Towards a Rationalisation of Social Media Exploitation in Government Policy-Making Processes

There has been significant research and practice oriented towards the rational exploitation of the rapidly expanding social media by private sector enterprises. However, much less research and practice have been done in this area with respect to the public sector. This paper explores advanced forms of rational exploitation of social media in government policy-making processes, aiming to strengthen and widen participation of and interaction with citizens, concerning new or existing public policies and services. The proposed approach is based on a platform, which can publish policy-related content and micro-applications towards multiple social media simultaneously, also collect data on citizens' interaction with them (e.g. views, comments, ratings, votes, etc.), using the application programming interfaces (API) of the targeted social media. The information gathered through social media will then undergo various types of advanced processing (e.g. access analytics, opinion mining, simulation modelling) in order to extract synthetic conclusions from them and provide substantial support to government policy-makers, always respecting data privacy guidelines. In addition, an extension of this 'stimulated/ guided crowdsourcing' approach is presented, based on 'non-moderated crowdsourcing' by government agencies. The above approaches allow a more advanced and rational exploitation of social media by government for supporting evidence-based decision and policy making.

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Social Media, Public Policy, Simulation, Opinion Mining, Analytics, Crowdsourcing

“ Social media bring evidence-based decision and policy making closer to reality. ”

1. Introduction

There has been significant research and practice oriented towards the rational exploitation of the rapidly emerging 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 effectively by enterprises for supporting and strengthening various functions, such as marketing, customer relationships, new products development, etc. It is widely recognised that social media already play an important role in many sectors, and this is going to increase tremendously in the near future. However, much less research and practice have been done towards the rational exploitation of social media in the public sector (Punie et al., 2009; Moreira et al., 2010).

Government agencies have been for a long time interested in establishing a communication with the citizens they serve, and this led to the development of public participation ideas and practices, initially based on traditional 'offline' (i.e. non electronic) channels (Barber, 1984; OECD, 2003; Rowe et al., 2000; Rowe et al., 2004). The emergence and increasing penetration of the Internet in everyday life, was used for supporting and widening public participation, giving rise to the development of eParticipation (OECD, 2004; Sanford et al., 2007; Sæbø et al., 2008; Loukis et al., 2011). The first generation of eParticipation was based on the development of numerous 'official' eParticipation spaces operated by government agencies of various levels (e.g. Ministries, Parliaments and Municipalities), offering citizens information on government activities, decisions, plans and policies, and also the possibility to express their opinions and suggestions on various topics. However, the use and outcomes of the first generation of eParticipation were much lower than expected (Chadwick, 2009a; Ferro & Molinari, 2010). Governments assumed that citizens would visit these websites, in order to participate in public debates on various proposed public policies or legislations, and become adapted to the structure, language and rules of these websites; however, this happened only to a limited extent. At the same time, many of the topics discussed were defined by the government and very often did not directly touch citizens' daily problems and priorities. Also, most of the ICT tools used in these government eParticipation websites were not sufficiently user-friendly and appropriate for wide citizens' participation. Web 2.0 social media offer a great opportunity to address the above challenges and proceed to a second generation of a wider and more inclusive eParticipation, leading to a more intensive and deep interaction with the citizens.

Moreover, in many of these social media, there is already significant 'bottom-up' (i.e. initiated by the citizens and not by government agencies) political activity (Chadwick, 2009b; Honeycutt et al., 2009; Agarwal et al., 2011; Larsson et al., 2011); many political discussions are taking place there, political information and news are exchanged and propagated, and offline political events (e.g. movements, demonstrations) are also organised. Therefore, government agencies cannot be absent from these important electronic spaces; they should organise their presence in the web 2.0 social media, in order to express their positions, justify their decisions and policies, and at the same time 'listen' to the citizens and gaining a better understanding of their needs and opinions.

For the above reasons, it is necessary to build up knowledge on how social media can be used rationally and effectively by government agencies in order to promote and enhance participative public policy-making and communication with the society in general. This paper contributes in this direction by exploring advanced forms of taking advantage of the social media in government in order to intensify interaction with citizens, considering new or existing policy, legislation and public services. They are based on the concept of a central platform, which can publish policy-related content and micro-applications to multiple social media simultaneously and also collect data on citizens' interaction with them (e.g. views, comments, ratings, votes, etc.) in an efficient manner

using the application programming interfaces (API) of the targeted social media. These interaction data will then undergo various types of advanced processing (e.g. calculations of analytics, opinion mining, simulation modelling) in order to make use of them to the highest possible extent for extracting synthetic conclusions and for providing substantial support to government policy-makers, promoting and supporting evidence-based decision and policy making. This research is conducted as part of a research project called PADGETS ('Policy Gadgets Mashing Underlying Group Knowledge in Web 2.0 Media' - www.padgets.eu), which is co-financed by the 'ICT for Governance and Policy Modelling' research initiative of the European Commission. Then, an extension of this '*stimulated/ guided crowdsourcing*' *approach* is described, which is based on '*non-moderated crowdsourcing*', through the collection and analysis of policy-related citizen-generated content from multiple social media. This direction is explored as part of a research project, called NOMAD ('Policy Formulation and Validation through non moderated crowdsourcing' - www.nomad-project.eu), which is co-financed by the 'ICT solutions for governance and policy modelling' initiative of the European Commission.

The paper is organised in seven sections. In section two, the theoretical background of the proposed approach is briefly presented. Then in section three, the architecture of the central platform is described, while in section four, the focus is placed on the decision support functionality provided, which is based on processing citizens' interaction data. In section five, some findings are presented concerning the benefits this approach can provide and the preconditions for its practical application, while in section six, an extension of this approach is described based on the concept of 'non-moderated crowd-sourcing'. Finally, in section seven, the conclusions are summarised and future research directions are proposed.

2. Theoretical Background

The basic theoretical background for the proposed approach is the 'wicked problems theory' initially introduced by Rittel and Weber (1973), and then further developed by other scholars (Kunz et al., 1979; Conklin et al., 1989; Conklin, 2003). This theory argues that in the last decades the nature of public policy design problems has changed considerably, and this necessitates new and more sophisticated methods for addressing them. In particular, since the societies have become more heterogeneous and pluralistic in terms of culture, values and lifestyles, public policy problems have become 'wicked'; this term denotes that they lack clear and widely agreed definition and objectives; they are characterised by high complexity as there are many stakeholders who perceive different and heterogeneous views of the problem and objectives. The previous generation of 'tame' public policy problems had clear and widely accepted definitions and objectives, and could be solved by 'technocratic' approaches based on the use of various mathematical optimisation algorithms. On the contrary this new generation of wicked public policy problems require a two-phase approach, which combines, on the one hand, public participation in order to formulate a shared definition of the problem and the objectives to be achieved and on the other hand a technocratic analysis to be followed by experts.

Thus, the first and fundamental phase should be a consultation process among problem stakeholders (i.e. all the groups affected by the social problem that a public policy attempts to address), during which negotiations take place, aiming to synthesise the existing different views and formulate a shared definition of the problem and the objectives to be achieved. Based on this, a technocratic analysis by experts can proceed in the second phase, using mathematical optimisation algorithms for the well-defined at that phase problem (i.e. based on the shared definition of the problem and the objectives that have been formulated in the first phase).

Subsequent research on this approach (Kunz et al., 1979; Conklin et al., 1989; Conklin, 2003) has revealed that it can be greatly supported by the use of information and communication technologies (ICT), and in particular by appropriate 'Issue Based Information Systems' (IBIS), which can "stimulate a more scrutinised style of reasoning, which more explicitly reveals the arguments. It should then help identify the proper questions, to develop the scope of positions in response to them, and assist in generating dispute" (Kunz et al., 1979).

The emergence of the Web 2.0 social media creates even more opportunities for a wider and more inclusive application of the above participative approaches, which involves more citizens and social groups than previously. It enables a stronger interaction among government institutions and the multiple stakeholder groups affected by a new public policy (e.g. having the form of a new legislation or a new public service). Social media, due to their ease of use, wide reach and high popularity among Internet users (attracting large numbers of citizens from various diverse groups with regard to education, age, sex, ethnicity, religion, and political beliefs) allow a wider and more inclusive discourse and synthesis of views on public policy problems that government faces. Additionally, social media enable government agencies to collect large amounts of experience and knowledge acquired by citizens on the highly complex public policy issues under discussion ('crowdsourcing'), rapidly, efficiently and at a very low cost (Brabham, 2008; Nam, 2012). These can result in better and more socially-rooted and balanced public policies, taking into account the views, objectives and knowledge of a greater number of citizens. Governments have started moving in the above direction, but currently they limit themselves to isolated, fragmented and non-coordinated uses of some Web 2.0 social media for the above purposes (Punie et al., 2009; Moreira et al., 2010). Therefore, it is necessary to build up knowledge on how social media can be used more rationally and effectively by government agencies in order to promote and enhance participative public policy-making and communication with the society in general. Our research contributes in this direction.

3. Platform Architecture and Functions

The proposed approach of using rationally and effectively web 2.0 social media for making more participative their public policy-making processes is based on a central platform which can i) publish policy-related content and micro-applications to multiple social media (SM_1, SM_2, .., SMn) simultaneously, ii) collect data on citizens' interaction with this posted content/applications (e.g. relevant citizens views, comments, ratings, votes, etc.) in an efficient manner using the application programming interfaces (API) of the targeted social media, and iii) make advanced processing of the collected data (e.g. calculations of analytics, opinion mining, simulation modelling) (Figure 1).
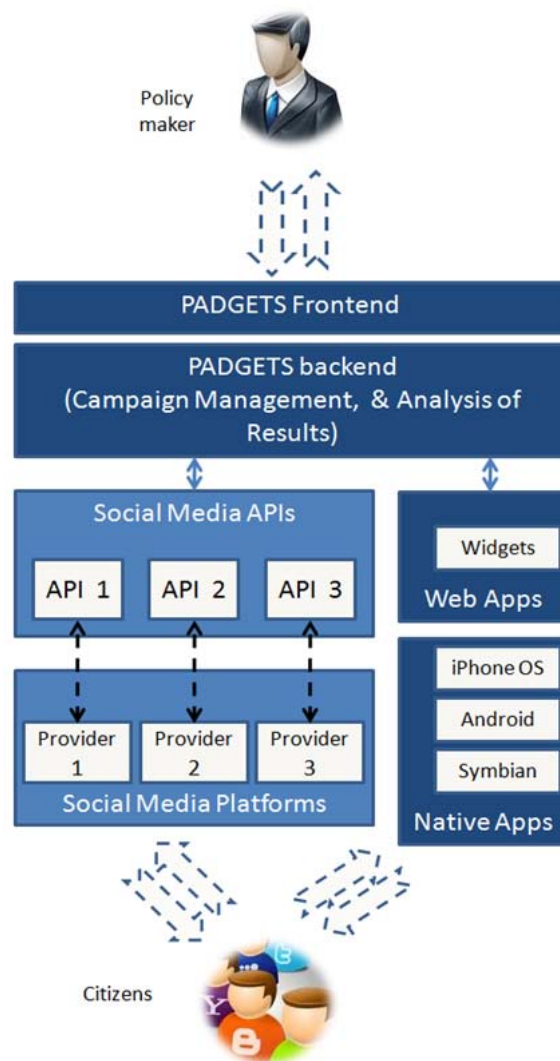
Figure 1: The PADGETS architectural framework

This enables government agencies to develop electronic political campaigns on various public policy issues under discussion across multiple social media. For this purpose, a package of relevant multimedia content will be created (e.g. short description, longer description, video, images, etc.), which then will be distributed to multiple social media (attracting the main groups of citizens that government wants to involve in the discussion), according to the type of content each of them can host; for instance, the short description can be published on Twitter, the longer one in one or more relevant blogs, the video on YouTube, the images on Picasa, etc. In particular, the following categories of social media platforms will be targeted:

- Platforms for Communication, such as Blogs, Internet forums, Presence applications, Social networking sites, Social network aggregation sites and event sites.

- Platforms for Collaboration, such as Wikis, Social bookmarking (or Social tagging) sites, social news and opinion sites.

- Platforms for Multimedia and Entertainment, such as Photo sharing, Video sharing, Livecasting and Virtual World sites.

- Platforms for News and Information, such as Google News, Institutional Sites with a high number of visitors (i.e. EU, Human Rights and WWF sites) and newspaper sites.

- Platforms for Policy-making and Public Participation, such as governmental organisations' forums, blogs, petitions, etc.

In order to examine the feasibility of the aforementioned approach, the APIs of the most popular social media (Facebook, Youtube, Linkedin, Twitter, Delicious, Flickr, Blogger, Picassa, Ustream and Digg) have been analysed. 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 to open API standards (Charalabidis et al., 2010). In particular, they provide a rich functionality through their APIs 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, content push functionality (i.e. methods for publishing text, images, videos or more complex forms of media such as 'events', 'albums' etc); also, a large part of the APIs is dedicated to the creation, uploading, modification and deletion of such content. On the other hand, a functionality that supports the direct retrieval of various types of content generated by users also exists (i.e. methods for retrieving 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. The above findings from the analysis of the APIs of the most popular social media confirm the feasibility of the proposed approach.

Going into more detail, the technical architecture of the central platform is highly modular, consisting of the following five areas:

i.   Web Front-end, for handling all communication with the policy-maker through the Web (i.e. pages for login/register, getting input from the policy-maker for setting up a campaign, presenting citizen feedback on the campaign to the policy-maker, presenting advanced processing results, etc).

ii. Mobile Native Application and Widget area, for supporting all the abovementioned types of communication with the policy-makers, and also for providing to the citizens with alternative channels of accessing the platform, reading its policy-related content and commenting on it (through mobile smartphones and Google widgets).

iii. Publishing, Tracking and Storing Content area, for publishing the volume of different content types provided by the policy-maker across suitable social media platforms, monitoring citizen feedback on the published information and storing all relevant information (published content, citizen interaction, social media analytics).

iv. Service Discovery, Composition and Binding area, for providing the required infrastructure that enable service communication, both internally among the different platform components and externally among the platform components and external systems (such as the native mobile application, widgets and social media platforms).

v.   Decision Support area, for processing all the accumulated set of data (e.g. data provided by the policy-maker, citizen feedback, analytics collected or produced by social media, etc) and providing decision support to the policy-maker on his/her published campaigns. This area is described in more detail in the following section.

4. Policy-maker Decision Support

The objective of the decision support area of the central platform is to process using various advanced methods the data retrieved from various social media (concerning various types of users' interaction with the policy messages published on them), in order to extract useful decision support information for policy-makers. This information aims to assist the policy-maker in understanding 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 improving the policy in question.

The architecture of the decision support area consists of three layers, which are shown in Figure 2.

The first layer will retrieve and process the 'raw analytics' which are provided by the analytics engines that nearly all social media have, either directly through a user interface, or through appropriate methods of their APIs. From the investigation performed on the relevant capabilities of the most popular social media, it has been concluded that a rich variety of such raw analytics can be provided; furthermore, there is a continuous evolution and new development towards this direction.

The second layer will provide more advanced 'PADGETS analytics' focusing on the textual input (e.g. blog postings, opinions, comments, etc.) of the users of the targeted social media. By using social media APIs, the textual input of citizens as postings, comments and opinions will be retrieved and stored in PADGETS central platform. All textual input is produced by the user via interactions with the published policy message. These texts will be processed using methods of opinion mining, in order to identify the general sentiments on these policy messages (classifying them as positive, neutral or negative), and also the particular issues raised and the relevant sentiments (positive, neutral or negative) (Maragoudakis et al., 2011).

Finally, the third layer will include the use of simulation modelling for two purposes: i) for screening the numerous proposals made by citizens in all the targeted social media on public policies under formation or application, by estimating their outcomes (i.e. effects on various important socio-economic variables), and ii) for projecting in the future the current awareness and interest of citizens in the particular policy and the level of its acceptance (e.g. forecasting their evolution in the next 12 months). This simulation modelling will take input from various 'social indicators' produced by the other two layers (Charalabidis et al., 2011).

From a review of opinion mining methods (Maragoudakis et al., 2011), it has been concluded that a useful body of knowledge has been developed in this area consisting of methods for addressing the following three problems:

- classification of an opinionated text as expressing - in general - a positive, negative or neutral opinion (document-level sentiment analysis).

- classification of each sentence of such a text as objective (fact) or subjective (opinion), and then focus on the latter and classification of each of them as expressing a positive, negative or neutral opinion (sentence-level sentiment analysis).

- extraction of the particular features/subtopics commented by the authors of these texts, and for each of them identification of the orientation of the opinions expressed about it as positive, negative or neutral (feature-level sentiment analysis).
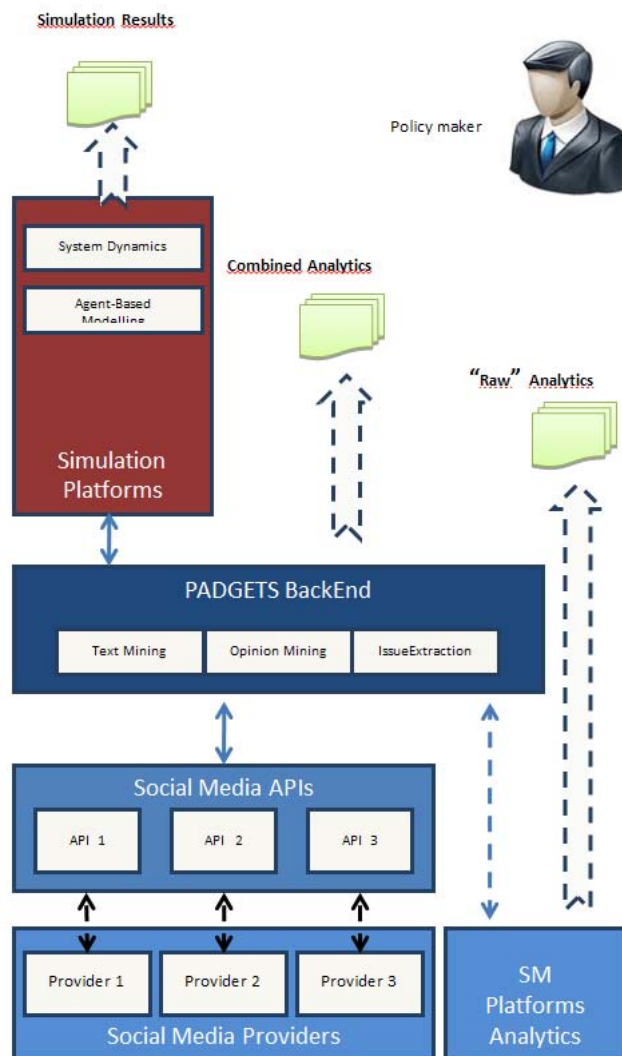
Figure 2: Architecture of the Decision Support Area

Based on the conclusions of this review, a basic framework for the use of opinion mining methods in our central platform has been formulated, consisting of five stages:

i. Classify each posting on the policy under discussion as positive, neutral or negative, using methods of document-level sentiment analysis, and then calculate relative frequencies of positive, neutral and negative postings.

ii. For each posting, identify its subjective sentences (expressing opinions) and classify each of them as positive, neutral or negative, using methods of sentence-level sentiment analysis, and then calculate relative frequencies of positive, neutral and negative subjective sentences.

iii. Compare and integrate findings of the above steps I and II, as well as the findings from the analysis of other types of citizens' non-textual feedback (e.g. numbers of users who voted in favour or against the policy/decision under discussion in an eVote tool, or rated it positively or negatively in an eSurvey tool, or even liked or disliked a relevant content published on social media). This will allow conclusions to be drawn as to the citizens' general sentiments/feelings (positive or negative) on this government policy/decision.

iv. By further processing all postings on this policy/decision using feature extraction methods, identify the main issues raised and commented by citizens.

v. Finally, for each issue classify each of the postings' sentences containing it as positive, neutral or negative using methods of sentence-level sentiment analysis - opinion orientation, and then calculate relative frequencies of positive, neutral and negative subjective sentences. This will allow the identification of the main issues raised by the citizens and the particular sentiments/feelings on them (e.g. positive and negative aspects and effects of the policies/decisions under discussion, implementation barriers, improvement suggestions, etc.).

Additionally, a review of the simulation modelling area has been conducted, examining existing approaches as to their suitability for the abovementioned two purposes (for screening the numerous proposals made by citizens, estimating their outcomes and for projecting in the future awareness, interest and acceptance) (Charalabidis et al., 2011). From this review, the following conclusions have been drawn, indicating two main approaches:

a. <u>System Dynamics</u> (Forrester, 1961; Schwaninger et al., 2008) seems to be one of the most promising approaches for the above purposes, which require high/macro level modelling and simulation of complex social or economic systems in continuous time for assessing the impacts of different policy-related proposals. Such systems include various individual processes with 'stocks' (e.g. users and non-users of various services or new technologies, employed and unemployed citizens, citizen groups of various income levels, etc.) and 'flows' among them (e.g. some citizens start using a new technology or service, so they move from the non-users' stock to the users' stock), which are influenced by public policies, so System Dynamics is well positioned for modelling and simulating them.

Another advantage is that Systems Dynamics has been successfully used in the past for assessing the evolution of a number of critical variables of economy and society, such as unemployment, economic development, taxation income, technologies penetration, pollution, poverty, etc. So it is not any more in an 'experimental phase'; it has become mature in terms of knowledge and experience that have been gathered from its use in the above areas.

b. <u>Agent-based Modelling and Simulation</u> (Epstein, 1999; Ferro et al., 2010) can also be useful for the aforementioned purposes, as it can be used for modelling and simulation at both meso- and macro levels. This approach does not require us to define the basic structure of the system in order to estimate its macro behaviour (as in Systems Dynamics), but the behaviour and interaction rules of the individual units (e.g. persons, firms, etc.) instead.

Taking into account that usually for social and economic systems it is easier to define the former (structure) than the latter (behaviour and interaction rules of the individual units), it can be argued that Systems Dynamics might be more advantageous than Agent-based Modelling and Simulation in most cases. However, in cases that it is easier to define behaviour and interaction rules of the individual units, Agent-based Modelling and Simulation might be the preferable approach.

5. Findings

The value generated by the proposed approach has been investigated and elaborated through a series of interviews with experienced staff from the three government agencies participating in the PADGETS project (Piedmont Region, Italy; Observatory for the Greek Information Society, Greece; Centre for e-Governance Development for South East Europe, Slovenia). This value unfolds along a number of dimensions, and may vary among the different phases of the policy-making cycle. In essence, the proposed approach is perceived as a way to further reduce the distance between policy-

making and society's needs, compared with the 'first generation' eParticipation approaches, 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 vision of the disparate stakeholders' opinions and priorities, exploiting in a rational and centrally managed way highly popular web 2.0 social media. By giving policy-makers a privileged 'interface' for 'hearing society's voice' directly, in the electronic spaces where citizens choose to express their opinions, 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 section two, the proposed approach allows for rich interaction among the various stakeholders of the public policy under discussion, and also with the government, in a rational, efficient and low cost way. This facilitates the formulation of a shared definition of the problem to be addressed by each public policy under formulation and the particular objectives to be achieved for this purpose, resulting in better and more socially-rooted and balanced public policies.

It can provide significant advantages over the existing practices of government agencies in this area, which consist mainly in isolated, fragmented and non-coordinated uses of some Web 2.0 social media. The possibility 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. In addition, the ability to collect citizens' interactions and feedback from all targeted social media in a single point, allows a synthesis and - at the same time - a 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 smooth participation accompanied by more socially-rooted policies for stakeholders; fresh, useful and low cost inputs for policy-makers.

It should be emphasised that electronic campaigns of this kind may be launched at any phase of the policy-making cycle: agenda setting, policy analysis, policy formulation, policy implementation, and policy monitoring and evaluation (according to the phases of the policy-making cycle proposed by the OECD, e.g. see OECD (2003)). 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 introduced by the PADGETS platform can be summarised as follows:

i. Relaxation of current constraints in terms of size, frequency and quality of citizens' participation. All different stakeholders are free to participate in any policy process they are interested in, at a preferred time, spending the amount of effort they are willing to, and above all using tools they are already accustomed to. From the opposite perspective, policy-makers can continuously access reports pertaining to stakeholders' opinion, being allowed to quickly modify and adapt the policy issues under discussion.

ii. Integrated management of multiple social media channels. The presence of a Web dashboard dedicated to the policy-maker with the main results of his/her campaigns reduces the complexity and heterogeneity that usually comes, 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.

iii. Creation of an 'open' decision support system. Opening up the decision support process means integrating it with activities carried out over social media platforms. This allows establishing a direct link between government decision process and the external world, as well as to reason on fresh and relevant information, and finally to support and promote evidence-based decision and policy making in the public sector.

iv. Finally, the decision support component provides a number of promising functionalities that generate precious knowledge to be used in order to inform the decision making process. In particular, this component allows to generate snapshots on the levels of awareness, interest and acceptance of a given policy, create possible scenarios of how such levels of awareness, interest and acceptance may vary over time (e.g., in the next 12 months) and, finally, single out relevant opinions emerging from the interaction of the end users with the policy message.

However, the interviewees emphasised the preconditions for the practical application of this novel approach and for realising the above benefits. They clearly mentioned that this new multi-channel approach to eParticipation will require significant interventions and changes in government agencies at the structural, processes, human resources and technological levels:

- It will require the creation of a new organisational unit in order to organise and manage the presence of the government agency in these multiple eParticipation channels, and also to analyse 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 in these social media.

- Also, new processes should be established for the integration of the results and conclusions of the analysis of the above structured and unstructured eParticipation 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 specialised skills for managing efficiently the 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 around them, characteristics that are quite different compared with the official eParticipation spaces.

- At a technological level, the analysis of the large quantities of unstructured data (in textual form) that will be collected from the above channels (e.g. hundreds or thousands of postings) will require highly sophisticated ICT-based tools for text analysis and opinion mining methods. These tools will have to be integrated into the technological infrastructures of the above channels. Also, the use of these tools is not easy, and requires extensive adaptations and language resources, such as lexicons of polar words, synonyms and antonym.

6. Extending the approach

The approach presented in the previous sections constitutes a kind of 'stimulated/guided crowdsourcing', in which government seeks citizens' knowledge and feedback on a public policy issue through relevant stimulation/guidance it provides to citizens by publishing policy-related content to various social media. Therefore, a natural extension is to proceed towards the concept of the 'non-moderated crowdsourcing', in which the government does not provide such stimulation/ guidance. It can be based on the search by government agencies for content on a public policy under formulation (e.g. concerning health, education, crime), which has been created by citizens in numerous web 2.0 sources (e.g. blogs and microblogs, news sharing sites, online forums, etc.) freely, without any initiation, stimulation or moderation through government postings; this content then can undergo various forms of advanced processing in order to extract from it arguments, opinions, issues and proposals on the particular policy, identify their sentiments (positive or negative), and finally summarize and visualize them (Charalabidis et al., 2012). This can extend the approach presented in the previous sections towards earlier stages of the policy life cycle (e.g. early agenda setting),

while it also allows the exploitation of the vast amount of user-generated content that is created in numerous web 2.0 social media, in order to support governments to understand better the needs, wishes and beliefs of citizens, and create better and more socially rooted policies for addressing them. It leads to an extended approach to the exploitation of social media by government agencies in their policy-making processes. It enables the policy-makers (in a wider sense, e.g. government organisations, members of parliament, politicians) to effectively LISTEN and monitor what citizens say in social media, ANALYSE those conversations and get the main stakeholders positions and opinions, RECEIVE all responses and data properly processes and displayed for an effective use and exploitation, and finally ACT on this information by proceeding to a more active crowdsourcing through postings to various social media.

Therefore this extended approach consists of the following four stages:

i. Listen: This phase includes listening to and monitoring what people say on a specific domain of government activity under discussion (e.g. based on its vocabulary or ontology of it), and what their needs, their opinions and their proposals are. For this purpose, an advanced web crawler can be used, i.e. a program, which browses the Web and collects relevant content from many sources of information:

- Micro-blogging sites, such as Twitter;

- Blogs including Blogger, WordPress, Typepad & LiveJournal;

- Video sites including YouTube, Vimeo, Metacafe, Bliptv;

- Social networks such as Facebook and MySpace;

- Discussion forums;

- News sites, whether international, national or regional;

- Images sites such as Flickr;

- Corporate sites.

ii. Analyse: This phase includes analysing the content, in order to identify issues, opinions, arguments and proposals concerning a particular policy domain, which are hidden within the text of the citizens electronic conversations, and creating a semantically rich, accurate stream of data that can be leveraged in the next phases. In particular, each web page found by the crawler can go through a series of automated analysis processes:

- Language detection;

- Opinion and Argument Extraction;

- Sentiment Analysis;

- Argument Summarisation.

iii. Receive: In this phase, a Position Map of the extracted argument clusters will be constructed, built upon the relevance, the visibility and the sentiment (either positive or negative) of the data collected from the above web hosted conversations. With the use of visual analytics all related data will be presented into a visible form that highlights important features, including commonalities and/or discrepancies. In this context, all the data that comes from sources as diverse as blogs, online opinion polls and government reports are properly displayed in a synthetic manner that allows policy-makers to draw conclusions.

iv. Act: Once the policy-maker finds out about the existing opinions of his constituency regarding a particular domain of government activity, based on the argument extraction and visualisation outcomes, the draft-policy agenda can be formulated accordingly. This can then be tested against social opinion. Using the platform described in the previous sections three and four, it is possible to:

- Publish this draft-policy agenda in multiple appropriate social media;

- Collect citizens' feedback on this agenda;

- Analyse it using the decision support tools described in section four;

- Make the required modifications to the above policy agenda, based on the conclusions of this analysis.

This extended approach is currently investigated, elaborated and evaluated as part of the NOMAD project (mentioned in the introduction). As part of this project, the focus was placed on the three countries - Greece, Austria and the UK - where pilots are going to be organised, and possible sources of political and policy-related content were searched. In all these three countries the core of these sources were numerous political blogs, where extensive political discussion and content generation takes place. Therefore, for each country an initial selection of sources of political discussion was made, based on the rankings of the ALEXA system, since it is the only open source method, which provides a relatively accurate system of website popularity metrics and audience demographics. In particular, all websites with political content which are ranked up to 500th position on ALEXA were initially selected and examined. This analysis revealed that in all three countries there is a considerable number of sources of political content with good popularity (ranked up to 500th position on ALEXA), hence the above extended approach seems to have a considerable content basis.

At the same time, this analysis revealed an important difference among the blogospheres of these three countries. In Austria and the UK there is a much stronger consolidation and concentration, with a small number of political blogs being among the top 500 country websites (38 for Austria and 55 for the UK); on the contrary, in Greece there is a high fragmentation in this area, with a much bigger number of political blogs (100) being among the top 500 country websites. This indicates that the content basis for this extended approach can vary significantly among countries.

7. Conclusions

Governments have started using the rapidly emerged web 2.0 social media for achieving a wider interaction with the citizens, however they have not developed advanced practices for this purpose, so they currently limit themselves to isolated, fragmented and non-coordinated uses of some Web 2.0 social media. Therefore, it is necessary to build up knowledge on how social media can be used more rationally and effectively by government agencies in order to promote and enhance participative public policy-making. This research attempts to contribute to the following direction: towards the rationalization of social media exploitation by government agencies in their policy-making processes.

In the previous sections, an advanced form of exploiting web 2.0 social media by government agencies for achieving a stronger interaction with more and diverse groups of citizens has been explored. It is based on a central platform, which allows i) publishing content and deploying micro web applications to multiple web 2.0 social media simultaneously, ii) retrieving users' interactions with this content and applications (e.g. views, comments, ratings) in all these social media, in an efficient systematic

and centrally managed automated manner using their API, and iii) performing various levels of advanced processing of these interaction data (calculation of various analytics, opinion mining and simulation modelling). Also, an extension of this approach has been presented, which is based on 'non-moderated crowdsourcing', through the collection of citizen-generated content on a particular domain of government activity from multiple social media. This content then undergoes advanced processing in order to extract from it arguments, opinions, issues and proposals on the particular policy, identify their sentiments (positive or negative), and finally summarise and visualise them.

The proposed approaches allow for a stronger and better interaction of government agencies with the various stakeholders of the public policies they design and implement, in a rational manner and at a low cost. They offer the possibility of centralised and efficient management of many electronic channels of communication with citizens: they allow publishing policy-related content from one single point to multiple social media, which results in time and cost efficiencies, and also in homogeneity of presence in all these social media. Also, they allow collecting citizens' interactions and feedback from all targeted social media in a single point and performing a synthesis and - at the same time - a comparison across many different groups of citizens. They enable government agencies to apply crowdsourcing ideas efficiently, both in a 'stimulated/guided' and a 'non-moderated' manner, in all stages of the policy lifecycle. In this way more valuable 'tacit knowledge' on important social problems and needs, and policy options for addressing them, which is possessed by large numbers of citizens, can be transformed into 'explicit (codified) knowledge' that can be used by government for designing better and more socially rooted policies. Furthermore, the proposed approaches facilitate the formulation of a shared definition of the problem and the objectives to be achieved, resulting in better and more socially-rooted and balanced public policies. For the above reasons they can provide significant advantages over the existing practices of government agencies in this area, which consist mainly in isolated, fragmented and non-coordinated uses of some Web 2.0 social media. They can offer to government agencies foundations for rationalizing the ways and processes of exploiting social media.

However, it should be noted that the practical application of these approaches constitutes a radical change of the current government agencies' approach to eParticipation, which will be gradually replaced by a multi-channel one, using a series of interconnected eParticipation channels (the official eParticipation space, plus a number of appropriate social media), having quite different characteristics, structure, language, style and target groups. This new approach will require significant interventions/changes in government agencies at the structural, processes, human resources and technological levels: a new organisational unit for managing the presence in these multiple channels, new processes for integrating the new information they provide in the existing decision and policy-making processes of government agencies, human resources with appropriate skills and culture, and also new ICT tools.

Further research is required for the elaboration, validation and evaluation (at the technological, organisational and political levels) of the proposed approaches. 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 a wide discussion on important policies of three government organisations participating as partners in this project (the Observatory for the Greek Information Society, the Centre for e-Governance Development, in Slovenia, and the Regione Piemonte, in Italy). Furthermore, the elaboration, validation and evaluation of the proposed extension based on 'non-moderated crowdsourcing' has been planned to be conducted through further pilots (in Greece, Austria and the UK) as part of the NOMAD project.

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