A framework for advanced social media exploitation in government for crowdsourcing

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Abstract

Purpose – This paper aims to develop and evaluate, in "real-life" pilot applications, a framework for advanced social media exploitation by government agencies in their policy-making processes to promote public participation and conduct crowdsourcing.

Design/methodology/approach – This framework has been developed through cooperation with public sector employees experienced in public policy-making, using both qualitative and quantitative techniques: semi-structured focus group discussions, scenarios development and questionnaire surveys. The evaluation of the framework has been conducted through semi-structured focus group discussions with public sector employees involved in the pilot applications.

Findings – A framework has been developed for advanced social media exploitation by government agencies, which is based on the automated posting of policy-related content to multiple social media, and then retrieval and processing of citizens' interactions with it (e.g. views, likes, comments and retweets), using the application programming interfaces (API) of these social media. Furthermore, a supporting information and communication technologies (ICT) infrastructure and an application process model for it were developed. Its evaluation, based on "real-life" pilot applications, leads to useful insights concerning its capabilities, strengths and weaknesses.

Research limitations/implications – The proposed framework has been evaluated in a small number of pilot applications, so further evaluation of it is required, in various types of government agencies and for different kinds of policy consultations.

Practical/Implications – The above framework enables government agencies to communicate with wider and more heterogeneous audiences in a short time and at a low cost, increase public participation in their policy-making processes, collect useful knowledge, ideas and opinions from citizens and, finally, design better, more socially rooted, balanced and realistic policies.

Originality/value – This research contributes to the development of knowledge concerning advanced practices for effective social media exploitation in government (which is currently limited, despite the considerable relevant knowledge developed in this area for the private sector), by developing and evaluating a framework for advanced and highly automated exploitation of multiple social media by government agencies. Furthermore, an evaluation methodology for such practices has been developed, which is based on sound theoretical foundations.

1. Introduction

In many countries, there is a continuously growing number of government agencies that make considerable efforts to enhance citizens' participation in their policy making processes exploiting the capabilities provided by the Information and communication technologies (ICT) This has led to a rapid development of research and practice in the area of e-participation, and in general e-governance (Commission of the European Communities, 2006 and 2010; Loukis *et al.*, 2011). One of the most promising ICT for these purposes is the Web 2.0 social media. These new communication channels have been initially exploited by private sector firms to support mainly their marketing and customer relations functions; therefore, there has been considerable research in this area, which has already developed useful knowledge on methods and practices for the effective utilization of social media in the private sector, and their critical success factors (Constantinides, 2010; Heath *et al.*, 2013).

Governments started exploiting the high capabilities and popularity of the social media much later, so there has been less research and knowledge concerning their effective utilization by government agencies. Social media are already used extensively by citizens for political discussions and for organizing and coordinating political activity (Agarwal *et al.*, 2011; Larsson and Moe, 2011), so government cannot be absent from them. Therefore, it is necessary to develop new knowledge in this recently emerged area, concerning methods and practices for the effective utilization of social media in government, their impact and value and also the challenges they pose and their limitations, which will enable a mature and effective exploitation of social media by government agencies (Chun and Luna Reyes, 2012; Criado *et al.*, 2013).

This paper aims to contribute to filling this research gap. In particular, its research objectives are:

- the development of a framework for advanced exploitation of multiple social media by government in an efficient and effective manner to collect knowledge, ideas and opinions from citizens and applying crowdsourcing practices in the public sector;

- its elaboration, by developing an ICT infrastructure supporting its application, and also an application process model for it (meant as a model of process to be followed by government agencies for the practical application of it, consisting of a sequence of specific activities that have to be executed); and

- finally, to make a theoretically sound evaluation of this framework in "real-life" pilot applications.

This research has been conducted within the European research project PADGETS ("Policy Gadgets Mashing Underlying Group Knowledge in Web 2.0 Media" – for more details, see www.padgets.eu/) supported by the "ICT for Governance and Policy Modelling" research initiative of European Commission.

In the following sections, we will first present the background of our research (Section 2) and the research methodology (Section 3). Then, we describe the proposed

framework (Section 4), the ICT infrastructure required for supporting its application (Section 5) and its application process model (Section 6). Next, the results of its evaluation are presented (Section 7), and, finally, the conclusions are summarized and the implications are outlined (Section 8).

2. Background

Previous research has revealed that the solution of the modern complex and "wicked" policy problems can be greatly supported by information systems that allow stakeholders to enter and exchange relevant perceived "topics" and "questions", and also "ideas" and "arguments" (positive and negative ones), which are called "Issue-Based Information Systems" and can stimulate and promote a controlled and productive way of discussion among competent government agencies and different stakeholder groups, and also facilitate mutual understanding and convergences among them (Kunz and Rittel, 1979; Conklin, 2003). In general, ICT can enable and facilitate extensive exchange of information, knowledge, perceptions and opinions among government agencies and policy stakeholders, which can be highly beneficial for the development of better, more balanced and acceptable public. This has led to a rapid development of e-participation research and practice (Commission of the European Communities, 2006 and 2010; Loukis et al., 2011). Especially the recently emerged Web 2.0 social media and their high penetration in modern societies creates big opportunities for a wider low-cost application of these approaches, involving more and diverse citizens groups in policy consultations. There is already considerable literature that analyses the great potential of social media use in government (Tapscott et al., 2008; Osimo, 2008; Bertot et al., 2012a; Bertot et al., 2012b; Bonsón et al., 2012; Linders, 2012; Margo, 2012; Criado et al., 2013). It has been concluded that social media provides government agencies extensive capabilities to:

- increase citizens' participation and engagement, providing to more groups of modern societies a voice in debates on public policies development and implementation;
- promote transparency and accountability and reduce corruption, enabling governments to open up large quantities of activity and spending related data and, at the same time, enabling citizens to collectively take part in monitoring the activities of their governments;
- proceed to public services co-production with citizens, enabling government agencies and the public to develop and design jointly government services;
- exploit citizens' knowledge and talent to develop innovative solutions to the increasingly serious and complex societal problems; and
- drive important innovations in both internal operations of government agencies and the ways they interact with the public outside their boundaries.

Furthermore, social media enable the application of crowdsourcing ideas (Howe, 2008; Brabham, 2009 and 2012) in the public sector, which can be quite beneficial for the design of better, more socially rooted, balanced and realistic policies. Management literature has been discussing for long time the capability of a large network of people connected through ICT, termed as "crowd", to perform successfully difficult design and problem-solving activities (Lévy, 1997). This collective intelligence has recently started

being exploited systematically, mainly by private sector firms. This practice is referred to as "crowd-sourcing", defined as:

> […] the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call.

There is already considerable literature on crowdsourcing in the private sector, which initially focused on the analysis of success stories, and later on the identification of patterns and trends in this area. A typical example of the later is the work of Hetmank (2013), who, based on a review of crowdsourcing literature, identified a basic process model of it, which includes ten activities: define task, set time period, state reward, recruit participants, assign tasks, accept crowd contributions, combine submissions, evaluate submissions, select solution and finally grant rewards. Also, he identified a basic pattern in the structure of crowdsourcing IS, which includes four main components performing:

(1) user management (providing capabilities for user registration, user evaluation, user group formation and coordination);

(2) task management (providing capabilities for task design and assignment);

(3) contribution management (providing capabilities for contributions evaluation and selection); and

(4) workflow management (providing capabilities for defining and managing workflows), respectively.

However, there is much less literature concerning the application of crowdsourcing ideas in the public sector. Linders (2012) proposed a typology of social media-based government "citizens co-production" initiatives, aiming to support the future systematic analysis of them. It includes three main categories of such initiatives:

(1) "citizen sourcing" (having a citizens-to-government (C2G) orientation: citizens assist government to become more responsive and effective);

(2) "government as a platform" (having a government-to-citizens (G2C) orientation: government provides to citizens extensive information and knowledge to assist them to improve their well-being and productivity); and

(3) "do it yourself government" (having a citizen to citizen orientation: government provides to citizens support to "self-organize" and provide some simple kinds of public services themselves to other citizens).

Mergel and Desouza (2013) analyze the experience gained from the Challenge.gov, a crowdsourcing – open innovation initiative of the US government, which adopts a crowdsourcing approach similar to the abovementioned private sector one. In particular, it includes the organization of contests, aiming to engage individual citizens, or teams of citizens, in solving particular problems of government agencies; independent judges' committees evaluate the submitted solutions, and the best is awarded a predefined prize.

Furthermore, it should be noted that government agencies initially adopted simpler practices of social media use, which included operating manually accounts in some social media, posting relevant content to them (e.g. concerning current and future

policies and activities) manually and then reading citizens' interactions with it to draw conclusions from them. Gradually, there is some research on and experimentation with more advanced and sophisticated forms of social media use in government, which exploit the extensive capabilities provided by the APIs of social media platforms; most of them aim at the automated retrieval and analysis of content from various "external" Web 2.0 sources to identify citizen's needs, problems and opinions (Kokkinakos *et al.*, 2012).

It is widely recognized (Chun and Luna Reyes, 2012; Criado *et al.*, 2013) that for the exploitation of the above great potential of social media in government, further research is required for the development of specific methods and practices of effective of social media utilization in government, and the investigation of their impact and value, and also the challenges they pose and their limitations. The research presented in this paper makes a contribution in this direction, developing a framework for advanced exploitation of social media by government agencies, based on the automated operation of multiple accounts in various social media for conducting crowdsourcing, and also evaluating it, revealing both the value it generates and, at the same time, its weaknesses and limitations.

3. Research methodology

The development of the framework was performed through cooperation with public-sector employees experienced in public policy-making, using both qualitative and quantitative techniques: semi-structured focus group discussions, scenarios development and questionnaire surveys. In particular, the methodology we adopted for the development of the framework consisted of the following four stages:

(1) Initially, three semi-structured focus group discussions were conducted in the three government agencies participating in the PADGETS project as user partners [Center for eGovernance Development (Slovenia), ICT Observatory (Greece) and Piedmont Regional Government (Italy)], which aimed at obtaining an understanding of their policy-making processes, the degree and form of public participation in them and also their needs for and interest in ICT support of the latter. They were all based on the questionnaire shown in Appendix 1.

(2) The same questionnaire was filled in and returned to us through e-mail by another four government agencies [City of Regensburg (Germany), World Heritage Coordination (Germany), North Lincolnshire Council (UK), IT Inkubator Ostbayern GmbH (Germany)], which have some form of close cooperation with the above three user partners of PADGETS project. This allowed us to obtain the above information from a wider group of government agencies, and cover a variety of government levels (national, regional and local).

(3) Three scenarios were developed in cooperation with the above three user partners of PADGETS project concerning the combined use of several social media in a highly automated and efficient manner for consultation with citizens on the following public policy subjects aiming at "crowdsourcing" (selected based on the interests and priorities of user partners at that time):

- "Legal and illegal immigration and integration of third-country nationals" (in cooperation with the Center for eGovernance Development – Slovenia);
- "Introduction of citizen electronic identity card" (in cooperation with ICT Observatory –s Greece);
- "Large-scale implementation of tele-medicine in Piedmont region" (in cooperation with Piedmont Regional Government – Italy); and
- each of these scenarios described which social media should be used and how, what content should be posted to them, and also how various types of citizens' interactions with it (e.g. views, likes, comments, retweets, etc.) should be monitored and exploited, and what analytics would be useful to be computed from them.

(4) Finally, a survey was conducted, using a shorter online questionnaire concerning the required functionality from an ICT tool supporting the use of social media for public policy-related consultations over social media, which is shown in Appendix 2. It was distributed by personnel of the three user partners involved in the PADGETS project to colleagues from the same or other government agencies, who have working experience in public policy-making, and, finally, filled in by 60 persons.

Based on the responses of the participants in Stages I and II, the responses in the survey of Stage IV, and the scenarios from Stage III, initially our framework for advanced exploitation of multiple social media in government was formulated (described in the following Section 4), and then a supporting ICT infrastructure and an application process model for it were developed (described next in Sections 5 and 6, respectively).

For the evaluation of the proposed framework, ten pilot applications of it were conducted. They concerned social media consultations on the following subjects (selected based on the interests and priorities of user partners at that time, and the recommendations of European Commission partially financing the project):

(1) "Media freedom".

(2) "Corruption".

(3) "Cooperative institutes' contribution to poverty reduction, employment generation and social integration".

(4) "Tax evasion and fraud".

(5) "European year of citizens and citizenship".

(6) "Employment, enterpreneurship and freedom of speech for European youth".
[the above six pilot applications were organized and conducted by the Center for eGovernance Development, Slovenia, in cooperation with Slovenian Members of the European Parliament (MEP)]:

(7) "Under-representation of women executives in the higher management of enterprises";

(8) "Financial crisis in the Southern European countries".

(9) "Exploitation of wind energy".
(these three pilot consultations were organized and conducted by the University of the Aegean, as the Greek ICT observatory had been abolished at

that time as part of the Greek government austerity program, in cooperation with a Greek MEP),

(10) "Large-scale implementation of tele-medicine in Piedmont region".
(this pilot consultation was organized and conducted by Torino Polytechnico in cooperation with Piedmont Regional Government).

After the end of these pilot applications, semi-structured focus group discussions were conducted for evaluating them, in which participated the involved personnel of users partners and MEP assistants. They were based on the evaluation questionnaire shown in Appendix 3, which is based on previous research on "wicked" policy problems and "issue-based information systems" (Kunz and Rittel, 1979; Conklin, 2003) outlined in Section 2. It aims to assess to what extent the proposed framework is useful for conducting policy-related social media consultations in a short time and at a low cost, and for reaching wide audiences; also, to what extent it is useful to identify for a particular domain of government activity or public policy what are the particular problems/issues, possible solutions to them and relevant advantages – positive arguments and disadvantages – negative arguments; and finally, to what extent it allows identifying stakeholders groups with different views and concerns and facilitates convergence (at least to some extent) among them. All focus group discussions were tape-recorded, transcribed and then coded manually, using an open-coding approach (Maylor and Blackmon, 2005).
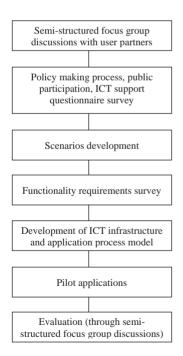
Our research methodology is illustrated in Figure 1.

Figure 1.
Research methodology

4. Framework description

The main characteristics of the proposed framework for social media exploitation by government agencies are:

- simultaneous utilization of multiple social media, with each of them attracting different citizens' groups, so that wide and diverse audiences can be reached and engaged;

- in a centrally controlled and highly automated manner, based on a central ICT platform, and exploiting the application programming interfaces (APIs) of the utilized social media to have high levels of efficiency and effectiveness;

- publishing public policy-related content in multiple accounts of a government agency in these social media, and continuously monitoring citizens' interactions with this content, so that new appropriate interventions can be made in time (i.e. through publishing new relevant content in some of the above social media) if necessary; and

- finally, making highly sophisticated processing of the above citizens' interactions to maximize conclusions' drawing, knowledge extraction from them and crowdsourcing, in general, and, finally, policy-makers' support.

Our framework is illustrated in Figure 2.

We can see that it is based on the centralized automated publishing of content to multiple government agency's – or policy-maker's – accounts in several Web 2.0 social
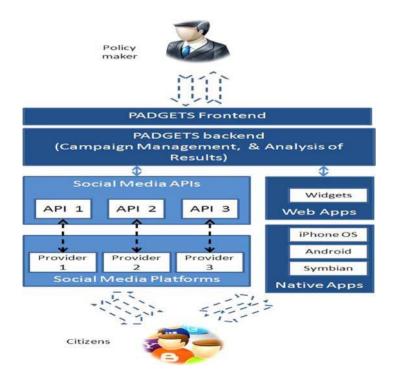

Figure 2.
A framework for social media exploitation by government agencies

media (e.g. Facebook, Twitter, YouTube, Picasa, Blogger), and then collecting and monitoring various types of citizens' interactions with this content (e.g. views, likes, ratings, comments and retweets), all through a central ICT platform, using the API of these social media. In particular, a government policy maker, through a web-based dashboard or a mobile phone application, initiates a campaign concerning a specific topic or policy in multiple social media. For this purpose, he/she creates relevant multimedia content (e.g. short and longer topic description, images, video, etc.), which will then be automatically published in the corresponding social media (e.g. in the Twitter the short topic description, in Blogger the longer one, in YouTube the video, in Picasa the images, etc.). The citizens will view this content, and also interact with it (in all the ways that each social media platform allows), either through these social media, or through a mobile phone application. Then, these interactions will be automatically retrieved and shown continuously to the policy-maker through the above Web-based dashboard or mobile phone application. Finally, after the end of the campaign, sophisticated processing of all citizens' interactions with the above content will be performed in this central ICT platform, using a variety of techniques (e.g. calculation of web analytics, opinion mining) to provide useful analytics and knowledge extraction that support government decision and policy-making.

For examining the technological feasibility of this framework, the APIs of the most popular social media (Facebook, Twitter, YouTube, LinkedIn, Blogger, Picasa, Delicious, Flickr, Digg and Ustream) have been analyzed (Charalabidis *et al.*, 2010; Charalabidis and Loukis, 2011). In particular, for each of them, we examined the following:

- Available APIs and types of provided capabilities.
- Capabilities for pushing content through their API (e.g. posts, photos, videos, rating, voting, etc.).
- Capabilities for retrieving content through their API (e.g. comments on posts, photos, videos, approved requests, etc.).

From this analysis, it has been concluded that all these social media have a strategy of providing extensive API to attract third parties to develop applications. They provide rich functionality through their APIs for posting and retrieving content, exposing methods that provide third-party developers with an extensive and continuously growing set of capabilities. Therefore, it can be concluded that the proposed framework is technologically feasible. However, most of these API are not stable, and change frequently, so big effort and cost will be required for the maintenance of the above central ICT platform to keep it operational.

The practical application of the above framework will lead to a collection of large amounts of content generated by citizens in various Web 2.0 social media concerning the particular topic or policy under discussion, so it will be of critical importance to develop highly sophisticated methods of processing it to support conclusions' drawing, knowledge extraction and crowdsourcing, in general, offering substantial support to government policy-makers. This necessitates the development of appropriate decision support systems (DSS) that can increase the quality of the government policy making process (Shim *et al.*, 2002; Schwaninger *et al.*, 2008). Because a large part of this citizens-generated content to be collected

from social media will be in textual form, opinion mining, defined as the advanced processing of text to extract sentiments, feelings, opinions and emotions (Maragoudakis *et al.*, 2011), will be a critical technology for our DSS. The development and use of opinion mining first started in the private sector, as firms wanted to analyze comments and reviews about their products, which had been entered by their customers in various Web sites to draw conclusions as to whether customers like the specific products or not (through sentiment analysis), the particular features of the products that have been commented (through issues extraction) and the orientations (positive, negative or neutral) of these comments (through sentiment analysis). These ideas can be applied in the public sector as well, as citizens created content in the Web is a valuable source of information that can be quite useful for government decision- and policy-making; it is important to identify the main issues posed by citizens (through issues extraction) on a particular topic or policy-making we are dealing with, and also the corresponding sentiments or feelings (positive, neutral or negative – through sentiment analysis).

5. ICT infrastructure
An ICT platform has been developed for supporting the practical application of the above framework, providing all required functionalities to the two main types of users of it: government policy-makers and citizens. In particular, a "policy makers' dashboard" [accessible through a Web-based or a mobile interface (Android mobile application)] enables policy-makers:

(1) to create a multiple social media campaign by defining its topic, the starting and ending date/time, the social media accounts of the policy-maker to be used and the relevant messages and multimedia content to be posted to them;

(2) to monitor continuously citizens' comments on the messages; in Figure 3, we can see this part of the Web-based policy-makers' interface, which is structured in three columns:
   - in the first column, the active campaigns are shown, by selecting one of them;
   - in the second column are shown the corresponding messages posted by the policy-maker (the initial, and the subsequent ones) and, finally, by selecting one of these messages; and
   - in the third column are shown citizens' comments on it (textual feedback stream).

(3) after the end of the campaign, to view (in graphics and visualizations form) a set of analytics and opinion mining results, which are produced by the decision support component of the platform (described later in this section) for the whole campaign.

The citizens can see the content of each campaign, and also other citizens' interactions with it (e.g. textual comments), either through the interfaces of the corresponding social media, or through a mobile interface (Android mobile application), or a widget, which enables citizens to view active campaigns and by selecting one of them to view all policy-maker and citizens' comments on it or add a new comment.

The technological architecture of this ICT platform is shown in Figure 4. We can see that it consists of two main areas:
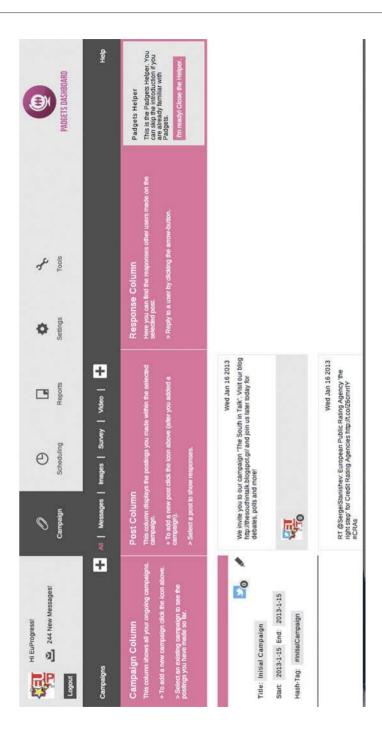
Figure 3.
Policy-makers' interface
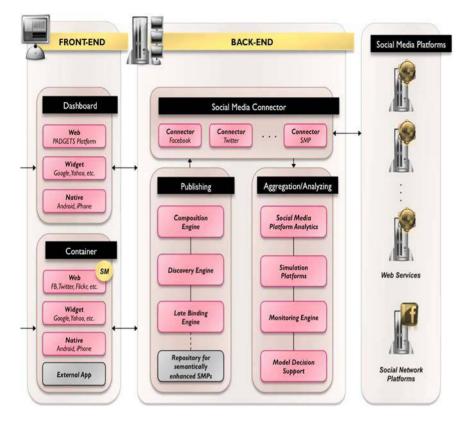for viewing active
campaigns, messages and
citizens' feedback

(1) The Front-end area, which provides the abovementioned Web interface to the policy-makers, and also the mobile application and widget alternative interfaces to policy-makers and citizens.

(2) The Back-end area, which includes three components: the first of them performs publishing of various content types in multiple social media through the second component, consisting of connectors with the utilized social media. The third component performs aggregation/analysis of citizens interactions with the above-published content in these social media, retrieved through the second component; it consists of one sub-component that allows continuous monitoring of these citizens interactions (in the way shown in Figure 3), and several sub-components that provide analytics for policy-makers' decision support.

One of these sub-components collects and processes the "raw analytics" provided by the analytics engines of the utilized social media. From our analysis of the most popular social media platforms and the capabilities they offer, it has been concluded that there is a very rich variety of raw analytics that can be provided by them, which can be exploited for policy-makers' decision support. Another sub-component provides more advanced analytics, called "Padgets Analytics", which focuses on citizens' textual inputs (e.g. blog

postings, comments, opinions, etc.), processing them using opinion mining techniques (Maragoudakis *et al.*, 2011). In particular, it performs the following three types of tasks:

(1) classification of an opinionated text (e.g. a blog post) as expressing a positive, negative or neutral opinion (this is referred to as document-level sentiment analysis);

(2) classification of each sentence in a such a text, first as subjective or objective (i.e. determination of whether it expresses an opinion or not), and then for each subjective sentence (i.e. expressing an opinion) classification as positive, negative or neutral (this is known as sentence-level sentiment analysis); and

(3) extraction of specific issues commented by the author of a text, and for identification of each issue's orientation as positive, negative or neutral (this is referred to as feature-level sentiment analysis).

Another sub-component performs simulation modeling, having mainly two objectives: estimation of the outcomes of various citizens' proposals on the public policies under discussion, and also forecasting the future levels of citizens' interest in and awareness of these policies. The simulation modeling takes as input various indicators produced by the other two aforementioned layers (Charalabidis *et al.*, 2011).

It should be noted that the above structure of the ICT platform required for the practical application of the proposed framework has some similarities with the typical structure of the crowdsourcing information systems (IS) described in Section 2 [which according to Hetmank (2013) includes user, task, contribution and workflow management components], but also important differences as well. In particular, our ICT platform includes "task management" components (that enable setting-up a campaign and creating/adding multimedia content to it) and "contribution management" components (allowing processing citizens' interactions with the above content in the utilized social media). However, it does not include "user management" components (as the management of the citizens participating in our campaigns is performed through our social media accounts) and "workflow management" ones (as according to our requirements' analysis, based on the methodology described in Section 3, there is no need for defining different variants of our main application process model, presented in the following Section 4 – if such a need arises in the future, then workflow management functionality will be added). Furthermore, our platform provides much more sophisticated task management functionality (e.g. capabilities for creating campaigns with rich multimedia policy-related content for stimulating wide and lively social media consultations) and contributions management functionality (e.g. extensive capabilities for processing citizens' interactions with this content through analytics calculations, opinion mining and simulation modeling) than the typical crowdsourcing IS.

6. Application process model

Furthermore, for the proposed framework an application process model has been developed; it provides a model of the process to be followed by government agencies for the practical application of it, which includes a sequence of specific activities to be executed. The application of this framework is usually initiated by a government policy-maker (or his/her assistants), who has to decide about a new policy, or a modification of an existing one, and would like to have consultation with citizens to collect from them useful relevant knowledge, ideas and opinions (i.e. conduct

corwdsourcing). The process that needs to be followed consists of the following eight activities, which are shown in Figure 5:

(1) the policy-maker initially sets up a policy campaign, using the capabilities of the central ICT platform described in previous section, through a graphical user interface;

(2) then he/she creates textual content for this campaign (both short and longer policy statements and adds various types of multimedia content to it (e.g. policy images, video, etc.);

(3) and finally defines the multiple social media accounts to be used in this campaign;

(4) as well as views a preview of the campaign in each of them;

(5) the campaign is launched by publishing the above content (in each of these multiple social media will be automatically published the appropriate part of the above content, e.g. in the Twitter will be published the short policy statement, in Blogger the longer one, in YouTube the video, in Picasa the images, etc.);

(6) citizens interact with the published content in various ways in these social media (in the ways each of them allows): access and see this content, rate it and make some comments on it, retransmit it in their networks, etc;

(7) the above citizens' interactions are automatically retrieved from all the used social media in the central ICT platform, and are processed there using various
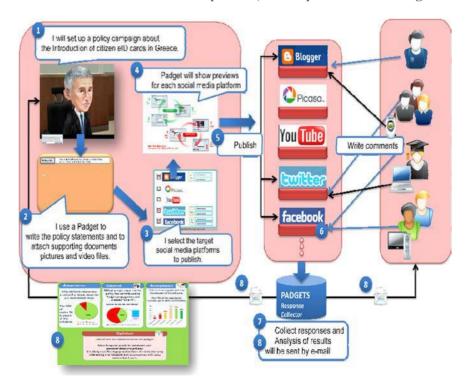

Figure 5.
A process model for the application of the proposed framework

advanced techniques (as described in section 5) to calculate useful analytics that provide assistance and support to the policy maker; and

(8) the results are sent immediately to the policy maker, by e-mail or SMS message.

This can be the end of the campaign, or it can lead to a second round of content publishing in these social media, so these activities from 1 to 8 will be repeated, etc.

The above process model we have developed for the application of the proposed framework has similarities with the typical crowdsourcing process model [according to Hetmank (2013)] described in Section 2, but also important differences as well. In particular, our application process model includes six out of the ten activities of this typical crowdsourcing process model (define task, set time period, assign tasks, accept crowd contributions, combine submissions and evaluate submissions); however, most of them in a quite different form. On the contrary, the former does not include the remaining four activities of the latter (state reward, recruit participants, select solution and, finally, grant rewards) due to inherent differences of the proposed framework from the typical crowdsourcing (e.g. lack of reward, participants management through our accounts in the utilized social media).

The above application process model has been further elaborated, leading to the development of a more detailed one, which is shown in Figure 6.

7. Evaluation results

In all the evaluation focus group discussions there was a wide agreement among the participants that the proposed framework constitutes a time- and cost-efficient method for organizing wide policy consultations, which reach wide audiences, communicate policy-related multimedia messages to them, and stimulate and motivate them to think about public policies under formulation and express their relevant ideas, knowledge and opinions. It enables much wider reach and participation of more citizens (representatives of affected citizens' groups and individuals) in comparison with the traditional methods already used by government agencies for this purpose (such as physical events and meetings with representatives of the most important stakeholders), with lower effort and cost. It can be especially useful for involving younger target groups in policy debates, which seems difficult to be achieved currently with the traditional consultation methods.

The participants in these focus group discussions characterized our framework and the supporting ICT platform as valuable tools for identifying the main issues perceived by citizens with respect to a particular social problem or domain of government activity, and for collecting from citizens interesting ideas on possible solutions and directions of government activity for addressing them. These are, indeed, quite important for the design of better, more socially rooted, balanced and realistic policies. As underlined by one of the participating MEP Assistants, "the outcome of the campaign provided an identification of the issues that should be taken in consideration in the formation of solutions, as input coming from society".

However, some participants mentioned that their consultations generated mainly "high level information" (i.e. main issues and broad solution directions), but not the more detailed and in-depth information they would need concerning perceived issues, solutions, advantages and disadvantages. Therefore, it was suggested that to achieve this higher level of depth and detail, a series of such consultations might have to follow,
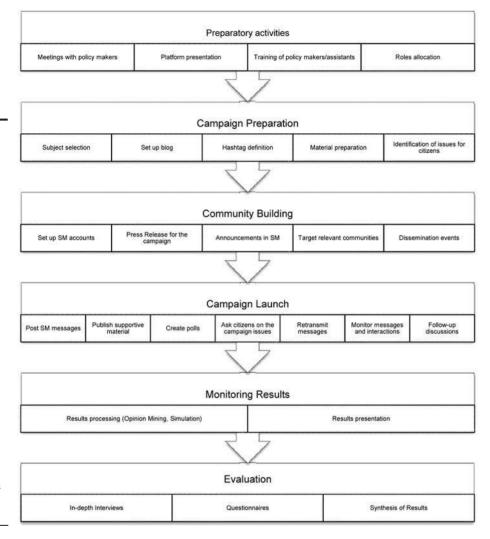
Figure 6.
A more detailed process
model for the application
of the proposed
framework

probably more focused ones on particular sub-topics and/or participants' groups. In
particular, it was recommended that a good practice would be to process the information
collected from such a consultation, and then use it for organizing subsequent more
focused consultations on specific sub-topics mentioned in the first consultation, and also
on social actors with strong interest and extensive knowledge on the particular problem/
policy and experts.

Another weakness mentioned was that in many of these multiple social media
consultations we did not have "balanced debates", with different and diverse views and
perspectives being expressed, so we did not have the opportunity to identify stakeholder
groups with different views, opinions and concerns and have dialog among them and
finally convergences, which are quite important for the formulation of effective,

balanced and acceptable public policies. On the contrary, in some other consultations (e.g. in the consultation on the exploitation of wind power, which was organized in cooperation with a MEP), we had more balanced and pluralistic debates, with higher diversity of views and opinions expressed, in which different opinion clusters could be clearly identified, providing finally more assistance and support for the formulation of public policy. This was attributed by the participants in the corresponding focus group discussion to the fact that in the latter consultations there was particularly strong emphasis on and great effort for building a wide and diverse community, by inviting a big number of civil society organizations and individuals with strong interest and extensive knowledge on the corresponding topic/policy and also diverse perspectives and orientations; this did not happen in the former consultations (in which the debate was mainly within the network of the initiator policy-maker, so it resulted in limited diversity of views and opinions).

Furthermore, several participants mentioned that in the traditional consultations conducted by their government agencies as part of their policy-making processes, there is usually participation of a variety of diverse stakeholders, having different perspectives, orientations and opinions. This does not necessarily happen with this multiple social media consultation approach, which might lead to discussions among like-minded individuals belonging to the networks of the initiator government policy-maker, resulting finally in reduced diversity of opinions and perspectives. Hence, it was recommended that it is critical that such consultations should not be based only on social media accounts and networks of one government policy-maker and that it would be useful to:

- invite additional individuals and civil society organizations having strong interest and extensive knowledge on the corresponding topic/policy, and also diverse perspectives and orientations;
- exploit social media accounts and networks of other politicians as well, preferably from different political parties and orientations, and also of other social actors; and
- to have access to a wide range of diverse communities with interest in and knowledge on the topic/policy under discussion. Also, it was widely agreed that the outcomes of these multiple social media consultations should be combined and integrated with the outcomes of other types of consultations usually conducted by government agencies with traditional methods and the recommendations of experts' studies.

8. Conclusions and implications
Web 2.0 social media have been initially exploited by private sector firms, mainly in their marketing and customer relations processes, and it was much later that government agencies started exploiting them, mainly in their public policy-making processes for communicating with citizens. Therefore, much more knowledge has been developed concerning the exploitation of social media in the private sector than in the public sector. Therefore, it is necessary to focus our research attention on the development of knowledge on how (i.e. through which frameworks methods and practices) social media can be effectively and efficiently utilized in government (Chun and Luna Reyes, 2012; Criado et al., 2013). This paper makes the following four contributions in this direction:

(1) It develops a framework for advanced exploitation of multiple social media by government to collect knowledge, ideas and opinions from citizens, applying crowdsourcing practices in the public sector, which is based on the use of the API of these social media, initially for the automated posting of policy-related content to them, and then for the retrieval of citizens' interactions with it (e.g. views, likes, comments and retweets), and also on the sophisticated processing of these interactions (calculation of various analytics, opinion mining and simulation modeling) to maximize knowledge extraction from them and crowdsourcing, in general, and finally policy-makers' support. It should be noted that this approach focuses on the exploitation of the accounts and the development of the networks of the government agencies and policy makers, so it is quite different from the approaches of the limited previous research on advanced and sophisticated forms of social media use in government, which focus mainly on the exploitation of various "external" Web 2.0 sources (Kokkinakos et al., 2012).

(2) It also develops an ICT infrastructure that supports the application of this framework, whose structure has some similarities with the typical structure of a crowdsourcing IS (Hetmank (2013)), but also important differences as well; it provides more capabilities than existing commercial tools (e.g. HootSuite), especially with respect to the processing of citizens' interactions, and is more specialized for government context.

(3) And also, a process model for the practical application of the above framework, proposing a sequence of eight specific activities to be performed for this purpose, which has both similarities with the typical crowdsourcing process model (Hetmank (2013) and also notable differences as well.

(4) Finally, our framework is evaluated in "real-life" pilot applications, from a public policy perspective, assessing to what extent it assists in addressing its fundamental complexities, based on sound theoretical foundations (from previous research on wicked policy problems and issue-based information systems) and, at the same time, identifying its weaknesses and limitations.

From this evaluation, useful insights have been generated concerning the capabilities, strengths and weaknesses of the proposed framework. In particular, it has been concluded that this framework constitutes a time- and cost-efficient way of organizing wide policy consultations, which reach wide audiences, communicate policy-related multimedia messages to them and stimulate and motivate them to think about public policies under formulation and express their relevant ideas, knowledge and opinions. Furthermore, it is a valuable tool for identifying the main issues perceived by citizens with respect to a particular social problem or domain of government activity and for collecting from them interesting ideas on possible solutions and directions of government activity (i.e. for applying crowdsourcing ideas in the public sector).

However, our pilot applications have shown that the information generated from such a consultation might not be at the level of detail required by government policy-makers. Therefore, to achieve a higher level of detail, and more discussion depth in general, a series of such consultations might be required, each of them focused on particular sub-topics and/or participants' groups. Furthermore, the proposed framework might lead to unproductive discussions among like-minded individuals

belonging to the networks of the government policy-maker who initiated the consultation; such discussions are characterized by low diversity of opinions and perspectives, low productivity of ideas and, in general, limited creativity, do not allow the identification of stakeholders' groups with different views and concerns and do not facilitate dialog among them and convergence, which are all highly important for the design of effective, balanced and acceptable public policies,. Therefore, for the effective application of the proposed framework, it is of critical importance to build large and diverse networks for these social media consultations; for this purpose, we can combine networks of several politicians, preferably from different political parties and orientations, and also invite additional interested and knowledgeable individuals and civil society organizations.

The proposed framework provides a "soft" model of applying crowdsourcing ideas in government, which does not include contests, judges' committees and prizes, being different (and much simpler) from the "hard" crowdsourcing model of Challenge.gov (that is similar to the private sector crowdsourcing model) presented and analyzed by Mergel and Desouza (2013). Therefore, our framework can be used by government agencies for taking some first "soft" steps in the area of crowdsourcing (collection of knowledge, ideas and opinions from citizens), gain some first relevant experience from them and then probably proceed to "harder" steps, having the form of contests, with definition of more specific problems to be addressed by citizens, judges' committees and prizes, if this seems to be appropriate for the particular government agency. The proposed framework can be quite useful for the efficient and effective implementation of the first of the three citizens co-production categories proposed by Linders (2012) (termed as "citizen-sourcing"), in any of the three stages of government services' lifecycle (design, execution and monitoring).

Our research has interesting implications for research and practice. It opens up new directions of research on advanced frameworks, methods and practices for effective social media exploitation by government agencies and also for the development of advanced information systems for this purpose, and appropriate application process models. Furthermore, it provides a methodology for their theoretically sound evaluation from a public policy perspective. With respect to government practice and management, it provides to government agencies effective methods and ICT tools to communicate with wider and more heterogeneous audiences in a short time and at a low cost, increase public participation in their policy making processes, collect useful knowledge, ideas and opinions from citizens (i.e. apply "citizen-sourcing") and, finally, design better, more socially rooted, balanced and realistic public policies. It can provide significant opportunities for more interaction with the society; however, their exploitation will not be straightforward. The application of such methods will not lead automatically to better and more socially rooted and responsive public policies, if it is not combined with a change of culture of public servants and politicians (more trust/interest in and emphasis on the voice of society); also, it is necessary to create rules concerning the use of social media by government agencies, the exploitation of the knowledge, ideas and opinions collecting from this process and, in general, its integration with the policy-making processes of government agencies.

At the same time, our study has some limitations, which should be addressed by future research. The proposed framework has been evaluated in a small number of pilot applications, so further evaluation of it is required, in various types of government

agencies and for different kinds of policy consultations. Also, our research focuses on the exploitation of social media by government agencies as a means of more intensive "external communication" with their external environment (e.g. with the society – civil society organizations and individual citizens), so further research is required on the exploitation of social media as a means of more intensive "internal communication" among different government agencies (or even among different departments of the same government agency) for the design and implementation of public policies. Finally, further research is required concerning the comparison of the proposed "soft" citizen-sourcing approach with the "harder" ones (of Challenge.gov type) from various perspectives, and also their combination.

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Appendix 1

Policy-making process, public participation and ICT support questionnaire

(1) Which are the main public policies (at a local or central level) you are responsible for?

(2) Which are the main stakeholder groups affected by these public policies?

(3) To what extent do you have discussions–consultations with representatives of the above stakeholder groups on these policies?

(4) In which stages of the policy-making lifecycle? – And how?

(5) Which are the main obstacles for this?

(6) How important do you think it is to have discussions-consultations with representatives of the above stakeholder groups on these policies?

(7) What is the final outcome you would expect to get from these discussions–consultations with representatives of the above stakeholder groups that would assist you in designing-implementing better policies?

(8) To what extent do you have wider discussions–consultations with the wider public affected by these policies?

(9) In which stages of the policy-making lifecycle? – And how?

(10) Which are the main obstacles for this?

(11) To what extent would be useful a software tool that would publish a political message or public policy under formulation to several appropriate Web 2.0 social media, and then collect and process users' ratings, comments and other interactions?

(12) What social indicators would you like to know for the involved citizens during policy planning or implementation?

(13) What other means (ICT-based or not) you think would contribute to successful policy planning and implementation for your organization?

Appendix 2

Functionality requirements questionnaire
  (1) What functionality should future tools for policy-making over social media provide?
  (2) What are useful indicators for a policy-making campaign over social media?
  (3) Where is the value in having policy-making consultation over social media?
  (4) What kind of content would you prefer to publish in policy messages reaching wide?
  (5) How important do you think it is to have age, sex and instruction level of people reached in policy-making?

Appendix 3

Evaluation questionnaire
To what extent this approach is useful for:

- conducting policy-related social media consultations that reach and involve wide audiences in a short time and at a low cost;
- identifying the particular problems/issues in a particular domain of government activity or public policy;
- identifying possible solutions to them;
- as well as relevant advantages – positive arguments and disadvantages – negative arguments;
- identifying stakeholders' groups with different views and concerns; and
- finally, facilitating convergence (at least to some extent) among them.

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