Good Governance is an important objective for improving responsible management of public resources. Also the formulation of policies for e-government research requires complying with Good Governance. To ensure that the principles of Good Governance are met in strategic planning of e-government research, stakeholder involvement in the formulation and scoping of future research fields is crucial. Stakeholder involvement and participation encompass political, social and societal engagement.

In this paper, we first examine in how far stakeholders can be and are already involved in policy-oriented science and technology roadmapping. We then propose a concept for open collaboration to facilitate online stakeholder engagement in strategic planning of e-government research.

1. Good governance: foundation of stakeholder involvement in policy planning

The concept of Good Governance describes “the principles, approaches and guidelines for good governance and public administration to promote interaction and formation of political will with regard to societal and technological changes” [37]. United Nations characterizes Good Governance as being participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive thereby following the rule of law [33]. World Bank defines Good Governance as “the traditions and institutions by which authority in a country is exercised for the common good. This includes (i) the process by which those in authority are selected, monitored and replaced, (ii) the capacity of the government to effectively manage its resources and implement sound policies, and (iii) the respect of citizens and the state for the institutions that govern economic and social interactions among them” [38]. The definition of the OECD is similar to the World Bank’s definition. However, OECD also embraces participatory development, human rights and democratization [28]. The European Commission (EC) set up five path-breaking principles for Good Governance, namely openness, participation, responsiveness, effectiveness and coherence (cf. [37], [31]).

These definitions emphasize the involvement of stakeholders as crucial aspect for achieving Good Governance. In this paper, we investigate how well stakeholder involvement is achieved in strategic planning of e-government research. We first scan different policy-oriented science and technology roadmapping (PSTRM) methods thereby analyzing, through which means and in how far online consultation is used. From the insights gained, we develop a concept to achieve more effective community and stakeholder engagement based on participatory online means.

The remainder of the paper is structured as follows: Section 2 gives an overview of the PSTRM context of the European Commission (EC). Section 3 reviews existing methodologies for PSTRM to ground our concept for online engagement of stakeholders in PSTRM. Furthermore, literature on online participation use of web 2.0 of stakeholder engagement is studied. In section 4, the concept for online stakeholder engagement in PSTRM is introduced. Particular focus is given on e-participation tools to support online stakeholder involvement and open collaboration throughout the whole PSTRM process. Section 5 reflects on the work thereby highlighting benefits and limitations of the concept. We conclude with a summary of developments and provide an outlook on the next steps to conceptualize and implement a corresponding ICT toolbox.
2. PSTRM context at the EC

Before the EC proposes new initiatives, the potential economic, social and environmental consequences of the initiatives are assessed (cf. [12], [32]). Besides, interim technology forecast, technology assessment and technology foresight studies [32] are continuously conducted in order to ground the tactic and strategic decisions accordingly [12]. In this paper, we focus on foresight as a means for strategic planning to support priority setting for research funding programs of the EC [9]. The objective and tasks of EC funding programs are derived from the global tendencies and needs of sustainable socio-economic development. The rationale for this lays in (see [32], [12] and [18]):

- the ever-increasing necessity of comprehensive assessment and modeling of the complex issues of development,
- forecasting of development trends and potential impacts, and
- providing analytical background for the policy and managerial decisions.

Over the last years, the EC regularly funded PSTRM projects to perform policy analysis and strategic planning of the priorities and research themes to ground next research programs. Most of these funded projects (see examples in section 3) base their methodology on a combination of scenarios and technology roadmapping (TRM).

Scenarios are used to identify changes in the environment and the corresponding consequences arising in the long-term future. In politics, scenario analysis involves modeling of possible alternative paths of a social, economic, technological or political environment thereby focusing more on qualitative arguable future aspects [3].

TRMs are often used to draw and visualize guidelines of how to get from a certain starting point (as-is-situation) through a terrain, partly known and partly unknown, to an assigned destination (to-be-situation). TRM serve as means for selecting the best convenient direction among the drawn alternatives to determine how to arrive at a destination considering travelers preferences [26]. TRMs cover a time-based strategic planning process, which helps to line up and communicate needs (why to do) with the corresponding actions (what to do) and the supporting resources (how to do) [26].

Often, such PSTRM projects have limited resources and, hence, are limited to a small group of external experts to be consulted. Hence, in such PSTRM projects the principles of Good Governance, as introduced in the introductory section, are not fully met; this in particular as the development of the Internet towards a social medium based on web 2.0 and a vast amount of participatory tools and technologies provide a huge potential for a wider consultation of stakeholders (see [32]). These issues ground the research conducted to integrate open collaboration in TRM. The paper at hand reports on the findings from investigating stakeholder involvement theories and practices in strategic e-government planning and related work. The research that underlies this paper starts from the desire to improve empowerment and engagement of individuals, groups and communities in strategic e-government planning. Monitoring and evaluation of the eParticipation Preparatory Action pilot projects of the EC demonstrated, how using modern ICT tools can make it easier for people to participate in and contribute to better decision-making (see [8], [4]). This paper starts from the hypothesis that web 2.0 and participatory tools and technologies are able to increase trust of the citizens and facilitate a more efficient collection of feedback from stakeholders in order to continuously improve governance.

The next section investigates PSTRM projects and their methodologies in terms of stakeholder involvement. Besides, web 2.0 and e-participation tools are reviewed. Both lay the foundation for a comprehensive concept of online stakeholder involvement in PSTRM.

3. Reviewing stakeholder involvement in theory and practice

The need for a well defined stakeholder involvement concept as proposed in this paper emerged from our research projects in PSTRM. Lessons from the eGovRTD2020 project [9] stressed the need to facilitate qualitative data analysis in PSTRM projects through ICT to improve reliability and validity of results (cf. [36], [6]). In the subsequent CROSSROAD project [17], the need to support stakeholder involvement in PSTRM through ICT substantiated, as through social media and open innovation, the demand for a wider consultation in policy development became predominant. A wider stakeholder engagement is also grounded in the principles of Good Governance (see section 1). Hence, in PSTRM, stakeholder engagement contributes to more transparency and openness in strategic planning.

A review of PSTRM applications as well as e-participation theories and practices forms the ground for a rigorous conceptualization. The methodology used to scientifically ground the results presented in this section and the following ones base on case study
analysis of existing IST roadmapping projects funded by the EC and desk research in the field of e-participation.

The case study research method [39] was used to investigate stakeholder involvement approaches to support PSTRM for strategic planning. The main focus of the study was to investigate how to foster and conduct useful stakeholder involvement. The next sub-section gives an overview of PSTRM projects such as eGovRTD2020, PHS2020, ROADiBROM and CROSSROAD with particular focus on their overall methodology, as well as their approaches to stakeholder engagement. A comparative analysis highlights opportunities for wider online stakeholder involvement.

The second sub-section investigates the e-participation literature including web 2.0 and social media to demonstrate their benefit in PSTRM exercises. Particular focus was given on tools' characteristics to identify potential fields of application throughout the PSTRM process.

3.1 PSTRM applications review

Four PSTRM projects conducted in the last few years were studied. The PSTRM methodology these projects employed consists of the following four phases: state-of-play, scenario building, gap analysis and roadmapping. PHS2020, ROADiBROM and CROSSROAD have their roots in the eGovRTD2020 method [9], hence eGovRTD2020 will be introduced first:

a) eGovRTD2020 project and methodology

The eGovRTD2020 project1 aimed at identifying future strategic research fields for the development of e-government and the public sector as such. The state of play grounds on literature review of current e-government research themes, running research programs and policies, as well as the existing e-government projects on foresight studies and trend analysis [7]. Then scenarios were built in expert workshops [3]. Qualitative data analysis took place to extract topics of interest from literature review (i.e., state-of-play analysis) and scenarios, which lay the foundation for the formulation of issues along the lines of categories formulated when applying the Grounded Theory [13]. To investigate the gaps in current research, the issues extracted from the state of play and the scenarios were compared [9] and gaps were assessed. The results were validated throughout expert roadmapping workshops [9].

Besides, an online roadmap forum was used including a) evaluation and commenting on the final set of scenarios, b) assessment and prioritization of the identified gaps, c) identification and prioritization of the proposed research themes and actions, and d) phasing of the proposed research themes and actions [9]. Stakeholder consultation to validate the results and derive feedback took place at the last stage of the process namely the roadmapping.

The project involved about 480 workshop participants and 380 survey respondents from all regions of the world [9]. “eGovRTD2020 thus embodied a comprehensive and rigorous approach to generating an e-government research agenda, encompassing both broad visioning and detailed analysis of extensive data collected directly from a large number of diverse stakeholders” [11]. In the end, thirteen research roadmaps have been derived.

b) PHS2020 project and methodology

The PHS2020 project2 aims at identifying and characterizing the key future research challenges to be addressed in the area of eHealth. The underlying method of PHS2020 is more or less the same as the eGovRTD2020 project approach (cf. [9] and [10]). The most relevant aspect in the context of this paper in which PHS2020 and eGovRTD2020 differ is their stakeholder involvement process. In contrast to eGovRTD2020, PHS2020 established a constant Expert Support Committee (ESC) for consultation [10]. A total of nine consultation events (i.e. five meetings of the ESC, and four open workshops for consultation with a broader set of stakeholders and workshops) were conducted [10]. Every ESC meeting took place after desk research phase in each of the methodological phases (i.e. state-of-play, scenario building, gap analysis and roadmapping) [10].

In the end, five research roadmaps have been derived that fed into the planning of the first FP7 call in the field [10].

c) ROADiBROM project and methodology

The ROADiBROM project was a joint EU-China roadmapping project [21]. It addressed digital broadcasting and mobile convergence towards 2015. Objectives were to define and create a vision of how the media landscape in Europe and China will look like in 2015.

ROADiBROM carried out the same method used in eGovRTD2020 to analyze and synthesize the state

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1 http://www.egovrtd2020.org/, co-funded by the EC under the 6th Framework Programme (FP) of Information Society Technologies (IST).

2 http://ec.europa.eu/information_society/activities/health/research/fp7phs, funded by the EC under FP6 of IST. PHS stands for Personal Healthcare Systems.
of play (cf. [9] and [21]). For the scenario building and subsequent analysis process, ROADiBROM applied not only desk research and visionary scenario workshops, but also expert interviews and an online survey [21]. Gap analysis was mainly conducted as Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis [21]. Strengths, weaknesses, opportunities and threats of the issues identified in the state-of-the-art were projected towards the identified issues of the scenarios. For the final roadmap, four brainstorming workshops were executed. The project involved about 300 workshop participants and 300 survey respondents from Europe and China [21].

The project combined European and Chinese knowledge to create common grounds and share ideas. The results will serve as a guideline and instrument to provide input to shape the future R&D investment of EC but shared with China authorities [21].

d) CROSSROAD project and methodology

The main goal of the CROSSROAD project is to identify emerging technologies, new governance models and novel application scenarios in the area of participation, electronic governance and policy modeling.

For defining the state-of-play of ICT for governance and policy modeling, CROSSROAD carried out desk research and developed a taxonomy that classifies the research themes, the research areas and the research sub-areas challenging the domain [17]. In contrast to eGovRTD2020, the taxonomy consists of predefined categories, which lead the desk research (cf. the development of categories using the qualitative content analysis [23]). Desk research grounds also scenario building that was enriched through an ESC workshop [25]. In this workshop, also the results of the state-of-play were reviewed. Gap analysis carried out a comparative analysis of the state-of-play and the scenarios to derive an initial set of gaps evaluated and reviewed by the ESC and a wider audience through online consultation and survey [5]. The final roadmapping is currently in progress. It will also base on desk research and an ESC workshop.

The results will serve as a guideline and instrument for strategic planning of future R&D investment of EC. As the project is in the midst of its run time, final roadmapping results can only be expected by the end of 2010.

Comparative analysis evidences that PHS2020 and CROSSROAD departed from eGovRTD2020. However, they differ from ROADiBROM and eGovRTD2020 in terms of establishing a fixed ESC. The ESC approaches of PHS2020 and CROSSROAD projects show that iterative stakeholder consultation throughout the whole process contributes to the success of the project and to the quality of results (i.e., reliability and validity). We, therefore, recommend projects to start the stakeholder involvement process early to legitimate strategic decisions such as priority setting of research investments. CROSSROAD, ROADiBROM and eGovRTD2020 used online consultations to engage a wider audience at certain points throughout the process. Figure 1 provides an overview of where in the methodical steps of PSTRM the different projects consulted stakeholders via other than online consultation means (cf. stakeholder consultation box). The projects with the bold frame indicates which projects deployed online consultations, and in which methodical steps.

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3 http://www.crossroad-eu.net, funded within FP7 of the EC
number of participants is large (i.e. a little less than 500) and rather constant along the process (because of the ESC in PHS2020 and CROSSROAD).

The samples of external experts in the different projects encompass international experts from multiple disciplines and backgrounds. These findings substantiate the assumption that PSTRM may profit from e-participation tools to support online stakeholder involvement and open collaboration. Sub-section 4.2 presents the results from reviewing literature on existing e-participation tools.

### 3.2 Theories and eParticipation tools supporting online consultation

The problem scope and purpose, why online consultation and open collaboration have become a central part of PSTRM, relates to the fact that e-government is a multifaceted subject (cf. [35], [7]). Strategic documents on e-government research and development (R&D) do not necessarily take account of all e-government activities, which are actually taking place in one country. This raises the need to additional expert consultation (e.g. the PHS2020 project consulted Gartner’s analysts and ESC [10]).

To achieve the best possible degree of completeness of contents and integrity, online stakeholder involvement in the PSTRM enriches the desk research through consulting experts in the field and other designated stakeholders using e-participation tools. Wider online stakeholder consultation facilitates a better conformity with the Good Governance principles (see [32], [8]). In particular, participation, openness and transparency are supported since a wider audience of stakeholders is involved throughout the process. Besides, also coherence is facilitated through the involvement of stakeholders from all EU Member States and even at global scale.

Over the last five years, e-participation has become a research discipline. Subject of e-participation research is the deployment of ICT for letting citizens and businesses participate at the political decision making process [22]. Over the past five years, a considerable number of e-participation projects have been funded at national and international level, among them trial projects at EC level¹, projects conducting fundamental research (e.g. DEMO-net²) and projects evaluating existing e-participation projects and programs (e.g. MOMENTUM³).

Although the definition of e-participation refers first and foremost to the involvement of affected people and stakeholders in democratic-political matters, e-government research planning can benefit from e-participation approaches, in particular if it relates to the active stakeholder involvement (cf. [34], [30]). The development of strategies and policies for e-government research considering only the government point of view (i.e. policy base only on the visions and knowledge of policy and decision makers) may be a barrier for achieving wide-ranging acceptance in society. Major problem of this approach is that stakeholders are not sufficiently informed about and involved in the policy formulation and impact assessment processes. Improving the information exchange and the communication between stakeholders and analysts during the whole policy formulation process is important for [34]:

- knowing and understanding the different viewpoints of stakeholders in the context of the policy
- informing stakeholders about the perspectives resulting from desk research
- promoting wide-ranging acceptance within and across stakeholder groups.

According to the ISO 10006 [16], seven key concepts exist for participation of stakeholders:

1. Identification and analysis of stakeholders
2. Publishing information
3. Stakeholder consultation
4. Negotiation and partnership
5. Complaint management
6. Stakeholder involvement in project monitoring
7. Reporting to stakeholder.

For the scope of this paper in particular point 2 (publishing information) and point 3 (stakeholder consultation) are relevant. Publishing information refers to issues of making information accessible for interested and affected parties, i.e. information should be available as soon as possible and presented in an easily understandable way. Publishing and informing is important, however, it only provides limited added-value as long as stakeholders are not actively involved in the policy and decision making process. In this context, quality of results benefit from stakeholder consultation (i.e. considering ideas, opinions and knowledge of stakeholders). Stakeholder consultation may be crucial success factor for the policy implementation. Hence, it is

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² [www.demo-net.org](http://www.demo-net.org), funded by the EC within FP6
³ [www.epmomentum.eu](http://www.epmomentum.eu), co-funded by the EC within the eParticipation Preparatory Action
necessary to document the consultation and to continuously visualize stakeholders what and in how far their contributions went into the policy formulated. The involvement of experts in the field and other designated stakeholders is valuable as networked knowledge supports collective problem solving. Collective problem solving is in particular to be considered for application-oriented research domains such as e-government. As already explained above, the outcome of executing the PSTRM methodology is likely to have wide-ranging impact on economy and society. Hence, it is crucial to base decisions on as much expertise and information as possible.

To effectively support online stakeholder consultation in PSTRM phases, next step was to investigate existing e-participation tools for their applicability for this purpose. Thus, we conducted a requirements analysis along the four methodical steps of PSTRM (state-of-play, scenarios, gap analysis and roadmapping) to identify criteria for online stakeholder consultation. Focus was on the integration of e-participation tools to enable external experts to take part in the problem solving process via online means.

Insights from the MOMENTUM project, which monitored and evaluated web 2.0 based tools deployed in the e-participation trial projects referred to above, ground the selection of the following web 2.0 based e-participation tools, which were assessed as deployable in PSTRM projects to consult stakeholders online:

a) Weblogs (Blogs)

Blogs can be used for opinion detection [24] and they allow PSTRM analysts to publish their (interim) results and receive feedback through online conversations about their results [27]. For instance, scenarios built by experts can be published as blog and commented by citizens or other designated stakeholders. Blogs present a story-telling environment, which is easy for different stakeholders to work with. This helps analysts to appreciate other perspectives on their results, as well as to form and to share their own findings. Blogs allow stakeholders to read and comment entries such as current research foci, aspects of scenarios, gaps or roadmaps. In contrast to discussion forums, the analysts are free to determine the topic and if comments are wanted (i.e., if feedback is aimed) or not (i.e., if dissemination of results is aimed) (cf. [1]).

b) Discussion Forum

Discussion forums [14] can facilitate PSTRM analysts to contact experts in the fields of interest or a specific stakeholder group in order to receive target-oriented information from them. In PSTRM, discussion forums provide the opportunity for both consultation and collaboration. Contributions are depicted either chronologically or structured through topics. A discussion forum may be applied in PSTRM for advancing and validating the desk research results and interim consultation results of the different methodological steps.

c) Wiki

Wikis allow users to insert and revise content (e.g., scenarios) collectively thereby providing an interactive environment to progress e.g. scenarios (cf. [15]). Editing functions are provided to allow stakeholders to work on the text of e.g. a scenario description. Within the wiki, articles, e.g. scenarios or gaps, are linked with each other.

d) Chat

Chats represent a means for live question-answer panels between experts, stakeholders and analysts. Chats are peer-to-peer interactions allowing many-to-many communication and enabling consultation with sequences of questions, answers and discussions. If there is something important unclear to the PSTRM analyst, chats can be used to clarify the issue. Live chats should be used only if necessary, as the content analysis is cumbersome and takes enormous efforts.

e) Survey tool including voting and scoring

Web-based instant surveys allow PSTRM analysts to fast and cheap conduct opinion polls (cf. [29]). For instance, online questionnaires can help assess the stage of current research foci or the importance of a gap. Online surveys offer a range of advantages, e.g. anonymization, time and location-independent consultation, semi-automated analysis, documentation of proceedings, objectivity of results and economic aspects, as well as immediate processing and real-time statistics. This means that the results of closed questions are available immediately after response.

The e-participation tools introduced allow stakeholders to provide information on an issue, to respond to particular subjects and/or to submit open comments. Therewith, they facilitate open collaboration and wider online stakeholder consultation in PSTRM. The next section introduces

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7 Cf. internal project report of MOMENTUM (D 2.8). The insights from the MOMENTUM project were further elaborated in the OCOPOMO project (www.ocopomo.eu) along the requirement analysis for a participatory toolbox in policy modeling contexts (cf. D1.1).

8 ScenarioThinking.org, http://scenariothinking.org/wiki/index.php/Main_Page
a comprehensive concept for deploying such e-participation tools in PSTRM.

4. Concept for policy-oriented science and technology roadmapping (PSTRM)

As evidenced in section 3, stakeholder involvement in PSTRM contributes to better meet Good Governance principles in strategic planning. In this section, we therefore present a concept for stakeholder involvement in PSTRM using online consultation and open collaboration.

Through this concept, the engagement of wider stakeholder groups for e-government research planning can be supported. The concept bases on the eGovRTD2020 PSTRM method (cf. [9]). Figure 2 depicts the method. Compared to the original steps, it has been further detailed and amended explicitly with online stakeholder consultation.

E-participation enables the involvement of various actors (stakeholders) in democratic processes by using online media. The stakeholder consultation approach through modern e-participation tools (instead of traditional participation offers such as face-to-face interviews, questionnaires or workshops) provides also benefits for PSTRM as shown in Figure 3.

As most e-participation tools are using the internet as basic technology for information sharing and communication, online consultation and open collaboration also benefit from the network effects of the internet. Nearly every household in western countries has internet access [19]. Hence, the diffusion of this medium is extraordinary high and provides an optimal starting point for networking knowledge and using collective intelligence of its users also in the context of PSTRM.

The concept introduced in Figure 2 envisions the integration of e-participation tools to involve such wider stakeholder groups in the e-government research planning and policy formulation process. To enable a wider heterogeneous stakeholder group in PSTRM, user friendly applications based on web 2.0 technologies are proposed as shown in Figure 4. This allows all affected and interested stakeholders to inform themselves on update elaborations, as well as to contribute to the different steps of the roadmapping process.

The approach tackled through this paper proposes above introduced web 2.0 based e-participation tools, which can be deployed in PSTRM projects to consult stakeholder online (see in Figure 4).
Figure 4. Conceptual design of online consultation and open collaboration through e-participation tools

The use of blogs is recommended to sum up the desk research and the interim consultation results of the different methodological steps (current research foci, future scenarios, gaps and gap storylines, as well as phased research themes and actions) and to publish them in the respective weblog with the aim of letting experts and stakeholders comment the results. The discussion forum is applied to have a formal discourse on issues and relations extracted from the state-of-play and the scenarios, as well as on gaps and gap storylines, and on research themes and actions. It bases on clear ‘conditions of use’ that provide a guideline for both moderators and users likewise. Before starting the discussion forum, the project team informs experts and stakeholders on how the results will be used for the further PSTRM process.

Within well-directed moderated discussion forums stakeholders are consulted to express their opinions, recommendations and concerns regarding completeness and assessment of desk research results. Discussion forums help to relate and advance descriptions while stakeholders are discussing their opinions with other stakeholders. Stakeholders are requested to extend the list of issues and relation clusters identified in the state-of-play and scenarios to the best of their knowledge. Collecting and sharing knowledge through mass collaboration, and grounding the analysis results in broad consensus among the affected parties, is likely to create trust and wide-ranging acceptance of the final policy for e-government research.

Likewise, stakeholder wikis can be deployed to co-jointly develop and validate scenarios and making them internally consistent (especially if the wiki is linked to a discussion forum). Wikis can also be used to engage stakeholders in the gap storyline development or in the roadmap exploration.

The e-participation chats used for the PSTRM are suggested to be time restricted and to require registration in advance. Users are free to interact with one another where users post messages to others and where each user will see all other’s responses. In contrast to discussion forums, responses in a chat room can overlap. The information in chats is unstructured and not organized. The resulting discussion needs detailed analysis thereby increasing the efforts in comparison to discussion forums. Hence, efficient use of chats is proposed and recommended in our concept.

Besides, survey tools and voting mechanisms are in particular important for validation purposes of the PSTRM interim results, as well as for evaluation purposes during the gap analysis (gap assessment and prioritization) and the subsequent roadmapping (prioritization of research themes and actions). As a constant number of users is not foreseen in open collaboration of policy developments, the implementation of online questionnaires allows to satisfy any demand at uncharged costs.

For the state-of-play and scenario analysis open collaboration is helpful to check the results from desk research in terms of completeness and validity by asking experts in the field to add missing issues and relation clusters and assess the stage of development of each issue. Therefore, the following features ought to be included:

- link the data base in which issues and relation clusters are stored to a web portal
- present a graph-like network of issues and relation clusters in an easily understandable way for external experts in the field and designated stakeholders (cf. [36])
- allow external experts and designated stakeholders to add missing issues and relation clusters thereby also collecting the required data to classify the issues and relation clusters
- allow a peer-reviewed assessment using a scoring systems.

Based on this, analysts are able to study the most highly ranked evaluations and learn about well developed research themes and what was not highly ranked at the research agenda by studying the lower-ranked issues. The concept is expected to facilitate not only the state-of-play and scenario analysis but also the gap analysis by providing information about the depth of research gaps.
5. Discussing benefits and potential drawbacks of the concept

The concept introduced facilitates the Good Governance principles in a number of ways:

• Openness:
  The concept for stakeholder involvement in policy planning ensures transparency with the intention that stakeholders can have confidence in the decision-making and management processes. Political entities operate more open and resolve in cooperation with stakeholders while involving them throughout the PSTRM. Thus, stakeholders take part in the policy development process and help to identify and to settle what ought to be done in a specific policy area.

• Participation:
  Participation is achieved in the concept through open collaboration and stakeholder involvement via online means. Good Governance asks for stakeholders to be involved in the policy making process from drafting a policy to enforcement thereof. Online stakeholder involvement throughout the PSTRM ensures that a wider audience can be reached and can participate. This can be used besides and in addition to traditional means (i.e. workshops, interviews, etc.). Reinforced participation results in higher confidence in the outcomes and in the policy.

• Accountability:
  The concept for open collaboration and stakeholder involvement via online means ensures accountability as it foresees robust mechanisms for reviewing interim results throughout the PSTRM. Roles and responsibilities throughout the process are clearly formulated and communicated. Responsibility for the outcome is therewith shared among the people who developed the strategic plans, i.e. analysts, decision-makers and designated stakeholders. This kind of cooperation facilitates the acceptance of the final results through the stakeholders.

• Effectiveness:
  The concept for open collaboration and stakeholder involvement ensures high quality outcomes for strategic e-government planning. The intended online stakeholder involvement will help to efficiently deliver PSTRMs, thereby representing good value for funds. The concept forces commitments among the policy makers and stakeholders. In addition, it provides good internal planning and review processes by involving stakeholders online. Online collaboration assures quality including a process for review of interim and final results through designated stakeholders.

Policy and subsequent implementations should be coherent and easily comprehensible. Results from the eGovRTD2020 project show that the demand for coherence grows [9], in particular government’s role and responsibilities in the virtual world ([2], [9]). Besides, e-government development goes beyond the borders of sector-related policies and governmental entity levels. In this context, coherence is facilitated through the concept for online open collaboration and stakeholder involvement in order that a consistent approach is brought to bear within the complex system.

Further benefit from online stakeholder consultation in PSTRM relates to better understanding and learning. The concept supports understanding as it presents the interim results of each methodical step to the stakeholders and let them discuss on the results. Being involved throughout the PSTRM process enables stakeholders to better understand and learn the interrelations and interdependencies among issues. Besides, stakeholders gather and provide information. The former supports their understanding but the latter helps decision makers to make better decisions and choose better courses of action. By understanding the different viewpoints of other stakeholders, consensus making and acceptance can be supported. This in turn leads to more transparency and higher trust in the results. Overall, decision makers can also get a better understanding of how to communicate their messages effectively in a way that many people can understand the policy decided.

On the side of drawbacks, the concept introduced requires a considerable effort to provide [background] information to wider stakeholder groups in a way that these stakeholders can understand. Otherwise, the added value and quality of contributions from wider stakeholder groups may suffer. Also, a high level of moderation is required to ensure active discussions and contributions. This means that the organizers of such open collaboration in strategic e-government planning need to ensure adequate and competent human resources in the periods of online consultations. For large participations, the efforts to structure and consolidate the contributions can be quite high. Further e-participation means such as argument visualizations, discussion trees and means to automatically mine vast amounts of contributions (including sentiment analysis) may become necessary. The concept introduced does not yet support such innovative features.

As only a selection of web 2.0 based e-participation tools was investigated, future research
could analyze further tools and technologies in the field to enlarge and/or advance the concept. Besides, further TRM projects, which are going beyond the scope of IST projects, may be investigated to analyze their stakeholder involvement approaches and advance the current concept thereby investigating the scalability of the concept to different problem scopes.

5. Summary and outlook

Involving stakeholders in policy development has become a high priority in European e-government research. Also, processes of policy development become more and more structured and are opened to engage wider stakeholder groups in online and offline consultations. In this paper, we have investigated the field of policy-oriented science and technology roadmapping (PSTRM) in the area of e-government research. In order to engage stakeholders in PSTRM projects, we have presented a concept for open collaboration via online means. We have investigated different e-participation tools and have assessed them in how far they support such online consultations and are useful to be deployed in a comprehensive concept for stakeholder engagement in PSTRM.

Besides stakeholder involvement, the collaboration and communication processes among the team of analysts needs support. To discuss the results of each other’s analysis ought to be also digitally facilitated. In particular querying and reasoning, as well as consensus building facilities may lead to time and cost reduction and improvements of quality.

From a scientific point of view, it can also be helpful for validation and evidencing of results. In this context, the integration of open collaboration among key stakeholders (such as policy analysts, policy operators, wider interest groups of specific policy domains, etc.) ought to be facilitated by using e-participation tools.

Supporting the participation of external experts and designated stakeholders, as well as the collaboration between the analysts internal to the project advance not only the PSTRM process but also improve quality of results. The development of a coherent concept for collecting and managing the different inputs is essential. With it, analysis and synthesis is facilitated all the way throughout the PSTRM methodology.

For this purpose, a respective ICT tool support is currently under development. This tool will involve not only e-participation tools for stakeholder involvement and open collaboration. It will also include computer-assisted qualitative data analysis software [36]. Special focus is given to manage and structure qualitative data and their representation on the desktop [36]. Emphasis is on file and change tagging. The concept for stakeholder involvement in combination with the qualitative data analysis presents better ways to cope with the information available. It will be deployed and further explored in the OCOPMO project.

7. References


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