Participative Public Policy Making Through Multiple Social Media Platforms Utilization

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ABSTRACT

This paper describes the research concerning the systematic, intensive and centralized web 2.0 social media exploitation by government agencies for widening and enhancing participative public policy making, which is conducted as part of the research project PADGETS ('Policy Gadgets Mashing Underlying Group Knowledge in Web 2.0 Media') partially funded by the European Commission. The proposed approach is based on a central system, which publishes various types of policy-related content (e.g., short text long text, images, video) and micro-applications in multiple social media simultaneously, and also collects from them and processes data on citizens' interactions (e.g., views, comments, ratings, votes, etc.). This poses difficult research questions and challenges, both technical (analysis and exploitation of social media application programming interfaces (APIs), appropriate design of the central system architecture, processing and integrating the large amounts of collected citizens' interaction data) and also non-technical (investigation of the value generated by this approach, preconditions for its effective application by government agencies), which are researched in the project. Some first findings on them are presented and discussed.

Keywords: Electronic Participation (E-Participation), Public Participation, Public Policy, Social Media, Web 2.0

INTRODUCTION

There has been considerable research on the exploitation of the rapidly growing web 2.0 social media by private sector firms (Constantinides, 2009, 2010; Evans, 2010; Dwivedi et al., 2011). This has generated a considerable body of knowledge on how social media can be used by firms for supporting and strengthening various important functions of them, such as

marketing, customer relationships, new products development, etc. It is widely recognized that social media already play an important role in many industries, and this is expected to increase tremendously in the near future. On the contrary, the exploitation of these powerful channels by government agencies has been much less researched (see following section for a brief review of this research).

Government agencies have been for long time interested in establishing a communication with the citizens they serve concerning

the public policies they design and implement, and this has lead to the development of public participation ideas and practices, which were initially based on traditional 'off-line' (i.e., non electronic) channels (Barber, 1984; Organization for Economic Co-operation and Development (OECD), 2003; Rowe & Frewer, 2000, 2004). This trend has been strengthened due to the increasing complexity of societal problems and needs, and therefore of public policy formulation, in the last 30 years. The societies tend to become more heterogeneous and pluralistic in terms of culture, values, concerns and lifestyles, and this makes public policy formulation problems 'wicked,' lacking clear and widely agreed definition and objectives, and having many stakeholders with different and heterogeneous problem views, values and concerns (Rittel & Weber, 1973). This increases the complexity of public policy making, and the need for extensive consultation with various stakeholder groups, so that a synthesis of their views can be achieved. At the same time the speed of economic and social evolutions has increased, resulting in rapid changes and discontinuities, to which government has to respond with timely and appropriate policies; this necessitates a more intensive interaction with citizens, in order to identify timely such events, and collect relevant information and knowledge about them from the society (i.e., crowdsourcing) (Brabham, 2008), in order to design effective responses.

The emergence and increasing penetration of the Internet lead to its exploitation for supporting and widening public participation, giving rise to the development of e-participation (Organization for Economic Co-operation and Development (OECD), 2004; Sanford & Rose, 2007; Saebo, Rose, & Flak, 2008; Loukis, Macintosh, & Charalabidis, 2011). The 'first generation' of e-participation was based on the development of numerous 'official' e-participation spaces operated by government agencies of various levels (e.g., Ministries, Parliaments, Municipalities), usually parts of their official websites, offering to citizens information on government activities, decisions, plans and policies, and also capabilities for expressing their opinions and suggestions on various topics. However, the usage and outcomes of this first generation of e-participation were below the initial expectations (Chadwick, 2009a; Ferro & Molinari, 2010). Governments expected citizens to visit these official e-participation spaces in order to participate in public debates on various proposed public policies or legislations, and get adapted to the structure, language and rules of these spaces; but this happened only to a limited extent. At the same time many of the topics discussed there were defined by government and very often did not directly touch citizens' daily problems and priorities. Also, most of the ICT tools used in these government e-participation spaces were not sufficiently user-friendly and appropriate for wide citizens' participation.

The rapidly growing web 2.0 social media offer a big opportunity for addressing the problems and proceeding to a 'second generation' of wider and more inclusive e-participation, characterized by more intensive interaction with the citizens. In many of these social media there is already significant 'bottom-up' political activity initiated by the citizens and not by government agencies (Chadwick, 2009b; Honeycutt & Herring, 2009; Agarwal, Lim, & Wigand, 2011; Larsson & Moe, 2011); many political discussions are taking place there, political information and news are exchanged and propagated, and also off-line political events and initiatives (e.g., movements, demonstrations) are organized and promoted. Therefore government agencies cannot be absent from these important electronic spaces, and should organize their presence in these social media and exploit them intensively and systematically, in order to communicate their positions and plans, justify their decisions and policies, and at the same time 'listen' to the citizens, solicit their opinions and comments and in general gain a better understanding of their needs and opinions. Instead of inviting the citizens to interact with government in the official e-participation spaces in accordance with their rules and structures, government can go to the web 2.0 electronic spaces where citizens

prefer to have discussions, create content and collaborate with others. This can be the basis of new more sophisticated 'multi-channel' and more inclusive e-participation strategies, based on a multitude of interconnected e-participation channels used by different citizens' groups. The exploitation of web 2.0 social media by government agencies can help them to cope with the mentioned increasing complexity and volatility of the societal problems and needs, and the corresponding public policies, by allowing them to extract more intensively information and knowledge from more citizens on multiple aspects of societal problems and needs.

For the reasons it is necessary to develop and investigate advanced forms and practices for efficient and mature social media exploitation by government agencies aiming to promote and enhance participative public policy making, and in general intensify communication and interaction with citizens. This paper contributes in this direction by exploring advanced forms of using and combining for the e-participation purposes multiple social media, with each of them being used by a different citizens' group (e.g., with respect to age, income, political orientations, lifestyle, etc.) or focusing on a different type of content (e.g., short text, long text, images, video). The proposed approach for this is based on the concept of a central system which can publish various types of policy-related content and micro-applications to multiple social media simultaneously and also collect data from them on citizens' interactions (e.g., views, comments, ratings, votes, etc.). These interaction data will undergo in this central system various types of advanced processing (e.g., calculation of analytics, opinion mining, simulation modeling) in order to exploit them to the highest possible extent for drawing synthetic conclusions and providing substantial support to government policy makers. This approach allows a more intensive, systematic, efficient and centrally managed exploitation of social media by government agencies.

However, at the same time this approach poses some research questions and challenges:

- Technical ones, such as the need to analyze and exploit the application programming interfaces (APIs) of the most important social media for publishing content in them and then for collecting the corresponding citizens' interactions, to design an appropriate architecture of the central system, and to process and integrate the large amounts of collected citizens' interaction data (both in numeric and textual form); especially the textual comments, whose reading would require long time and therefore delay policy making processes, require automated processing in order to extract the general attitudes of the citizens on the new policy under discussion and the main issues raised, which necessitates the use of efficient opinion mining techniques;
- and also non-technical ones, such as investigation of the value generated by this approach for government policy makers, and the preconditions for its effective application by government agencies.

The research presented in this paper on the questions and challenges has been conducted as part of the research project PADGETS ('Policy Gadgets Mashing Underlying Group Knowledge in Web 2.0 Media' – http://www.padgets.eu), which is partially funded by the 'ICT for Governance and Policy Modelling' research initiative of the European Commission. The paper is divided in nine sections. In the following sections relevant previous literature is reviewed, and the theoretical background of the proposed approach is presented. Then the proposed approach is presented. In the following two sections is described some development work completed so far, concerning the architecture of the central system, and the decision support subsystem of it, which makes advanced processing and integration of citizens' interaction data. Then one of the pilot applications that have been designed for the evaluation of the proposed approach is described. Some preliminary findings are presented next, concerning the capabilities provided by the APIs of the most popular web 2.0 social media and their sufficiency for the

purposes of our project, the value generated by the proposed approach and the preconditions for its effective application. Finally the conclusions are summarized and future research directions are proposed.

LITERATURE REVIEW

There is some recent research describing and analyzing some first successful attempts of government agencies to exploit web 2.0, not only for 'soft' tasks (e.g., public relations and public service announcement)s, but also for 'core' ones as well, such as service provision, regulation, law enforcement, sharing expertise internally, cross-agency collaboration, information dissemination, exchange of information between policy and citizens, and even for information sharing between soldiers in the battlefield (Osimo, 2008; Punie, Misuraca, & Osimo, 2009; Mergel, Schweik, & Fountain, 2009; Moreira, Gerhardt, & Ladner, 2010; Margo, 2012). There are several success stories concerning the use of web 2.0 social media by government agencies especially for disaster management as an information dissemination and coordination tool (e.g., see Yates & Paquette, 2011; Margo, 2012).

Another research stream in this area investigates the potential of web 2.0 social media for improving and transforming government (Eggers, 2005; Tapscott, Williams, & Herman, 2008; Bertot et al., 2010; Meijer & Thaens, 2010; Bertot, Jaeger, & Hansen, 2012). Eggers (2005) argues that ICT, and especially web 2.0 technologies, can 'improve education, cut red tape, reduce gridlock and enhance democracy' and in general lead to the emergence of a new more citizen-centered government paradigm, termed 'Government 2.0'; these technologies can affect all domains of government activity, from transportation to education to elections to law enforcement, producing innovative solutions to difficult problems of modern societies, changing the terms and the issues of the left/right political debate, and offering ordinary people access to a degree of information and individual influence until recently accessible only to the most powerful citizens. In Bertot et al. (2010) and Bertot, Jaeger, and Hansen (2012) the opportunities that web 2.0 social media offer to government agencies are classified into three main groups: i) democratic participation and engagement (use of social media technologies to engage the public in government policy making, fostering participatory dialogue and providing to more citizens' groups a voice in discussions of policy development and implementation), ii) public services co-production (governments and the public jointly develop, design, and deliver government services using the social media, aiming to improve service quality, delivery, and responsiveness), and iii) crowdsourcing solutions and innovations (seeking innovation by exploiting public knowledge and talent through social media interaction, in order to develop innovative solutions to big societal problems; in order to facilitate this the government shares data with the public in order to establish a base on which the citizens can reflect and innovate). Tapscott, Williams, and Herman (2008) argue that web 2.0 social media constitute a 'tectonic' technological shift, which is going to have strong and multi-dimensional effects on government structure and operation. They can drive a transition from monolithic government to 'Government 2.0,' in which pluralistic, networked forms of government called "governance webs" (or g-webs) become the dominant organizational model for service delivery and policy-making; this term denotes digitally enabled networks of public, private and/or civil society participants, which perform activities that previously were the exclusive domain of single public agencies. While industrial-age government was based on monopoly power, and structured around rigid hierarchies, these new g-webs distribute power broadly and leverage innovation, knowledge and value from the market and civil society.

Mergel, Schweik, and Fountain (2009) through an analysis of cases of successful web 2.0 use in government reach the conclusion that web 2.0 technologies might have stronger transformational effects on government than previous ICTs, driving significant changes at

the organizational, cultural, technological and informational changes. They state that this strong transformation potential is due to the lower technical know-how, and therefore the lower cost (for both government organizations and individual citizens) of using the web 2.0 technologies, in comparison with the previous generations of ICT used in government (e.g., intra-organizational information systems, web 1.0 Internet, etc.). These lower requirements allow a much quicker and easier deployment of web 2.0 based solutions by more individuals in order to meet various external and internal communication needs at various organizational units and hierarchical levels of government agencies. Also, Chadwick (2009a, 2009b) is dealing with the potential of web 2.0 social media for transforming the political domain in general. In particular, he elaborates the basic principles of web 2.0 based politics and suggests the following directions: "the Internet as a platform for political discourse; the collective intelligence emergent from political Web use; the importance of data over particular software and hardware applications; perpetual experimentalism in the public domain; the creation of small scale forms of political engagement through consumerism; the propagation of political content over multiple applications; and rich user experiences on political Web sites."

A third research stream in this area (Bovaird, 2007; Torres, 2007; Lukensmeyer & Torres, 2008; Chun et al., 2010; Hilgers & Ihl, 2010; Nam, 2012) focuses on the capabilities offered by web 2.0 social media to government agencies for 'crowdsourcing'(Brabham, 2008), defined as "a new web-based business model that harnesses the creative solutions of a distributed network of individuals through what amounts to an open call for proposals"; this enables government to mine fresh ideas from large numbers of citizens for addressing various social needs and problems or for improving public services, transforming radically their ways of interacting with citizens in order to exploit 'collective wisdom' and mine fresh ideas from large numbers of citizens for addressing various social needs and problems

or for improving public services. According to Nam (2012) traditionally government agencies provide services to citizens, who consume them without questioning about them or taking part in decisions that led to the design and provision of these services; on the contrary social media can drive and facilitate new government paradigms, in which citizens' roles change, so that government become a consumer to whom citizens provide information or even useful professional services. For this reason Lukensmeyer and Torres (2008) suggest that such citizen-sourcing may change the government's perspective from viewing citizens as "users and choosers" of government services to "makers and shapers" of policies and decisions. This can lead to the application of open innovation ideas in the public sector (Hilgers & Ihl, 2010), and gradually result in 'co-production' of public services by government and citizens in cooperation (Bovaird, 2007).

However this great potential of social media is exploited by government agencies only to a limited extent, since the dominant exploitation pattern consists in individual and fragmented uses of only a few web 2.0 social media. It usually includes posting to a web 2.0 application of some content, e.g., a political message in the form of a text, image or video, and then retrieving and reading or processing the corresponding user-generated content, e.g., comments on or ratings of this message), while a methodology for systematic, intensive and centrally managed exploitation of a wide range of appropriate Web 2.0 social media is missing. Our research aims to contribute to filling this gap.

THEORETICAL BACKGROUND

In this section are outlined the theoretical foundations of the proposed approach of exploiting multiple social media by government agencies in a systematic and centrally managed manner, through a central system, for widening and enhancing public participation in public policy making: a) the theory of wicked problems, and b) the theory of software platforms and ecosystems.

Theory of Wicked Problems

The theory of wicked problems has been initially proposed by Rittel and Weber (1973). It posits that after the end of World War II the nature of public policy design problems has changed considerably, and this necessitates new and more sophisticated methods for addressing them. In particular, the societies have become more heterogeneous and pluralistic in terms of culture, values and lifestyles, and this has made public policy problems 'wicked'; this term denotes that they lack clear and widely agreed definition and objectives, and are characterized by high complexity and many stakeholders with different and heterogeneous problem views and objectives. The solution of these wicked public policy problems cannot be performed by experts through analytic techniques, but requires a two phases approach, which combines on one hand public participation, consultation and negotiation in order to formulate a shared definition of the problem in a first phase, followed by the use of analytic techniques by experts in a second phase on the other. So the first and fundamental phase should include systematic consultation among problem stakeholders, during which a negotiation takes place, aiming to synthesize the existing different views and formulate a shared definition of the problem and the objectives to be achieved. Having this well defined problem as a base in a second phase we can proceed to a technocratic analysis by experts using mathematical optimization algorithms. Subsequent research on this approach (Kunz & Rittel, 1979; Conklin & Begeman, 1989; Conklin, 2003) has revealed that its application can be greatly supported by the use of ICT, and in particular by appropriate 'Issue Based Information Systems' (IBIS), which can 'stimulate a more scrutinized style of reasoning which more explicitly reveals the arguments. It should help identify the proper questions, to develop the scope of positions in response to them, and assist in generating dispute' (Kunz & Rittel, 1979).

The emergence of the web 2.0 social media creates huge opportunities for a wider and more inclusive application of the approach, which can involve many more citizens and social groups than previously. It enables a more intensive interaction among government and the multiple stakeholder groups affected by a new public policy. Social media, due to their ease of use and high popularity (attracting large numbers of citizens from various diverse groups with regard to education, age, sex, ethnicity, religion, political beliefs, etc.) allow a wider and more inclusive discourse and synthesis of views on public policy problems that government faces, rapidly, efficiently and at a very low cost. This can result in better and more socially-rooted and balanced public policies, taking into account the views, objectives and knowledge of more citizens.

Theory of Software Platforms and Ecosystems

Software development today is increasingly based on pre-existing 'platforms' consisting of building blocks providing basic functionality, which are used for developing 'modules' that provide additional functionality which fulfills specialized needs of specific user groups (Gawer, 2009; Tiwana, Konsynski, & Bush, 2010; Gaurer, 2010), e.g., the Firefox browser served as a platform for the development of its 8,000 add-on "extensions," Apple's iPhone operating system served as a platform for the development of its thousands of "apps." Usually the platform is developed by a major player, while numerous modules are developed by a diverse developer community, which possess skills and knowledge of user needs that platform owners might not possess. This emerging software development paradigm reduces significantly the time and cost required for developing such specialized functionality, so it is highly beneficial. Therefore the competition in the software domain tends to be not between individual software products but between 'ecosystems' consisting of platforms and modules based on them.

In particular, the main concept in this software development paradigm according to Tiwana, Konsynski, and Bush (2010) is the

'platform,' which is defined as an extensible codebase of a software-based system, which provides core functionality shared by the modules that interoperate with it, and the interfaces through it can be accessed and used; as 'module' is defined an add-on software subsystem that connects to the platform in order to add functionality to it, while as 'ecosystem' is defined the collection of the platform and the modules that have been developed based on it. Of critical importance for this software development paradigm are the 'interfaces' (specifications and design rules that describe how the platform and modules interact and exchange information) and the 'architecture' (conceptual blueprint that describes how the ecosystem is partitioned into a relatively stable platform and a complementary set of modules that are encouraged to vary, and also the design rules binding on both). The development and evolution of such an ecosystem necessitates effective 'governance' of it, defined as the allocation of decision making to its various stakeholders.

Since the main objective of the research presented in this paper is to develop a central platform that allows the centralized exploitation of multiple social media for participative public policy making, the adoption of the paradigm is highly beneficial, using the functionality of the targeted social media as platforms (i.e., foundation), and based on them develop the functionality of the central platform. However, it is necessary to examine whether this paradigm is feasible, and this depends mainly on the capabilities provided by the application programming interfaces (API) of the targeted social media.

BASIC APPROACH

Our basic approach for widening and enhancing public participation in government policy making using multiple social media is shown in Figure 1. It is based on a central system which can, i) publish policy related content and micro-applications to multiple social media (SM_1, $SM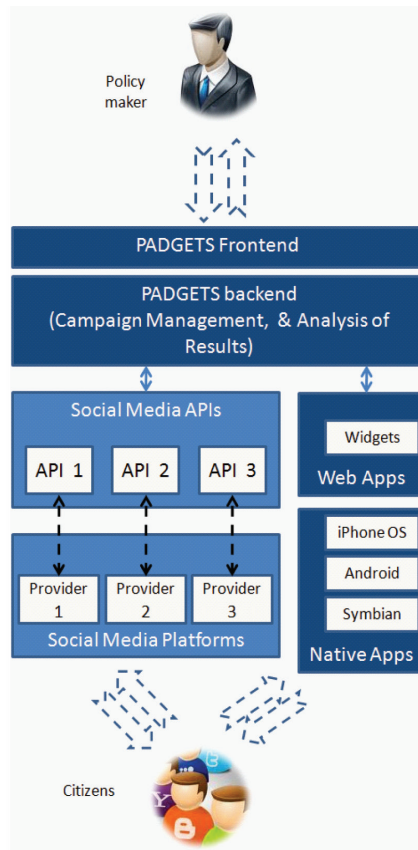_2$, .., SM_n) simultaneously, ii) collect data on citizens' interaction with them (e.g., views, comments, ratings, votes, etc.) in an efficient manner using the API of the targeted social media, and iii) make advanced processing of them in order to extract from them as much as possible useful information for the policy makers (e.g., calculations of analytics, opinion mining, simulation modeling).

In particular, this central system enables the policy maker, through a web-based dashboard, or through a mobile phone dashboard or iGoogle, to develop an electronic political campaign on a public policy under discussion across multiple social media. For this purpose a package of relevant multimedia content has to be created (e.g., short description, longer description, video, images, etc.), which will be distributed and published to multiple social media that attract the main groups of citizens that government wants to involve in the discussion, according to the type of content each of them can host, e.g., the short description can be published in Twitter, the longer one in one or more relevant blogs, the video in YouTube, the images in Picasa, etc. The citizens will be able to access this content and interact with it (e.g., view it, like or dislike it, comment it), either through these social media, or through an iGoogle gadget, or through a mobile application. This system also enables the policy maker to retrieve from all these social media data on users' interaction with the content, and make advanced processing of them, both per social media platform and synthetically, in order to extract from them useful information for the policy maker.

CENTRAL SYSTEM ARCHITECTURE

Based on use cases of the central system, which have been developed in cooperation with the three government agencies participating in the PADGEST project (Piedmont Region, Italy; Observatory for the Greek Information Society, Greece; Centre for e-Governance Development for South East Europe, Slovenia), and also on the
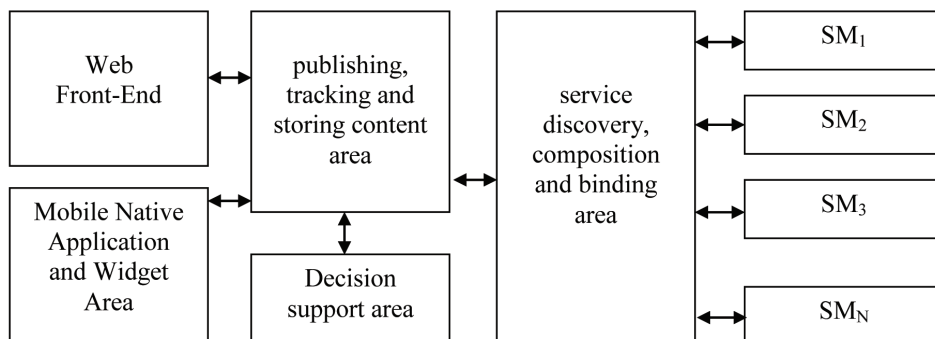
Figure 1. The basic approach

analysis of the APIs of the most popular social media (the main conclusions of it are outlined in a following section), the architecture of the central system was designed; a high level view of it is shown in Figure 2.

It consists of five subsystems. The first of them is the 'web front-end,' which handles all communication with the policy maker through the Web. It provides functionality for getting input from the policy maker for setting up a campaign on a policy-related topic, entering relevant short and long text, video, images, etc., defining the targeted web 2.0 social media where this content will be published, and presenting to the policy maker the results of processing citizen feedback on this content. The second subsystem is the 'mobile native application and widget area,' which supports all the mentioned types of communication with the policy makers through mobile apps and iGoogle, and also allows citizens to access the system, read its policy-related content and comment through this alternative channel. The third subsystem is the 'publishing, tracking and storing content area,' which publishes the content provided by the policy maker across the defined social media systems, retrieves and monitors citizen feedback on the published content and stores all relevant information. It is supported by the 'service discovery, composition and binding area' providing to it the required infrastructure for service communication, both internally among the different system components and externally with various social media platforms

Figure 2. High level architecture of the central system

(SM$_1$, SM$_2$, ..,SM$_n$). Finally, the fifth subsystem is the 'decision support area,' for processing all the retrieved data from the social media concerning citizen interaction and feedback, and providing decision support to the policy maker on his/her published campaigns. Due to its high importance it is described in more detail in the following section.

Because the central system has to communicate and cooperate with many different social media, with each of them having a different 'language' (i.e., different API functions for publishing and retrieving data from it), it has been decided that the best way to cope with this is to use Activity Streams based modeling data exchange with social media and relevant activities. Activity Streams is a quite new data format that tries to describe objects and activities in social media in a common way (for more details on this see http://activitystrea.ms). Using a unified way to describe activities and data in social media through abstract concepts, such as "social objects," it becomes easier to create an independent (from specific system's APIs) description. In particular, Activity Streams modeling is based on "actor - verb - object" tuples, with an optional "target" parameter, e.g., Chris bought Planet Earth [at Amazon.com], John posted a comment [at Facebook]. In this direction Activity Streams – adapted for the needs of this project – provide the basis for describing content and activity objects concern-
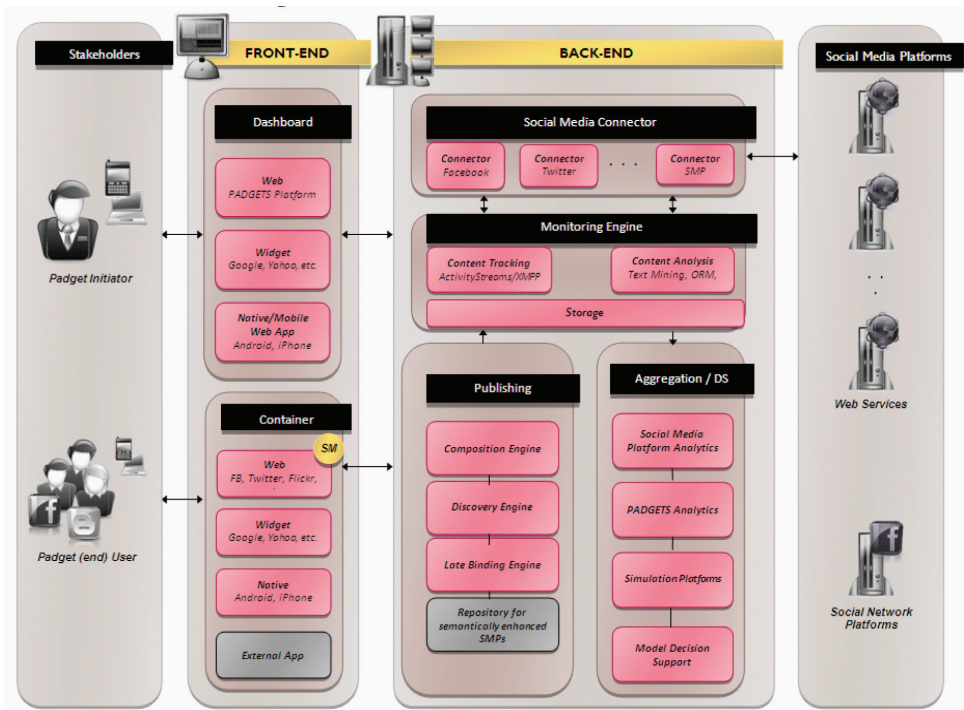
ing the targeted social media. In Figure 3 the architecture of the central system is shown in more detail.

DECISION SUPPORT SUBSYSTEM

As mentioned the objective of the decision support area of the central system is to process the large amount of data retrieved from various social media concerning various types of users' interaction with the policy messages published in them, and produce decision support information for policy maker. The main research challenge here is to integrate these heterogeneous data, coming from many different social media, and having several different forms, both numerical, e.g., numbers of views of the published content, likes and dislikes of it, and also textual, e.g., comments, to meaningful and useful information that assists the policy maker to understand the level of awareness and interest of the citizens about the public policy under discussion, the opinion of citizens about it in general (e.g., positive, neutral or negative), the elements of the public policy which are commented, liked or disliked by the citizens, and also their suggestions for improvements of the policy.

Based on the decision support requirements of policy makers from the three government agencies participating in the PADGEST project

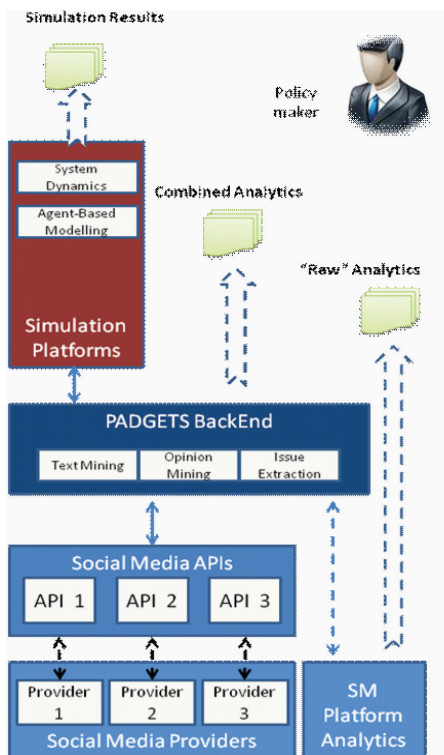*Figure 3. Detailed architecture of the central system*

the architecture of the decision support subsystem was designed. It consists of three layers, which are shown in the following Figure 4. The first layer (shown in the right part of Figure 4) will deal with the numerical interaction data to be retrieved from the social media, exploiting and processing the 'raw analytics' which are provided by the analytics engines that nearly all social media have and make available to their users. The second layer (shown in the middle of Figure 4) will deal with the textual interaction data to be retrieved from the social media (e.g., blog postings, opinions, comments, etc.) and provide more advanced 'Padget analytics' using methods of opinion mining (Maragoudakis, Loukis, & Charalabidis, 2011), though which will be determined the general sentiments of the citizens on the published policy messages (classifying them as positive, neutral or negative), and also the particular issues raised and the relevant sentiments (positive, neutral or negative). Finally the third layer (shown in the left part of Figure 4) will provide prediction of the future evolution of social awareness about the policy under discussion, interest in it and acceptance by the society, and also of significant socioeconomic variables as a result of this policy, or even different policy options. For this purpose system dynamics simulation modeling will be performed, taking as input various 'social indicators' produced by the other two layers, and producing as output the future evolution of important variables for the policy maker (e.g., projecting in the future awareness, interest and acceptance). Based on a review of the simulation modeling area we conducted (Charalabidis, Loukis, & Androutsopoulou, 2011) it has been concluded that System Dynamics (Forrester, 1961; Schwaninger & Ulli-Beer, 2008) is the most promising approach for the purposes of our purpose.

The analytics will be calculated both:

Figure 4. Architecture of the decision support subsystem

i)   for each of the used social media (per age group and sex, if this provided by its API), being grouped along the mentioned three main dimensions: awareness about the public policy under discussion (e.g., estimated through number of views), interest in it (e.g., estimated through number of comments) and acceptance of it (e.g., estimated based on the numbers of likes and dislikes, and also on the numbers of positive and negative comments)

ii) and also for all used social media synthetically, by combining for each of the three dimensions the corresponding analytics of each social media platform (e.g., for estimating awareness we can use views of the relevant video we published in Youtube, visits of the relevant fan page in Facebook, clicks on a link we have included in the relevant tweet in Twitter, etc.); this allows integrating citizens' interactions across multiple social media and finally drawing synthetic conclusions from them.

A PILOT APPLICATION

In order to evaluate the proposed approach in real life situations, and investigate the value it generates for various stakeholders, three pilot applications of it are going to be organized by the three government agencies participating in the PADGEST project (Piedmont Region, Italy; Observatory for the Greek Information Society, Greece; Centre for eGovernance Development for South East Europe, Slovenia). In this section we are going to describe in detail the pilot to be organized by the Piedmont region, as it provides a clear scenario on how the proposed approach can be practically used by govern-

ment agencies. This pilot application concerns the full scale implementation of a telemedicine initiative, which was initially deployed in the area of Verbano-Cusio-Ossola (VCO) (having a population of about 172.000 persons living in a mountainous area in the north west of Italy, with more than 23% of them being over 65 years old), to the entire Piedmont Region. The initial deployment focused on four patients' groups affected by heart failure disease, diabetes, chronic pulmonary occlusive disease and cancer respectively. Each group followed a personalized protocol defined by the responsible doctors: patients were equipped by devices able to track, store and send data in a secure manner to a server located at the local health center; for each disease, the doctors defined the number and the times of the measurements to be carried out. This project served about 300 patients in the last three years.

The main stakeholders, who should participate in the debate about the spread of this new policy (telemedicine) in the entire Piedmont Region, are the Piedmont Regional Authority (main policy maker, who possesses authority and can decide on the implementation of this policy), citizens (patients and members of their families, who may have different opinions on this project and concerns) and physicians (experts who will use telemedicine to improve medical services provided to patients, and can provide suggestions on possible barriers to the large scale implementation of this policy, and also critical issues for its success).

The policy maker (Piedmont Region) has to answer the following question: "Is it worth to extend the VCO (Verbano-Cusio-Ossola) initiative to the entire Piedmont Region?" In order to harvest the opinions of citizens and physicians on it they can proceed to the following steps:

A. Policy Statement Definition

Using a simple interface of the central system the policy maker starts a campaign on the question, and fills in the policy statement section of it, entering a short description of the policy, and adding URL links to videos and images (in appropriate social media platforms) that provide further details about the policy to both citizens and physicians (Figure 5). Then the policy maker selects in which of the web 2.0 social media supported by the central system the policy message will be published.

B. Publishing and Interaction with Citizens

Using the central system functionality the policy maker publishes the policy statement on the social media selected at the previous step (in Figure 6 we can see the publication in the Facebook). The central system allows the policy maker to collect and monitor the interactions of the citizens and physicians with this policy statement in all employed social media.

C. Publishing and Decision Support

The collected citizens' and physicians' interactions data from all the social media are processed by the decision support module at all the three levels described in the previous section (calculation of basic analytics, opinion mining, simulation modeling). The outputs to be produced will be a set of metrics of awareness, interest and acceptance, and also the main issues raised with respect to this new telemedicine policy (e.g., advantages, disadvantages, barriers, etc.) per stakeholder category, i.e., for citizens and physicians separately, and also per sex and age group. Also, using simulation modeling a forecast of future evolution of awareness on, interest in and acceptance of this telemedicine policy will be produced, and its impact from various perspectives (e.g., financial, speed and quality of service). These results are delivered to the policy maker in order to support him/her in making final decisions. The following Figure 7 shows the overall process of this telemedicine campaign from the policy maker's point of view.

PRELIMINARY FINDINGS

In this section we present some preliminary findings concerning i) the capabilities provided by

Figure 5. Policy statement definition

the APIs of the most important social media, ii) the value proposition of this approach, and iii) the preconditions for its practical application.
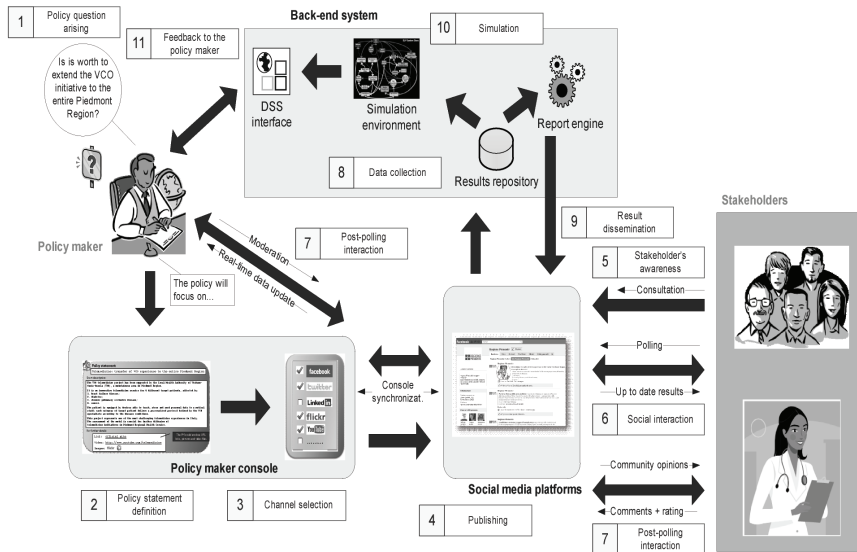
Social Media APIs

In order to examine the technical applicability of this approach we analyzed the APIs of the most popular social media (Facebook, Youtube, Linkedin, Twitter, Delicious, Flickr, Blogger, Picassa, Ustream and Digg). From this analysis it was concluded that there is a clear strategy of these social media to become more open and accessible to third party applications by conforming with open API standards (more

Figure 6. Policy publishing in the Facebook

Figure 7. Process of telemedicine policy campaign

details about this analysis and its conclusion are provided by Charalabidis, Gionis, & Loukis, 2010). In particular, through their APIs they provide a rich functionality for posting and retrieving content, exposing methods that "go deeply" into their innermost functionalities and provide third party developers with an ever growing set of capabilities. This includes on one hand functionality for pushing content (text, images, videos or more complex forms of media such as "events," "albums" etc.), and on the other hand for retrieving various types of interaction content generated by users (e.g., user ratings, unique visits, textual comments, retransmissions to other nodes of a social network).

On the contrary only a few social media allow deploying micro-applications in their environment, while most of them do not allow this. Another problem is that the APIs of most of the examined social media do not provide two important fields, sex and age group, for each user interaction (e.g., view, comment, like, dislike, etc.); these fields are necessary for estimating awareness, interest and acceptance with respect to the policy under discussion, not only in total (this is less useful for the policy maker, as it

is not known whether the sample of citizens who interacted with our policy message in the utilized social media is representative), but also per sex and age group. A third problem is that the APIs of most of the examined social media are not characterized by stability, and change very frequently; this necessitates significant effort in order just to keep the central system operational.

The findings lead to the conclusion that the theory/paradigm of software platforms and ecosystems outlined previously in the theoretical background section (i.e., use of the targeted social media as platforms, exploiting their capabilities through their APIs, in order to develop the functionality of our central system) is applicable in our project. Using the terminology of this theory there is perfect modularity with respect to social media and relevant third party applications, through clear design rules, and also clear and efficient governance rules as to the partitioning of decision rules among social media and developers of third party applications. However, there are some deficiencies of many social media APIs (mainly their lack of stability of design rules, and also some prohibitive design rules that do not allow highly important

functionality to be developed, e.g., calculation of analytics per sex and age group), which have negative consequences on the capabilities of our central system.

Value Proposition

A first investigation of the value generated by the proposed approach was conducted through a series of interviews with experienced personnel from the government agencies participating in the project. It has been concluded that this value proposition unfolds along a number of dimensions, and varies among the different phases of the policy making cycle. Its essence may be conceived as a further reduction in the distance between government policy making and society's needs, in comparison with the 'first generation' e-participation approaches (based on official government e-participation spaces/websites), both in terms of time and tools required. It provides a low cost and efficient mechanism to better inform the policy decision process by providing a clear and dynamic picture of a larger number of opinions and suggestions from wider and more diverse stakeholders' groups. By giving policy makers a privileged "interface" for "hearing society's voice" directly where the crowd chooses to discuss and express its opinion, the proposed approach enables an innovative way to gather, evaluate and decide upon society's input. Taking into account that public policy design problems are usually 'wicked,' as explained in the theoretical background section, the proposed approach allows a more intensive interaction with the stakeholders of the public policy under discussion efficiently and at a low cost. This facilitates the formulation of more complete and balanced shared definition of the problems and the objectives to be achieved, which incorporate views and perspectives of more citizens' groups, resulting finally in better and more socially-rooted and balanced public policies.

Furthermore, the capability to publish policy-related content from one single point to multiple social media results in time and cost efficiencies, and also in homogeneity of presence in all these social media. The capability to collect citizens' interactions and feedback from all targeted social media platforms in a single point, allows a cross-platform synthesis and at the same time comparison across many different groups of citizens. The central platform generates indirect positive externalities for the different classes of actors engaged in the process as well as different types of benefits for each actor class: convenient and frictionless public participation for citizens, fresh, useful and low cost inputs for policy makers (elected representative and higher public servants). It should be emphasized that such an electronic campaign may be launched during any of the phases of the policy making cycle (agenda setting, policy analysis, policy formulation, policy implementation, and policy monitoring and evaluation). The purpose, function and, as a consequence, value proposition of each campaign may vary according to the stage of the policy cycle in which the campaign is launched.

The main novelties that our approach brings, according to the interviewees, are:

- Relaxation of current constraints in terms of size, frequency and quality of citizens' participation. All the different stakeholders are free to participate to any policy process they are interested in, at the time they prefer, with the effort in participation they are willing to spend, and above all using their tools with which they are already accustomed to and the type of media they prefer (e.g., short text, long text, images, video). Also, policy makers can continuously have reports pertaining to stakeholders' opinion, which allows them to quickly modify and adapt the policy issues under discussion.
- Integrated management of multiple social media channels. The presence of a single Web dashboard dedicated to the policy maker with the main results of his/her campaigns reduces the complexity and heterogeneity that comes naturally when using different social media platforms, each of which exhibits peculiarities in terms of aims, interfaces, functionalities,

target audience, content types and degree of content sharing.

- Creation of an "open" decision support system, which allows the establishment of a stronger link between government decision process and the external world as well as to reason on fresh and relevant information. The decision support subsystem allows the creation of highly useful snapshots of the levels of awareness, interest and acceptance of a given policy, and also of estimations of how such levels of awareness, interest and acceptance may vary over time (e.g., in next 12 months) and, finally, single out the main issues emerging from the interaction of the end users with the policy message.

A more detailed investigation of the value generated by the proposed approach will be conducted through the pilot applications of it, which have been scheduled in the three government agencies participating as partners in this project.

Application Preconditions

However, the interviews with experienced personnel from these three government agencies revealed some preconditions for the effective practical application of the proposed approach, which necessitate some interventions at the organizational, human resources and technological level. In particular:

- It will require the creation of a new organizational unit to organize and manage the presence of the government agency in these multiple e-participation channels and also to analyze the large quantities of both structured data (e.g., citizens' ratings) and unstructured data (e.g., citizens' postings in textual form) that will be created and draw conclusions from them.
- Also, new processes should be established for the integration of the results and conclusions of the analysis of the structured and unstructured data in the decision and policy making processes of government agencies.

- The human resources of these new units must have a particular culture (which is quite different culture from the dominant 'law enforcement' culture of government agencies) and specialized skills for managing efficiently these new electronic modes of communication. In general government agencies should get accustomed to the style and language of interaction in the web 2.0 social media, and the whole culture that characterizes them, which are quite different in comparison with the official e-participation spaces.
- At the technological level, the analysis of the large quantities of unstructured data in textual form that will be collected from the channels (e.g., hundreds or thousands of postings) will require highly sophisticated ICT-based tools for text analysis and opinion mining. These tools will have to be integrated with the technological infrastructures of the government agencies. Also, the use of these tools is not easy, and requires extensive adaptations and language resources, such as lexicons of polar words, synonyms and antonyms.

CONCLUSION

In the previous sections has been explored an advanced approach of exploiting web 2.0 social media by government agencies in a systematic and centralized manner, achieving a more intensive interaction with more and diverse groups of citizens, in order to promote and improve public participation in public policy making. This approach is based on a central system, which enables i) publishing content and deploying micro web applications to multiple web 2.0 social media simultaneously, ii) retrieving users' interactions with them (e.g., views, comments, ratings) in all these social media, in an efficient systematic and centrally managed automated manner using their APIs, and iii) performing advanced processing of these interaction data, in order to extract from them as much as possible useful information for supporting the policy making. The theoretical foundations of this

approach have been outlined (theory of wicked problems, theory of software platforms and ecosystems). Also, some results of the research conducted as part of the PADGETS project is presented concerning the main questions and challenges that this approach poses.

In particular, it has been concluded that the most popular social media have sufficient APIs for the technical implementation of the proposed approach, which provide a rich functionality for posting and retrieving content. However, there are some deficiencies of many social media APIs, such as lack of stability of them, and also lack of capabilities for retrieving some important demographics (e.g., sex, age group) for the retrieved content, which have negative consequences on the capabilities of the central system. Based on a number of uses cases developed in cooperation with the three government organizations participating in the project, the architecture of the central system has been designed (a high level view of it is shown in Figure 2, while a more detailed view is shown in Figure 3), which includes five interconnected subsystems: web front-end, mobile native application and widget area, publishing, tracking and storing content area, service discovery, composition and binding area, and decision support area. The requirement that the central system communicates and cooperates with many different social media, each of them having a different 'language' (i.e., different API functions for publishing and retrieving data from it), lead us to the selection of the Activity Streams based modeling of data exchange with social media and relevant activities. Special attention was put on the decision support subsystem due to its criticality. Based on the policy decisions support needs of the three government organizations, the architecture of this subsystem was designed (it is shown in Figure 4), which includes three layers; the first one processes the numerical citizens' interaction data, the second focuses on the textual contributions (using opinion mining methods), while the third one performs future forecasts of citizens' awareness, interest and acceptance with respect to the policy under discussion.

From the research on the non-technical issues of the project it has been concluded that the proposed approach can definitely generate significant value both for government agencies and citizens. It can contribute to relaxation of current constraints in terms of size, frequency and quality of citizens' participation, taking advantage of the continuously growing web 2.0 social media. It enables a systematic, intensive, efficient and centrally managed exploitation of social media by government agencies, and an integrated management of multiple social media channels. This facilitates the formulation of a more balanced shared definition of the problem and the objectives to be achieved in each particular public policy debate, resulting in better and more socially-rooted and balanced public policies. At the same time it should be noted that the benefits will not be straightforward. The practical application of this approach constitutes a radical change of the current government agencies' approach to e-participation. Their current approach is based on the provision of a single e-participation channel to the citizens, which has the form of an official and government controlled e-participation website. This approach will be replaced by a multi-channel one, using a series of interconnected e-participation channels (the official e-participation space, plus a number of appropriate social media), having quite different characteristics, structure, language, style and target groups. Therefore, there are some important preconditions for the successful application of this new multi-channel approach to e-participation, which necessitate some significant interventions in government agencies at the organizational, human resources and technological level.

Further research is required for the elaboration, validation and evaluation (at the technological, organizational and political level) of the proposed approach. This is already in progress as part of the PADGETS research project based on a number of pilots in real life conditions. These pilots will include the use of web 2.0 social media for achieving wide and highly inclusive discussions on important policies of the three government agencies participating in

this project (Piedmont Region, Italy; Observatory for the Greek Information Society, Greece; Centre for eGovernance Development for South East Europe, Slovenia). During these pilots a wide range of evaluation data is going to be collected using both quantitative and qualitative techniques (e.g., questionnaire surveys, interviews, focus group discussions), which will allow a deeper investigation and understanding of the value that this approach generates, and both the required improvements (e.g., in the central system, or the processes of its exploitation) and preconditions for its maximization.

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