-democratic aspects of social media. Specifically, accordingly to the interviewee, few people on social media, can generate a significant "buzz" around specific issue, hence promoting unrepresentative opinions. Moreover the correspondent argues that often the contributors can have specific agenda and intentionally manipulate the discussion, hence promoting biased opinions.

"The other thing is you don't know for certain who is coming as a citizen in your area." (…) You could be getting something from out of Mongolia, or you could get somebody who is posing as somebody else (…) You don't really know if it is a citizen who you are concerned with, or it is you are talking to somebody in your own constituency, concerned citizens that are a part of the residents association and has some weight to them.

(…) you don't know if the people on social media are they say they are. (…) You don't know if they are the constituents you don't know if they are Irish people (…) One of the big problems is you get big debates which are basically run by special interest groups, and they might only be three people involved and they might have specific agenda and yet they are keep posting and posting and making a scene like there is a big lobby out there where in fact it might be not credible minority, few. From Social Media point of view, few people can generate a lot of traffic, that is not a democracy. (…) The challenge is the fact that Trust, that you can't trust all the opinions on it, you can't trust whether they are genuine because it is absolutely clear that there are people from other political parties trying to destabilise discussion deliberately, and there are also people from other countries. It is really possible to present a false picture on social media of what people you are trying to represent actually think. And It has been proven many times that that is a case.

" – Senator 4

Citizens' Opinions vs. Experts' Opinion

In principle, decision makers and politicians value both expert and general public opinion. Specific matters require expert opinion to create valid strategies; however, since politicians run from the mandate that was given by the public they need to ensure that citizens are satisfied with the policies undertaken. The challenge appears to lie in the balance between temporary public satisfaction and effective policy making supported by expert-delivered evidence.

For example the first two correspondents argue on the pivotal role of expert opinion in evidence-based decision-making:

"I think it is important because it becomes evidence-based, your decision making should be evidence-based." – Senator 2 (leading party)

"I would consider expert opinion, yes if this is an area of their expertise, if they have qualifications, yes I would. " – Local Government Member

This is corroborated by the next correspondent who argues that the expert opinion is essential to provide a complete picture on the matters discussed. However, the interviewee stresses that since the decisions affect citizens' life, their opinion about the expertise provided is pivotal:

"Expert opinion is useful, absolutely, especially if somebody has an expert opinion in the specialist areas (…) But then that expertise delivered may affect many people's life so that the citizen's view on that is relevant." – Independent Senator 5

This is confirmed by the next interviewee who emphasise that politicians indeed should consider both expert and citizens opinions; however, in particular, they are obliged to respect citizen's opinions who elected them based on specific promises made:

"I think you need both. I think certainly it is important to take citizens' opinions on board because at the end of the day we are elected by citizens, and one of the main complaints we get is that politicians get elected, and then they forget about what the citizens asked them to do, and they make policy which contradicts what they wanted" – Senator 1

The next interviewee argues that short-term policies should be driven by citizen's opinions as an implication of politicians representing the people. However, the same interviewee argues that long-term, important policies should rather follow experts' opinions even if they imply not very popular decisions. The correspondent emphasises that experts are also citizens who have the domain knowledge, which potentially makes them more suitable to advise the decision-maker on specific matters.

"I suppose in theory experts are experts (…) but in terms of: one expert vs. 500 citizens, no you would trust all those citizens. I think you need a good broad picture of any particular thing because ultimately you are representing people. You are representing ordinary citizens but experts are also ordinary citizens, and people shouldn't forget that. (…) when you put out legislation it is not always popular, and the thing is it has to be robust, it has to be long term. We will get rid of tax we will do all the popular things…you do have to consider a little bit more than that. You can't just go down the populist way all the time. I don't know that preferable option is a right word, but it should carry more weight if the person is genuinely an expert on the topic they are talking about." – Senator 4

Finally, this is corroborated by the next two interviewees who emphasize that both expert and citizens opinions are essential in the decision maker process.

"No, I think all opinions are required, right from the experts, through the operational, to the users, the end user " Local Government Consultant for Innovation 1

"So experts as an important source of ideas I definitely advise consulting both employers (business) and unemployed (citizens) but in a more structured and focused way, not only direct discussion but sort of quality and management of expectations." – Local Government Consultant 1

Social Media Monitoring & Government Engagement on Social Media

It is apparent that decision-makers and politicians do not monitor social media on regular basis. The interaction is limited mainly to superficial, irregular, manual analysis (using standard interfaces) of social media embedded streams. Politicians use social media as rather one-way dissemination tool for broadcasting information. Politicians re-share content generated by their colleagues to boost the reach and political influence. In some cases delegated assistants manage social media streams and filter out most important information for politicians. The reason for limited engagement and lack of social media monitoring appears to be a lack of time and lack of relevant resources to perform more advanced social media analysis or to engage with citizens by using current interfaces.

For instance, the first correspondent admits that the use of social media is limited time-wise, sometimes mediated (dedicated media person) and is rather one direction, for information broadcasting and re-sharing the information for better party policy dissemination.

"No, I don't. What I do is I check my own Facebook Page and Twitter feed and stuff like that, but you could spend all day on it, so I would not have the time

(…) We do have dedicated people, but it is more about managing our own output rather than what it is out there (…) Our Social Media people would be managing what are we putting into the Social Media, and helping to make sure we would maximise what we are putting out there. To make sure we are trying to get to as many citizens as possible but we do not monitor what other people are saying about it. (…) I suppose what we would do awful a lot we would re-tweet, and we would share what my colleagues in the party would be doing as well. So, for example, it there is somebody from the party who put up some very good video or an interesting statement about what Enda Kenny (the prime minister) said I would share that. Because what are we trying to do is to broadcast, to broaden people's knowledge of our own policy as well. " – Senator 1

This is corroborated by the next interviewee who considers social media as yet another broadcasting and advertising channel:

"I use Twitter and Facebook just to make an announcement, just put up information on the work I am doing. (…) I use social media when I put out a press release; I see this as another way of advertising." – Senator 3

The next three correspondents confirm the use of social media (to a limited extent, time-wise and scope-wise) to monitor other politicians' actions. The interviewees, similarly to the first correspondent, argue that the common practice is to have a dedicated Social Media people as part of media campaign to post for the politician.

"I look at feeds and see what people are saying on different kind of issues. I look at what other politicians are doing, what they announce or put some post, look at the feedback there are getting just to see to compare how you are doing and what the feedback is. (…)

Sometimes, if you have time for that, that is great, some politicians have people doing that for them. Write for them, do it for them, they do their

Facebook for them. You could have your secretary do it for you; we have one person that could divide the position in two like a half time job, a share. Some people have actually people writing things for them, and I don't like that I like to do my own Social Media. (…)I don't do the whole pile of it, a little bit I suppose. You answer people back, and you get the answer but can get caught up in it for too long. I would not spend too long with any particular person you need to keep moving." Senator 2 (leading Party)

"you might do it yourself, but you might get an associate who might find out what the general feeling is from a whole pile of different forums, some relevant forums." – Senator 4
"The challenge would be having the time and the people to work it (information overload and lack of time)" – Local Government Consultant for Business and Transport

This is corroborated by the next correspondent who stresses that there is a mismatch between the decision-maker office hours, and the time when most activity happens on social media (evenings):
"I would have concerns about how these platforms could be moderated by public sector where it is an environment when staff would be working 9 to 5. Where people engage outside those hours. (…)The main concern for using social media platform is the fact that I would not be engaging after work hours. That is a personal view. And the moderation, because there is a different expectation of the 24h culture out there and I don't think the public sector is there yet. " – Local Government Consultant for Innovation 1

The following correspondent also expresses moderate interest in using social media for general overview of political life. The interviewee emphasises the

lack of any specific tools that could help to manage the information coming from Social Media, as a blocker in using social media on daily basis:

"It would be just by looking at the news feed and looking at some of the conversations. I don't have aggregate tools; they might be useful." – Independent Senator 5

The next correspondent admits that politicians get involved in social media discussion though also expresses a concern over longer use of social media as a valid tool due to lack of focus:

"I note some politicians get involved in Twitter debates, but I stay out of those completely because I have seen people who can get stuck in those and goes all around the houses. I don't find that useful at all to be honest." – Senator 1

Technology support for duality of e-Participation

It is apparent that there are very few useful tools that politicians and decision makers would use directly for e-Participation. The technologies that are not available yet are considered essential by politicians include all sorts of cost-effective technologies enabling automatic content analysis, extending the reach and boosting the engagement. In particular politicians welcome technologies emulating actions usually performed manually by a group of social-media assistants at high labour cost. This includes, in particular, knowledge management tools (content summarization and filtering – location, topic, demographics) as well as integrated and targeted publishing, "hot topic" detection followed by detailed citizen mood analysis (sentiment). The set of tools that are also mentioned goes beyond manually performed analysis capabilities. This includes, in particular, tools providing insights into profiles of individual citizen-contributors with validity, demographics,

representativeness, and social influence metrics for each and group of profiles.

For example, one of the correspondents stresses that there is a need for tools that would enable to determine people background information, hence enabling focus on posts coming only from their own constituency. Moreover the interviewee stresses that there is a need for tools enabling self-moderation:

"Profiles, that you could tailor profiles, that you would know exactly who it was that was on the network. And once you have those profiles then you can match-make, I mean most of what we do is networking so while might be interesting to get the general feed the general feel for what we do, we problem need to be more focused.

(…)I think we require something that would meet our needs but would be also self-regulating." – Local Government Consultant for Innovation 1

This is corroborated by the next correspondent who stresses that there is a need for tools that would enable to focus on posts coming only from their own constituency and a capability to generate a list of most popular, local topics:

"That sounds great if I could zoom in on my constituency and local topics. That is the key to it I think. So I could have different issues like you say: mortgage and childcare and education and health that would relate to the issues in my constituency. That is the key to it (…) That is a big thing to target your constituency. There is no point for people from Carlow or other constituencies sharing or liking what I am doing; it is my own constituency that I need to be reaching out to. It is reach. It is crucial to be able to identify who my audience is, to be able to target and engage with my constituents. (…)

At the moment when I am on Social Media, I don't know if am I targeting my audience that is why I don't want to spend too much time because you can get

bogged down and it is not barring any fruit. At the moment when I am on Social Media, I don't know if am I targeting my audience that is why I don't want to spend too much time because you can get bogged down and it is not barring any fruit (…) It can be of help when you are then putting up your message through other media forms,

" – Senator 2 (leading party)

In the same line, the next interviewee emphasises that the tools enabling reaching specific segment of the population (based on demographics or location) is essential for very much constituency-driven and topic-driven policy-making. Moreover the correspondent stresses that there is a need for tools providing the information on the mood with in depth analysis of the opinions (not just simple positive/negative mood information). Finally the interviewee expects tools that would help to provide an overview of the topics discussed with possibility to reach the specific source-opinions and specific authors:

"also, because my own expertise is in education and I am married to a farmer, so those type of areas. There are specific blogs, don't get me wrong, so (…). And family oriented (…) is of interest to me.

(…) but what I still would like in that summarization I would love the individual quotes, because that is like doing a Ph.D. you need the qualitative stuff. It is to drill down.(…) I would love to know who those people are, on Facebook or on Twitter and just communicate with them about issues that are relevant. (…)

Yes absolutely, it is very relevant, it is very significant, though, not just (…)

the mood is important but is the reason for the mood that is more important. Because sometimes people are missing found quite genuinely. It is not that they got the third or fourth hand, so there is a lot of misinformation in the political scene. (…)

What I am really keen on is getting information about the person that is the author of that. Like, are they 30 or 45 are they men or female, social information."

" – Independent Senator 5

The next correspondent stresses that the major limitation of the Social Media interfaces is that interaction is often limited to their peers. Therefore it is essential to provide tools that would enable more in-depth, horizontal exploration of social web with particular integration of social media feeds.

"I think one of the downfalls we have with our own Social Media is that we can tend just to get feedback from who are our friends, so you don't see what is happening in another people sphere.(…)

I see the Social Media exploration would be quite different. I think it would be useful to have Social Media, and news feeds together. " – Senator 1

The essential role of the deep opinion analysis (including the mood information) tools is corroborated by the next correspondent:

"More and more, and especially when we are moving more into the concept of data analytics it is making it easier to actually get those opinions and form those opinions and analyse those opinions. (…)The information about mood would be useful; that would be input into your policy formation and your strategic plan. " – Local Government Consultant for Business and Transport

The next interviewee emphasises the need for content summarisation and topic detection tools as a solution to distributed information and information overload on various channels:

"(…). Preferably every newspaper or broadcast is organising a survey and in a way I think you should not let those surveys dominate the policies. You should as a policy maker be very assured how your people will react, (…)I think it

could be, I am not really an expert on that kind of summation processes, but I can imagine that could be very helpful. Because lots of time that kind of discussion are so wide, so many topics are covered that you can't make out any line. And when there is some kind of automatic process which highlights three or four topics mentioned by everyone, you could elaborate on them. So I think that would be a good idea if it is combined with a kind of open space for feedback and elaboration on those topics. I think the combination of both would be the best. I am a bit of old fashion kind; I think the straightforward communication between people who are really interested in the topic in the end creates a most quality of argument. But to single out some topics which concern lots of people, those summarization techniques would be very helpful. " – Local Government Consultant for Employment

The next correspondent emphasizes the need for tool integrating information from major communication channels including mainstream media digital publishing platforms and social media. Moreover the next correspondent stresses that there is a need for tools that would provide information on trending topics, filter information as well as tools supporting broadcasting and promotion of specific political opinions:

"So the ideal is the four different media hand in hand. (…)

I would say if I have a motion on particular topic that I would like to change or to get more attention to particular motion (…) Absolutely yes, if you could filter the content that would be good. " – Local Government member

This is corroborated by the two next correspondents who emphasize the need for information filtering and topic-based information summarisation.

"Yes, very important I do not need to elaborate on that, yes topics is crucial (…). You would be focusing on very specific thing at any point in time, so it is good to be able just to get to that particular thing and focus on it. (…) Yes, and certainly what is useful is to get an overall graph. If you look at the wider context of the particular thing, and you can get feedback for a period of time

like twitter. If you consider tens of thousand of them, that is useful because you are given a macro view and to some extent filter out or not allow that you are going to have subversive opinions and trolls and "messers"" – Senator 4

"Absolutely yes, if you could filter the content that would be good." – Senator 3

7.4 Analysis Conclusions

The analysis presented identifies a set of barriers and opportunities for harnessing the duality of e-Participation. In particular, the analysis reveals, that despite over a decade of e-Participation research and practice, there is a misalignment between the capabilities available (from the perspective of e-Participation democratic processes, initiatives and socio-technical platforms) and the specific needs presented by decision makers. Specifically, considering the research gaps that we identified in the e-Participation literature (by the application of the Integrative e-Participation Framework to e-Participation model space), our analysis confirms that democratic aspects of e-Participation are largely unaddressed. In particular, in the democratic context, the research gap spreads across three views discussed in the beginning of this dissertation: Formism, Mechanism, and Organicism. From the Formism perspective, there is no models nor clear methods in the literature that would identify the key e-Participation components nor specific activities in the democratic context that would enable e-Participation initiatives to feed relevant information back to the policy making process with full acknowledgement and consideration of citizens' input. This is particularly evident when considering existing e-Participation initiatives (also investigated in this dissertation) - the specific goals (Organicism) for e-Participation initiatives, with clear impact path, are rare. Instead, e-Participation initiatives are run without formal assurance of

impact, with hope that the outputs will be incorporated into government agenda. The results of our analysis support that premise derived from the state-of-the-art research and practice investigation. The analysis showed that due to lack of significant advancement in e-Participation methods and tools, the traditional models for policy-making prolong with limited political process innovation. Politicians seldom engage with citizens directly, with the majority of the citizen input still transmitted to policy-making agenda through the representation of local politicians. That introduces implicit censorship of citizens' input (with specific politicians as a bottleneck). Therefore, only a handful of selected ideas reach the higher decision-making instances. Moreover, the lack of methods and relevant e-Participation models that would include promotion of e-Participation as an imperative for new democratic processes or would try to fit the e-Participation to existing processes, results in situation where politicians and decision-makers have rather little knowledge of the existence of e-Participation platforms. The existing, specialised platforms deal with very specific issues, falling far away from expected "one-stop-shop" for policy-makers.

Considering the research gap, which is pivotal for this study: the lack of technologies delivering innovative capabilities for supporting duality of e-Participation, the analysis showed that the set of tools currently at government's disposal is very limited and insufficient to support the duality of e-Participation. In particular, there is no dedicated models nor guidance for specific technological tools to be used (gaps in Mechanism View in the Socio-Technical perspective of our Integrative Model-based state-of-the-art analysis) to facilitate the monitoring of social media platforms. This was anticipated and is reflected in our Integrated Model for e-Participation where technological innovation component (dealing with essential adaptive capabilities) requires delivering effective e-Participation discussions monitoring and support for ubiquitous social-media-based e-Participation. In

this context, our analysis confirms that it is rare for politicians to leverage digital technologies for citizen-generated content monitoring, mining for ideas or for citizen engagement on broader scale. Politicians acknowledge the existence of policy-related discussions on social media. However, due to lack of specific tools (or recommendation of thereof) they consider social media only a rapid feedback and dissemination solution with not much emphasis put on the possible long-term impact on policy-making.

Additionally, the lack of innovative capabilities related to social media user profile processing and filtering, in contrast to content filtering (not anticipated initially in the Integrated model for e-Participation), results in generally perceived low quality of contributions and perceived misrepresentation (or rather lack of means to verify the representativeness) of important social groups on social media. In particular, the e-Participation innovation requires relevant user-verification tools to alleviate the anonymity and prone to manipulation, standard interaction model. This is particularly important as the analysis indicates a great lack of trust in the authenticity (genuineness) and validity of the contributions on social media.

The limited innovation in the areas identified, implicates that, both classic e-Participation platforms and social media are often employed as one-way dissemination channel for broadcasting information, on par with mainstream media like newspapers, radio and television. Furthermore, the lack of easy to use, comprehensive and universal tools for obtaining information and ideas, supports the existing "internalism" of political organisations.

Nevertheless, both current e-Participation platforms and social media solutions are considered by decision makers a valuable starting base for innovation and create a lot of opportunities for future solutions for inclusion of citizen opinions in policy making. Decision makers do not deny the potential that lies in leveraging the classic e-Participation platforms combined with information stream from social media. In contrary, the opportunity is

seen in taking the existing tools to the next level, starting with the integration of citizen information sources (both e-Participation platforms, social media and other digital channels), through particular data enrichment (more metadata) and finally automatic (or semi-automatic) data analysis. Specifically, data filtering, aggregation, information summarisation and explanatory tools (as essential building blocks for effective e-Participation monitoring innovation) built on top of the existing solutions are seen as pivotal to harness the potential of citizen contributions in policy making. Moreover, solutions that could enable selective information mining and interaction with citizen based on specific citizen-profile-specific properties (like locations-constituency, age, reputation and influence) are considered essential. Therefore, it is apparent that technology can support the duality of e-Participation, by facilitating and improving already existing e-Participation information retrieval and information management processes and tools.

Below in Table 15 we present the conclusions from the analysis mapped onto the duality of e-Participation analytical framework. We distinguish the observations and propositions relating to consequentially the government-led, citizen-led and empowerment levels of e-Participation. On the horizontal axis, we divide the view at the results from the perspective of adaptive, absorptive and innovative capabilities that are essential to be developed to support the duality of e-Participation.

Table 15: Duality of e-Participation Analysis

The Aspect of e-Participation		Dynamic Capabilities		
		Adaptive	Absorptive	Innovative
	Empower	• Citizens can influence policy making through party membership – 3 references • **Citizen influence on policy is available mainly through representation – 13 references** • **Rare opportunity is given to citizens (not members of a party) to influence directly policy-making (currently limited to face to face meetings, public hearings or at events) – 12 references** • Politicians may ignore citizens' opinion if not aligned to current party policy – 5 references	• Citizens discuss the policies and policy ideas daily on social media, often addressing decision makers and political parties – 5 References • **The transformation and the inclusion of citizens' input from social media in policy-making agenda is still a challenge. Current methods enable the inclusion of input from social media only through representation – 20 references** • A high dependence on decision makers' capabilities exist, to identify citizen contributions and discussions linked to specific issues considered. Politicians are limited by manual discussions exploration – 11 references	• A need for technologies that would identify specific discussions and link it explicitly to specific policies and public services to enable decision makers to get a grasp of citizens' opinions and ideas on specific issues – 3 references • **A need for technologies to facilitate the process of inclusion and relevant forwarding of feedback from social media directly into policy-making agenda with full acknowledgement of key contributions on matters imported and possibility to engage with specific citizens – 8 references** • A need for data explanatory tools for better understanding of content provided – 4 references
CLeP	Process	• The manual, labour-intensive social media analysis by decision makers or designated people – 11 references • Rare use of information aggregation/analysis tools by decision-makers (interaction mainly through standard social media interfaces) -5 references • **A need for more efficient processing (possibly supported by automatic or semi-automatic analysis) of the vast information coming from social media -27 references**	• **The vast contributions on social media are of varying quality with limited metadata provided with the content – 24 references** • **There is no information on the scope of the discussion, topic, location and demographics of the contributors – 19 references** • Gathering and inferring relevant information important for the analysis is a challenge. Current, largely manual methods are very limited and are not able to deliver a rich, comprehensive analysis of the contributions on social media – 10 references	• The technologies that would enable effective information integration and consolidation are needed to provide more comprehensive social media contributions' analysis – 3 references • **Technologies that would identify topics and rank the content, based on the estimated quality of contributions would allow more valuable conclusions – 12 references** • **Technologies that would allow tracking of provenance and provide rich information on demographics and location would ensure more relevant and more fine-grained analysis – 13 references**

	Shaping	• Politicians very rarely engage in discussions with citizens on social media due to insufficient information on the demographics and origin of the contributors - 10 references • **The perception of the representatives and the trust that contributions are genuine is largely very low among politicians – 37 references** • Decision makers are afraid of activist hijacking the conversations; hence lack of reputation information is considered a blocker challenge – 8 references	• **Many discussions on social media, despite presenting significant-quality content, tend to be dominated by activist, biased individuals or specific groups of interest. This renders the social media discussions unattractive to engage with, from policy-making perspective. The challenge is to enable all types of stakeholders and objective experts to get the voice – 28 references** • **There is a lack of information on representativeness or bias of discussion contributors. Demographics and origin of the contributors information are essential to ensure that politicians engage with eligible voters / individuals (citizens, people from particular city or county) – 10 references**	**The technologies that would filter out only valid (by topic, location or demographics) and possibly valuable discussions (including non-biased participants of good reputation and influence) would enable much more targeted, therefore, more efficient engagement of politicians with citizens. In particular, this requires specific social network and social profile analysis technologies that can infer and rank social media contributors and classify them based on multiple criteria (such as age, location etc.) – 28 references**
	Listening	• **Decision makers do not monitor social media on regular basis. This is due to limited time available (officials working 9 to 5) – 10 references** • **Decision makers rather broadcast information than listen to opinions -12 references** • Information overload with numerous posts and opinions is overwhelming to decision-makers – 6 references • Politicians are often supported by dedicated assistants who manually monitor social media. This solution though is usually insufficient considering the ever-growing amount of information generated on social media – 5 references	• The volume of information generated by social media is largely overwhelming. The challenge is to extract, consolidate, filter and structure information in a way that would be easy to explore – 7 references • Even after filtering the volume of information is might difficult to comprehend therefore there is a need for relevant methods to summarise the content – 8 references	• **The technologies that would constantly aggregate, filter and process the information are the key to avoiding the time-space-misalignment between citizens and decision-makers – 12 references** • Effective data visualisation and presentation technologies are essential to enable fast and easy social-media discussions exploration for policy-making purposes. • **Sentiment-analysis technologies are seen as important to acquire insights on citizen opinion on specific policies – 11 references**

GLeP	Process	• Due to low of awareness and low significance of e-Participation platforms, decision makers rather rarely analyse the discussions on classic e-Participation platforms – 5 references • Occasionally, politicians visit political forums and manually browse through the content, seeking for interesting statements – 6 references	• e-Participation platforms exist however there is very little awareness of their existence among politicians – 5 references • **The image of the e-Participation platforms (or preference for politicians to use these platforms) as tools to engage with citizens is rather poor – 14 references** • It is important to provide better dissemination as well as better diffusion of the content through multiple channels in order to give the classic e-Participation platforms more exposure – 8 references	The technologies that would support effective dissemination and content promotion through social media would significantly improve the visibility of the content on classic e-Participation platforms. These technologies should also help to raise the image of e-Participation platforms as important sources of information from both citizens and politicians – 9 references
	Acknowledge	• **Citizen output is usually forwarded to the higher instances by representation. Nevertheless, this is done without credits given to the citizens who raised an issue or came up with an idea – 21 references** • Decision makers rarely acknowledge explicitly citizens contributions – 2 references	**There are valuable contributions on e-Participation platforms. There is still no mechanism to ensure that the contributors are acknowledged and specific credit given for successful solutions and ideas – 20 references**	The technologies that enable linking of specific policies and government undertakings with seed discussions that triggered the policy change (and feed the acknowledgement back to social media) would allow citizens to be explicitly rewarded for their contributions - 4 references
	Stimulate	• The eParticipation initiatives are usually advertised through mainstream media like newspapers and radio – 3 references • **There is a lack of specific mechanisms to boost the classic e-Participation – 10 references**	• e-Participation platforms should be better disseminated through digital channels as oppose to the mainstream media. Due to digital nature of these platforms it is more suitable to use digital channels for dissemination to reach the digitally enabled part of the society – 5 references • e-Participation initiatives' impact is not communicated effectively to citizens – 4 references •	**The technologies that would enable more effective, targeted advertising of e-Participation on social media should allow better discussion stimulation on classic e-Participation platform – 12 references**

	Request Participation	• Decision makers use popular mainstream media like television, radio and newspapers to inform citizens about new e-Participation initiatives – 3 references • **There are very few examples where politicians engage with citizens on classic platforms and explicitly request contributions. Requests disseminated through digital platforms are rare – 14 references**	e-Participation platforms usually serve a vast collection of topics and threads for discussions. The challenge is to ensure that the threads and topics are directly linked to the current policies and government efforts – 3 references	Technologies that would enable e-Participation platforms to create or link threads to specific policy documents and government efforts would allow straight-forward citizen engagement and invitation to discussions on upcoming policies – 4 references

8 Technical Infrastructure Revisited Design

8.1 Social Software Infrastructure Model

Based on the analysis provided, in this section we present a refined version of the Social Software Technical Infrastructure that directly addresses some of the barriers and considers the proposed solution. The revised model has been updated to meet the specific challenges pointed out by politicians and decision makers as major obstacles blocking the use of social media for everyday policy making. The high-level structure of the model has not changed. However, the functions and capabilities of specific building components have diffused into more specific areas (Figure 35). In particular, Government Interface Toolkit now has a more refined form (Figure 36). This implied some changes to the Knowledge Extraction & Management component.

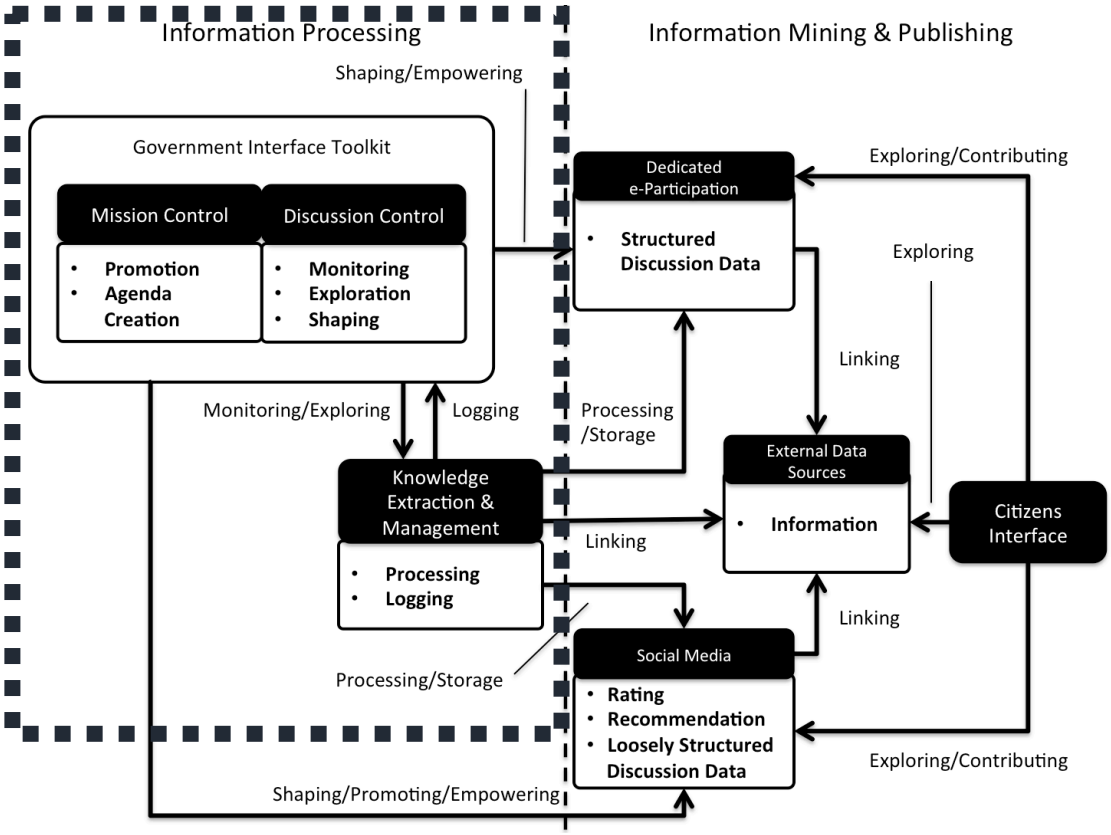

Figure 35: Social Software Infrastructure Design Changes

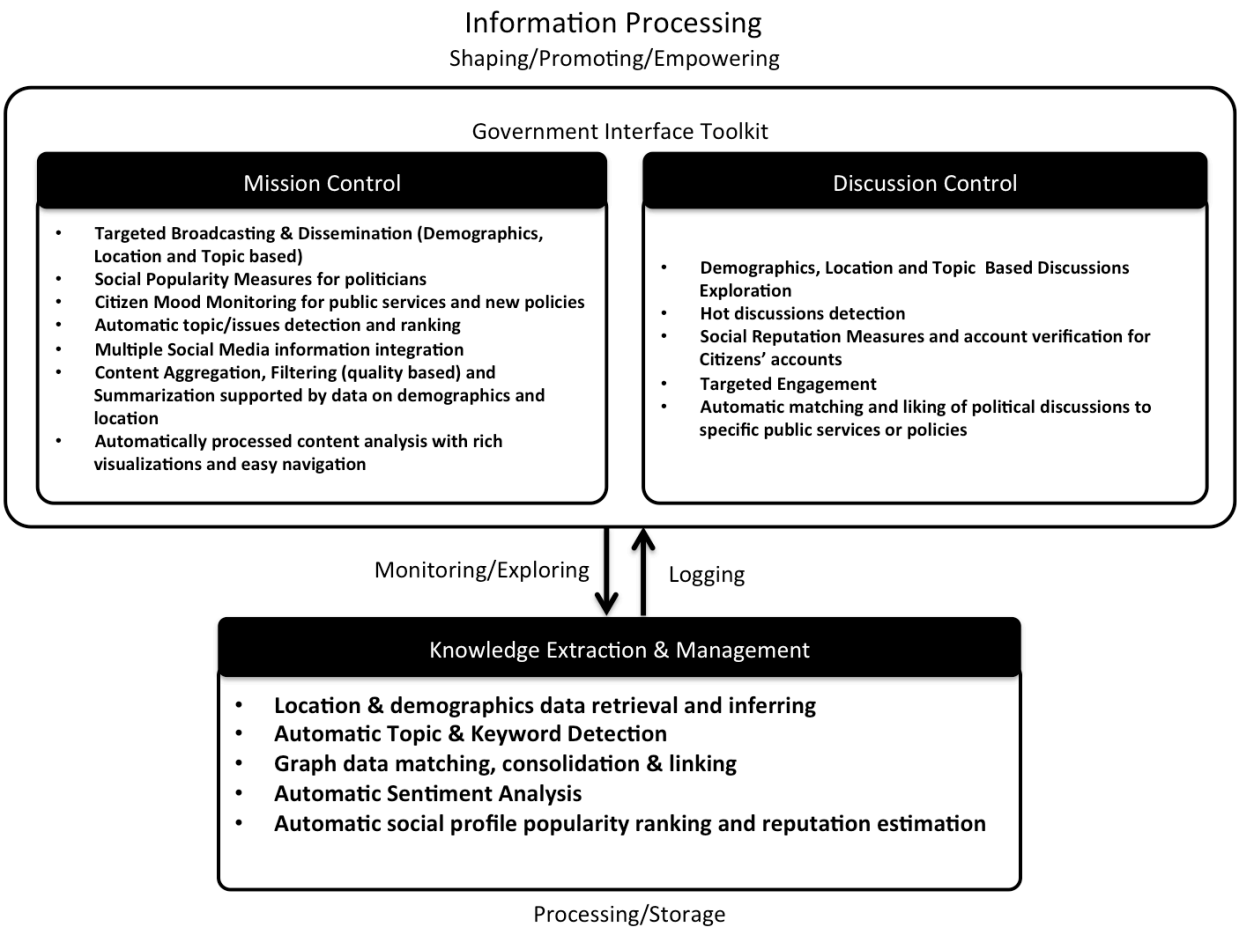

Figure 36: Social Software Infrastructure – Revised Components

In particular, most of the capabilities now are dependent on the availability of the information on location (social profile location) and demographics of participants for the social media contributions delivered by the Knowledge Extraction & Management component. This applies both to the capabilities related to political information analysis (Mission Control) as well as engagement in discussions by politicians (Discussion Control). It is important to ensure that the content analysed and presented for exploration for decision makers in the Mission Control is provided with representativeness and validity markers By validity, we understand that citizens contributing come from the location of interest for the decision maker. By representativeness, we consider that contributors belong to the age group range of interest for the decision makers. Here, location is also an important

filter when providing automatic social popularity measures for political profiles, since only popularity metrics within a specific constituency matter to decision makers. Also, information about the popularity within a specific age group is of great value to politicians. These facets also apply to political mood detection with regard to specific public services or new policies. The discussion topics detected, once assigned a specific mood value, should be linked to specific policies or public service information available on governmental portals and other external sources. This is a very important element of the infrastructure, as it becomes a powerful tool to judge the success of specific policies and services and may directly influence political decisions. Therefore, the data for the analysis should be fetched from as wide a range of social media platforms as possible for more objective conclusion making. The information from various sources has to be aligned and linked into a logical graph structure. The automatically processed content needs to be aggregated, filtered (based on the calculated content quality) summarised by relevant text summarisers and visualised. The analysis presentation has to have the form of a very simplistic interface for exploration and navigation to ensure that it does not include a steep learning curve. The Discussion Control has to deliver relevant social reputation measures for all the discussion participants. Therefore, the politicians could engage with objective citizens who are constructive in their contributions. The discussions have to be shortlisted based on the topic of interest for the decision maker. Also, the list of hot discussion topics has to be available in order to enable politicians to engage with the most influential and important discussions. All the topics should be potentially linked to the relevant policy documents and public services that they refer to. The list of discussions available has to again be restricted to a specific constituency or area that the politician is responsible for. The topic detection and discussion matching capabilities demand that the

Knowledge Extraction & Management component will deliver relevant topic and keyword detection functionalities.

8.2 Social Software Infrastructure Prototype Implementation

Based on the revised Social Software Infrastructure Design we present an example, prototype implementation. The infrastructure realizes many of the key principles highlighted in the model. We develop a prototype infrastructure in order to validate the design of high-end Social Software Infrastructure for politicians. The Social Media Analytics Dashboard provides basic content filtering and summary capabilities along with the topic detection and mood information. In this prototype, we focus on Irish politicians, Irish political scene and Twitter as social media example. Also, for the purpose of the study, we restrict the external information sources linked to Irish & UK public services. We first align our implementation to the state-of-the-art technologies; we elaborate in detail on the assets required to for the implementation and present early implementation results.

8.2.1 Candidate Technologies

Web 2.0 and Social Media in e-Participation

The last decade witnessed many examples of the use of social software as an infrastructure for realizing certain aspects of e-Participation. Social software is usually referred to as Web 2.0 Software (or platform) that enables social networking by offering capabilities for people to contact and interact with each other (Reuter & Marx, 2011). The main principle of Web 2.0 is collective intelligence, collaborative content creation and composition by the user (here citizen) who contributes towards common knowledge (O'Reilly, 2007). Many

e-Participation projects including HUWY[58], U@MARENOSTRUM[59], VIDI[60], WAVE, [61] VOICES[62], WEGOV[63], Puzzled by Policy[64], PADGETS[65], SPACES[66] employed Web 2.0 tools such as digital forums, blogs, wiki's and live-chat to provide dedicated e-Participation environment where citizens can express and discuss their needs, concerns and ideas. Those highly structured platforms, though supposedly well tuned to specific e-Participation needs, in principle suffer from the abysmally low participation of citizens. In contrast, very specific, incredibly popular sub-group of social software tools: Social Media are widely used by citizens for spontaneous political discussions though without a direct link to the formal e-Participation. This phenomenon is referred to in the literature as Duality of e-Participation (Ann Macintosh et al., 2009a). Therefore, in response to challenges faced by the dedicated e-Participation platforms some of the solutions indeed, introduced explicit support for the popular Social Media platforms with particular feed integration (in rare cases both ways content exchange is available) (Chang, 2008)(Panopoulou et al., 2010). Some more advanced solutions such as presented by PADGETS (Charalabidis & Loukis, 2011) with an injection of special widgets into Social Media enable direct back-loop feed to the dedicated platform. However the big challenge remains unsolved as the

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[58] http://www.huwy.eu/vi

[59] http://www.uatmarenostrum.eu/

[60] http://www.vidi-project.eu/

[61] http://www.wave-project.eu/

[62] http://www.give-your-voice.eu/

[63] http://www.wegov-project.eu/

[64] http://join.puzzledbypolicy.eu/

[65] http://www.padgets.eu/

[66] http://www.positivespaces.eu/

prominent e-Participation solutions integrating Social Media largely do not address the issue of volume nor quality (lack of relevant selectivity) of the content produced (Agichtein et al., 2008), therefore, do not ensure sufficient innovation to enable the dual e-Participation observed by Macintosh (Ann Macintosh et al., 2009a). We are aware of certain original attempts to leverage the potential of spontaneous discussions on Social Media, such as the innovative approach presented in WEGOV project (Claes et al., 2010). Nevertheless, the methodology applied in the project appears to rely on relatively generic Social Media analytics tools (for topic detection, topic popularity, sentiment analysis and seed user detection) without explicit, direct links to the government sphere including for instance: references to governmental services, policy documents or newsletters. Moreover, the methodology does not seem to give much of explicit thought to the essential synergy between current government-led solutions and processes, and citizen-led participation. Therefore, the solution offered by the project, though advanced, appears to repeat the principles of the already available off-the-shelf, popular Social Media analytics solutions for businesses.

Considering Social Media and politics, it is important to recall miscellaneous attempts to harness Social Media for e-Participation, beyond e-Participation research projects. In particular, as it has been shown that successful Social Media campaign can influence political popularity (hence can have a significant impact on results of elections), many decision makers and government offices employed Social Media as a direct campaign communication channel (Effing et al., 2011) (Moreira & Ladner, 2009). Another important e-Participation Social-Media-use context has been: improved, Social-Media-supported Disaster & Crisis Management and Policy Development derived from a Social-Media-facilitated citizen reporting capabilities (Kuzma, 2010)(Ashley et al., 2009). In particular, Social Media have been playing increasing role as rapid crowdsourcing and rapid response

tools, especially in the events of crisis (including political crisis) (Makinen & Wangu Kuira, 2008) and natural disaster (Gao, Barbier, & Goolsby, 2011). However, the Social-Media-applications for e-Participation, in the cases mentioned, focus rather on the use of popular Social Media platforms directly or use common, off-the-shelf (not a domain specific) analytical methodologies and solutions to harness the spontaneous political discussions what results in moderate performance. Therefore, a solution that would try to comprehensively address specific analytical needs of the e-Participation context, such as effective methods for identifying political content on Social Media or contextual information clustering and linking is yet to be developed.

Semantic Web

The Semantic Web (Web 3.0) provides a framework that allows data to be shared and reused across applications, enterprises, and community boundaries (Tim Berners-Lee, James Hendler, & Lassila, 2001). Semantic Web leverages ontologies for information modelling and knowledge representation. Ontologies provide a controlled vocabulary of terms that can collectively provide an abstract view of the domain (Schreiber & Swick, 2006). Semantic Web technologies and ontologies are being used to address data discovery, data interoperability, knowledge sharing and collaboration problems. Ontologies can be described in RDF (Resource Description Framework) (Frank & Eric, n.d.) which provides a flexible graph-based model, used to describe and relate resources. The application of Semantic Web technologies to e-Government gained significant momentum with applications to several major areas including the use of ontologies to formally model different aspects of e-government; Structuring e-Participation research (Wimmer, 2007), Enabling personalized service delivery (Loutas, Lee, & Maali, 2011); Enabling interoperability and integration of government resources and services (Ojo, Estevez, & Janowski, 2010).

Natural Language Processing

Information Extraction

The goal of Information Extraction (IE) is to derive information structures directly from text with an emphasis on the following aspects: identifying relations from textual content (Embley, Campbell, Smith, & Liddle, 1998), automatic instantiation of ontologies and building knowledge bases tools (Alani et al., 2003). Common methods on IE have focused on the use of supervised learning – SL techniques (Bikel, Miller, Schwartz, & Weischedel, 1997), self-supervised methods (Etzioni et al., 2005) and rule learning (Soderland, 1999). These techniques learn a language model or a set of rules from a set of manually tagged training documents and then apply the model or rules to new texts. The challenge for the SL approaches is the high cost of creating the labelled resources. In contrast, the unsupervised learning (UL) methods (also referred to as Open Information Extraction) attempt to fetch information automatically from the texts themselves (Dalvi, Cohen, & Callan, 2012).

Named Entity Recognition

A named entity can be defined as an entity classified accordingly to a predefined set of categories for instance: person, organization, location, brand, product, time, date, etc. (Grishman, 1996). The Named Entity Recognition applies multiple "classic" information extraction techniques listed before SL, SSL and UL. However certain contemporary NER solutions apply lexical resources (e.g. WordNet[67]), lexical patterns and statistics computed on large annotated corpus (Alfonseca & Manandhar, 2002). The common processing pipeline for NER includes detecting named entities, assigning a type weighted by a numeric confidence score and by providing a list of URIs

[67] https://wordnet.princeton.edu/

for disambiguation. The lexical resources and terminological databases are an essential part of modern NLP systems consisting of a large amount of highly detailed and curated entries (Mccrae et al., 2012). A Lexicon can be developed to be domain independent or to support a specific domain.

8.2.2 Approach

Design science creates and evaluates artefacts that define ideas, practices, technical capabilities and products through which the analysis, design, implementation and use of information systems can be effectively accomplished. Given that important part of this work is to construct a technical artefact, our research follows the Design Science Research guidelines and process elaborated in (Hevner & Chatterjee, 2010) and (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). In particular, our objective is to develop a Knowledge Extraction & Management Component (KEMC) and then The Government Interface Toolkit (GIT) leveraging the KEMC as the engine.

The architecture implements a standard MVC – Model View Controller – paradigm. The technology stack includes Java as the core programming language for logic components – controller, JavaScript and HTML5 for the view layer, and RDF – Semantic Web technology, for the model layer. The prototype solution has been built accordingly, as an HTML5 interface leveraging JavaScript (JQuery library) to query the Java-based core controller via a RESTful API. Therefore, the lightweight presentation layer including the Mission & Discussion Control portion is separate from the core processing component – the Knowledge Extraction and Management Component. In this way the information processing component can be improved at any time without changes to the interface. This also ensures that extra learning will not be required on the decision-maker side whenever a major change occures to KEMC to improve the efficiency of the system . To ensure the required set of

capabilities for KEMC, we construct two key technical artefacts – 1) a lexicon of public service names and 2) a Named Entity Recogniser based on the lexicon and integrating generic NER solutions through dedicated APIs. The development of the lexicon is based on national public service catalogues. The two datasets were employed as input into a process which automatically relates public service names based on a set of semantic similarity and relatedness measures including Explicit Semantics Analysis (ESA)(Gabrilovich & Markovitch, 2007) and WordNet-based measures. The resulting graph of Public Service Names is subsequently employed to develop an NER or spotter using an open source dictionary-based spotter framework. This is in line with the DSR process model described in (Peffers et al., 2007). We present the SSI Implementation architecture in Figure 37.

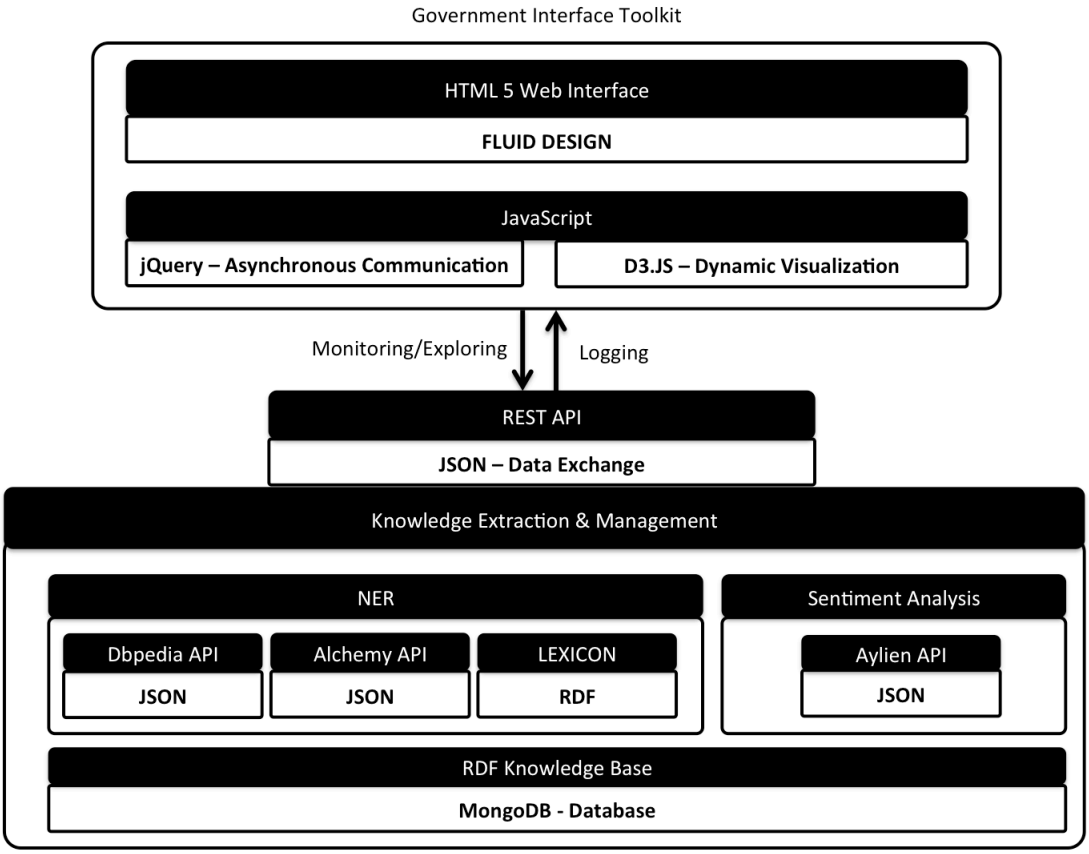

Figure 37: SSI Implementation Architecture

Knowledge Extraction & Management Component (KEMC)

In this section, we elaborate on the implementation of the Knowledge Extraction & Management Component. The core processing component leverages the Aylien[68] text analytics tool API to identify topics and estimate the sentiment (mood) for social media contributions. The analysis is run over social media content structured using RDF representation and stored in MongoDB[69] database. Our choice of MongoDB over other database solutions has been determined by the capabilities to store easily and operate over RDF represented data. In this prototype, we focus on Irish politicians, Irish political scene and Twitter as social media representation. The seed for the analysis is data from KildareStreet[70], a local Irish portal aggregating all conversations and presentations in the Irish parliament. The portal delivers rich information on politicians' scope of interest (topics related), their constituencies and areas of work. This information is pivotal from the perspective of updated Social Software Infrastructure driven by location (constituency), demographics (can be determined by the areas of work) and the citizen discussion topics that should be in line with the interest of specific politicians. The rich political profiles and related information extracted from KildareStreet.com is used as the starting point for the analysis. We aggregate the tweets from the locations indicated by KildareStreet input. We identify the discussion topics automatically through Aylien interface and match the specific conversations to the topics assigned to political profiles. Aylien also delivers information on the mood of specific tweets. . The interface enables the decision maker to login into the portal. A pivotal function for KEMC is to enable linking of the conversations to specific policies and public services. For

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[68] http://aylien.com/ (Accessed 17.11.15)

[69] https://www.mongodb.org/ (Accessed 17.11.15)

[70] https://www.kildarestreet.com/ (Accessed 17.11.15)

the purpose of this study we focus on public services in Ireland. In this regard the implementation encapsulates two core building blocks: the public service lexicon and the NER solution leveraging the generated language resource. We present the domain-specific lexicon creation process algorithm followed by application of the language resource to dedicated NER solutions combining the output of the generic NER solutions.

Lexicon

In order to construct the lexicon we drew from the existing catalogue of services and the Core Public Service Vocabulary[71] – a simplified reusable and extensible data model that captures the fundamental characteristics of a service offered by public administrations. We leveraged the Core Public Service Ontology as the basis for creating the initial language resource. Two major datasets were employed as input resource to the development of the lexical resource – the United Kingdom and the Irish Government Public Service Catalogues. Given that the recall potential of the resource is directly linked to the diversity of its entries continued update to the lexical resource based on other government public service catalogues is important.

Using this language resource in the information extraction helps in populating the public service ontology using the information extracted from governmental public service documents (different from public service catalogues) in the form of standard PDF documents or as web documents. We

Construct the lexical resource
Input: $C \neq \emptyset$ //C is the catalog of the public service names.
Output: R // R is the Lexical Linked Data (LLD) Graph of the service name.
begin
  $R \longleftarrow Initialize(c^*)$, where $c^* \in C$
  $c' = C - c^*$
  for $cg \in C'$ **do**
    $R = Align(R, cg)$
  end
  Initialize:
  Input: C_G //Dataset of public service names
  Output: R //LLD graph contains only service names in C
  $R = emptygraph$
  for $ci \in C_G$ **do**
    Add node Si to R with new URI and same name with ci
    Create a child node $CiforSi$ in R with same identifier name in ci
    Create node ci in R
    Creat a directed edge from Si to ci
  end

Align:
Input: R, C_G //C= Service Catalog
Output: R // C_G = Specific public service dataset, $C = C_G$
for $cg \in C_G$ **do**
  FoundSimilar = FALSE
  for $Si \in R$ **do**
    V = Set of nodes in R with outgoing edges
    for $n \in V$ **do**
      if $SemanticRelatedness(cg, connectedNodes(n)) > T$ **then**
        Create node cg in R
        Create a directed edges from node n to cg
        Update keywords in n
        foundSimilar = TRUE
      end
      if $!FoundSimilar$ **then**
        Add node Cg^* to R with new URI and same name with cg
        Create node cg in R
        Create a directed edges from node cg^* to cg
      end
    end
  end
end
end

describe the lexicon construction

Figure 38: Lexicon Construction Algorithm

[71] https://joinup.ec.europa.eu/asset/core_public_service/description

algorithm in Figure 38. In short: The construction starts with the acquisition of the first list of the Public Services Names and unique identifiers in a form of URLs from the first catalogue. Then the following public services catalogues information is aligned with the existing index based on similarity measures. The flat structure is lifted to a tree (ultimately a graph), and similar concepts are abstracted to generic concepts. The procedure follows for consequent data sources. The abstracted concepts are described by keywords derived from sub-concepts for better data navigation.

Named Entity Recogniser

In this section, we elaborate briefly on the dedicated NER solution. The Java-based basic tool developed incorporates the implementation of a "Public Services Spotter" for Social Media with the domain-specific lexicon for Public Services Names as the input dictionary. As we can observe from the results and an initial evaluation of its performance in "spotting" public services related information (presented in Table 16), the dedicated solution outperforms generic NER tools (DBpedia Spotlight[72] and Alchemy API[73]) which can hardly identify any public services. However, off-the-shelf solutions supply rich, contextual information, for instance: location, organisation, people (and more). The tools are also capable of providing statistics-based data, like "hot" topics and keywords. We argue that the final output of KEMC as a combination of public service names linked with fine-grained information in a single semantic graph can deliver a very powerful tool for political Social Media data analytics. In particular, this enables the creation of rich data stories with detailed information on where particular Public Services are being

[72] https://github.com/dbpedia-spotlight/dbpedia-spotlight/wiki

[73] http://www.alchemyapi.com/

discussed and in which certain political figures or organisations are usually mentioned around the topics in specific locations. Moreover, certain major topics and keywords can be supplied together with sentiment analysis and popularity statistics. To better visualise the range of possibilities, we consider a hypothetical use case scenario in next section.

Table 16: NER performance comparison

Tweet	LEX NER	DBpedia	Alchemy
Ireland is issuing passport cards for EU travel, like US/Canada. Can take photo from smartphone	Passport issuing: https://egov.deri.ie/PublicServices/Service/UK_PASSPORT_ISSUING Passport: https://egov.deri.ie/PublicServices/Service/CA_goc_passport	Passport cards: http://dbpedia.org/resource/Passport_card EU: http://dbpedia.org/resource/European_Union Canda: http://dbpedia.org/resource/Canada smartphone: http://dbpedia.org/resource/Smartphone	US/Canada: Country EU: Organization Ireland: Country
Why Rwanda Plans to Issue Biometric Passport - Rwanda will start issuing biometric passports to her citizens which	Passport: https://egov.deri.ie/PublicServices/Service/CA_goc_passport	Rwanda: http://dbpedia.org/resource/Rwanda biometric passports: http://dbpedia.org/resource/Biometric_passport	Rwanda: Country
@SenatorLesniak No hunting licence for ANYONE that hasn't completed a gun safety course.	https://twitter.com/christwords199/status/556372403046240256	hunting licence: https://egov.deri.ie/PublicServices/Service/UK_HUNTING_LICENCE	gun safety: http://dbpedia.org/resource/Gun_safety

Government Interface Toolkit (GIT)

In this section, we elaborate on Government Interface Toolkit implementation encapsulating two core building blocks: Mission Control and Discussion Control. In our simplified case, we merge those two elements in one user interface for more clarity. The key components leveraged to build GIT include HTML5 for the interface look and feel and JQuery[74] – JavaScript based library for interface logic. Moreover, we leverage the D3.js library for rich visualisation capabilities. HTML5[75] is the widely recognised World Wide Web Consortium's standard vocabulary for designing web interfaces. We use version 5 to ensure the state of the art visual appearance and capabilities. We

[74] https://jquery.com/ (Accessed 17.11.15)

[75] http://www.w3.org/TR/html5/ (Accessed 17.11.15)

leverage so-called “fluid-design” to ensure the interface scales automatically regardless of the device used. Therefore, whether a politician would use a desktop machine, laptop, tablet or a smartphone, the interface will automatically adjust to provide the best possible user-interface experience. The JQuery JavaScript library enables HTML document traversal and

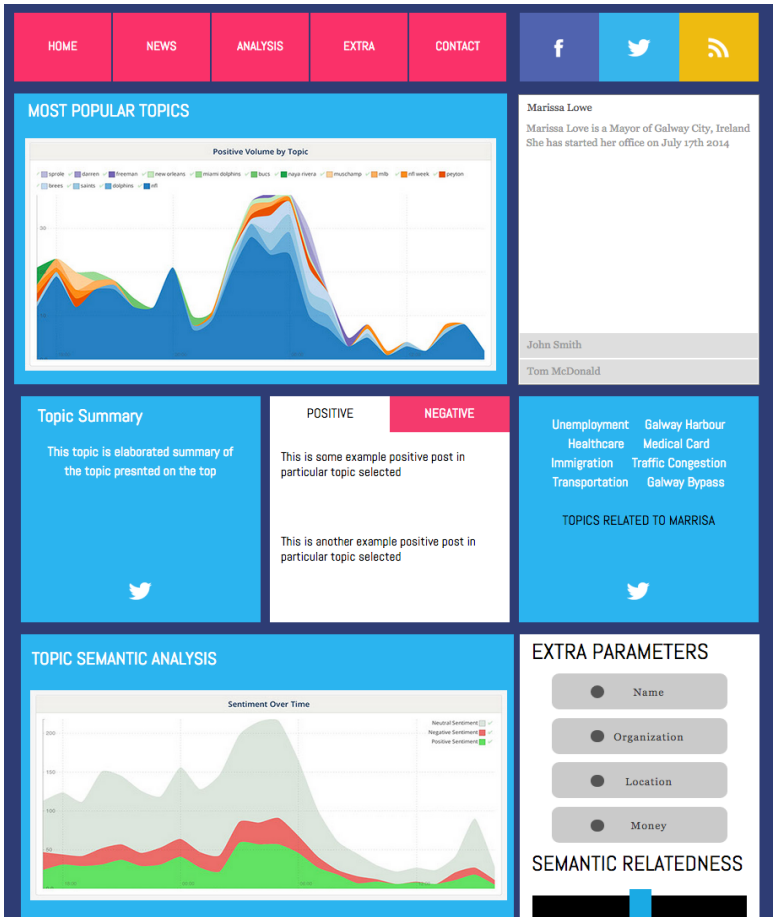

Figure 39: Government Interface Toolkit

manipulation. More importantly it enables asynchronous communication with remote servers which we use for communication with KEMC. The communication is carried by using calls to the REST (Representational State Transfer) interface available.

The HTTP calls can be executed remotely. Here are some example calls used:

To get list of the available politicians

http://140.203.154.166:8080/GetlistofPoliticians

To get list of topics that relate to a politician
http://140.203.154.166:8080/GetlistofTopics/{PoliticianName}
http://140.203.154.166:8080/GetlistofTopics/Se%C3%A1n%20Kyne

To get tweets about a specific topic
http://140.203.154.166:8080/GettopicInfo/{topic}
http://140.203.154.166:8080/GettopicInfo/job

Filter the result by getting only the tweets that include:

Organization mentioned
http://140.203.154.166:8080/GettopicInfo/{topic}/filter/organization/{true}
http://140.203.154.166:8080/GettopicInfo/City/filter/organization/true

Person mentioned
http://140.203.154.166:8080/GettopicInfo/{topic}/filter/person/{true}
http://140.203.154.166:8080/GettopicInfo/Labour/filter/person/true

Person mentioned
http://140.203.154.166:8080/GettopicInfo/{topic}/filter/location/{true}
http://140.203.154.166:8080/GettopicInfo/Dublin/filter/location/true

On top of the data received from KEMC through the REST interface via a JQuery library provides relevant data visualisations. The D3.js library enables us to visualise data in a dynamic graphical form. The library is considered one of the most powerful web-based data visualisation technologies (Qi Zhu, 2013). We present the GIT in Figure 39.

Scenario

Now we would like to demonstrate a typical use of the SSI solution through a use case scenario:

John Smith (hypothetical character) is an Irish politician promoting legislation introducing restrictions on medical card applicants' eligibility. John opens the

SSI-based e-Participation Analyser. Based on his specific request, the interface generates a dynamic report of places in Ireland from which it appears that citizens express negative sentiment towards the healthcare service. From the information mined from Twitter (public service tweets detected by our NER solution), it is apparent that Galway City (location detected) has the highest rate of negative opinions (sentiment analysis) oscillating around the institutions of University Hospital – UH and Merlin Park Hospital – MPH (organisation entities detected). Moreover, common topics found are (through topic analysis): prenatal care, physiotherapy and medical card. John tries to identify the key arguments against his policy for this project. Therefore, he explores the posts and discussions with the highest popularity rank having negative sentiment associated with medical cards and public healthcare. After following selected discussions (represented in Semantic Web format - every post and discussion is distinguished by a unique URL), he realises that the negative opinions come mainly from UH and MPH for not accepting a medical card for particular services (prenatal care and physiotherapy). Therefore he engages in discussion with citizens on Twitter where he explains that the issues mentioned by citizens are of local concern (but will be addressed) and ensures citizens that the upcoming legislation will not bring any harm but rather improve the current set of services covered. Also, since John now knows that the "hot" topics detected around Public Healthcare Services in Ireland are closely related to medical cards (similarity measures and graph distance), he suggests a relevant common strategy that should be developed in order to facilitate a solution to these problems. The use case scenario presented will be leveraged for real-world experimentation in an SSI deployment. We believe that the direct implication of the use of such an SSI will be to enable government to interact with citizen spaces on Social Media in a more selective, topic-relevant, efficient way and long-term, can contribute significantly to enhancing the delivery of public services as a result

of better understanding citizen's needs and concerns; hence directly supporting the duality of e-Participation.

Part IV

Conclusions and Future Work

IV Conclusions and Future Work

9 Conclusions

This dissertation started with the notion that the duality of e-Participation as the mutual (re-)shaping of the deliberations on traditional e-Participation and social media, is plausible, yet that significant socio-technical capabilities must be developed by governments to harness this duality. In this respect, we addressed the first research question: Q1 – What is the nature of the duality of e-Participation, by showing how the duality of e-Participation manifests itself and how specific methods can assist policy makers in bridging the gap between the realm of political discussions on social media and classic e-Participation, which is inherent to the above challenge. Moreover ,to address the second research question: Q2 – How to harness the duality of e-Participation, we have presented an integrated model for e-Participation capturing the key aspects of the duality. We have presented a Social Software Infrastructure Design building upon the integrated model. We leveraged the infrastructure to analyse the phenomenon of this duality. Finally, in order to answer question: Q3 – How technology can support the duality of e-Participation, we demonstrated how specific implementation of SSI can support policy-making by the inclusion of summarised and analysed political contents from social media.

This concluding chapter is divided into four sections: (1) we revisit the research contributions of this thesis, including (2) open questions, (3) future work and (4) the summary.

9.1 Research Contributions

We have categorised the specific research contributions of this thesis as follows:

• **Operationalization of the structuration model for e-Participation.** This contribution includes e-Participation state-of-the-art investigation, in particular e-Participation model space gap analysis. We designed a theoretical framework and identified the key underrepresented areas considering the state-of-the-art coverage. The direct outcomes of this category are specifically: 1) state-of-the-art investigation with highlights of major concepts, definitions and challenges; 2) integrative framework for analysing e-Participation domain model space; 3) an artefact - the map of e-Participation model space.

• **Development of models for e-Participation.** The models developed in this category deliver a theoretical and technical lens for the duality of e-Participation phenomenon analysis.

- **Construction of integrated model for e-Participation**. This contribution includes the construction of comprehensive, integrated model for e-Participation drawing from extensive e-Participation structuration and state-of-the-art analysis. The resulting model enables structured analysis of the phenomenon of the duality of e-Participation.
- **Development of a comprehensive, executable ontology for e-Participation to support the duality of e-Participation analysis and the SSI design implementation.** Based on the integrated model for e-Participation we developed ontology for e-Participation. The ontology covers three perspectives to e-Participation: 1) democratic, 2) project,

and 3) platform. The ontology for e-Participation enables structured e-Participation initiatives description and e-Participation knowledge consolidation and interoperability.

- **Development of an executable ontology for e-Participation deliberation to support the duality of e-Participation analysis and the SSI design implementation.** Based on the integrated model for e-Participation refined with Argumentation Theory and structured with Pepper's World Hypotheses we elicit a set of competency questions and refine the deliberation part of the e-Participation ontology into standalone e-Participation deliberation ontology. The ontology enables structured, spontaneous political discussions representation and integration, therefore, supports analysis of the social-media-based e-Participation channels.

- **Methods and tools for harnessing the duality of e-Participation.** Based on the integrated model for e-Participation we constructed a theoretical framework for the duality of e-Participation gap analysis. We identified the underrepresented areas and suggested possible solutions. Focusing on the technical aspects, based on the recommendations, we proposed a Social Software Infrastructure Design for harnessing the duality of e-Participation. We elaborated on the technologies that could support the SSI design. The SSI design and integrated model for e-Participation served as a knowledge base for a set of interviews and the analysis of duality of e-Participation conducted with politicians and decision-makers.

The direct outputs of this category include: 1) the duality of e-Participation analytical framework, 2) the state-of-the-art coverage map with respect to the presence of capabilities for supporting duality of e-Participation; 3) an artefact - the Social Software Infrastructure Design that addresses the gaps identified; 4) a set of recommendations for the technologies that could

support the duality of e-Participation; 5) a report from the SSI-derived analysis of the duality of e-Participation with politicians and decision-makers.

• **Technological artefacts.** This final contribution includes a revised design and proposed implementation of the Social Software Infrastructure. Based on the design, refined accordingly to the duality of e-Participation analysis results we built a prototype analytical dashboard for politicians. This technical artefact is a first step to providing comprehensive Social Software Infrastructure for politicians and decision-makers harnessing the key elements to support the duality of e-Participation.

9.2 Open Questions

While in this thesis we have addressed the specific research questions formulated with regard to the duality of e-Participation, this work also indicated new directions for research. In particular, our results indicated that there is a need for the following contributions:

• Despite the intensive debate about the potential of using social media for policy making in the e-Government community, there are very few studies on the exact ratio of political content to other types of contributions present on social media. Therefore, there is a need for a detailed analysis of the scope of the content on social media in order to judge the scale of the cost-to-benefit ratio in using social media for politics. Also, more attention has to be given to the context in which spontaneous discussions are conducted like location, culture and language.

• Another research question refers to the availability of the political and legal instruments to explicitly incorporate citizens' contributions from social media into policy making process. This includes studies of the political processes as

well as social aspects of e-Participation. Also, the ethical aspects need to be investigated in detail in order to ensure that the duality of e-Participation does not collide with the principal rights of privacy of the citizens.

9.3 Future Work

The research work presented in this thesis is a first step towards realising better social media-based e-Participation. The direct continuation of this research includes the following efforts:

• Investigation of the citizen's perspective on the duality of e-Participation. In particular, more research has to be done about the ways citizens use social media for political participation, the perception of social media-based e-Participation impact and expectations. This will involve a set of interviews with different, representative groups of citizens including different ages and an ethnically diverse group of individuals, companies, organisations and societies. This will result in comparative studies aligning citizens' needs and expectations to the capabilities offered by the governments.

• The study of the duality should be complemented by the investigation of the most recent form of e-Participation – so called, "m-Participation" (Mobile Participation). In particular, there is a need for careful analysis of the opportunities and challenges created by this new means of ubiquitous and constant citizen connectivity and citizen sensing. This is particularly important considering the context of developing countries where mobile technologies are ubiquitous, while classic broadband and computer-based communication are limited.

• Further investigation into the visibility of implementing a paradigm of citizen input-driven deliberative democracy with an explicit delegation of

responsibilities from government to citizens. This research resonates with new studies on the emergence of paradigms around smart cities, smart governments and smart societies.

9.4 Summary

The results presented in this thesis indicate that the reality of the duality of e-Participation to some extent differs from the image presented in literature. In particular, the expected seamless incorporation of e-Participation technologies with the policy-making process is rather limited. Politicians and decision makers are reluctant to use classic e-Participation platforms due to low citizen engagement. On the other hand, most decision makers and politicians do not consider social media as an important source of information for policy making. Instead, they use social media as a broadcasting and self-promotion tool for their policy agenda. This situation creates an illusion of control on the citizen's side that seems to be promoted by the mainstream media without deeper consideration of the problem faced by citizen-led participation. Despite the significant attention given to specific issues discussed on social media, it is rare that the ideas and conclusions coming from citizens on social media on various topics are actually incorporated into a policy-making agenda. Despite the great anticipation of ubiquitous citizen-led e-Participation, participation through classic political representation persists without a clear strategy for supporting the duality of e-Participation. The Social Software Infrastructure developed as an artefact of this research investigation helps to understand the underlying processes and to determine the essential capabilities for future e-Participation initiatives to meet the challenges mentioned. However, there is a need for deeper investigation of the citizen-to-government relationship in the context of collaborative value creation and inclusive policy making. This should involve broad research into the societal aspects of a technology-enabled deliberative democracy.

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