

MEASURING THE e-PARTICIPATION IN DECISION-MAKING PROCESSES THROUGH ONLINE SURVEYS

Cristiano Maciel¹, Licinio Roque² and Ana Cristina Bicharra Garcia¹

¹*Instituto de Computação, Universidade Federal Fluminense, Rua Passos da Pátria, 156 sl 326 Niterói, RJ, Brazil*

²*Departamento de Engenharia Informática, Universidade de Coimbra, Polo II - Pinhal de Marrocos, Coimbra, Portugal*

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Abstract: The deliberative decision-making process of the group can be a result of counseling and voting mediated by technology. The involvement of citizens in this process is crucial and measuring participation in process allows for assessment of the effectiveness of participation. Measuring the maturity of this decision, i.e. assessment of individual participation and its consequent reflection on the group's decision, can be accomplished through the maturity level method discussed in this paper. In order to accomplish an examination of the relative potential and difficulties in achieving and measuring e-participation, we found it necessary to have a reasonable level of information structuring. For this purpose, online surveys were built and tested in stages, structured according to the Government-Citizen Interactive Model in a way as to support the Maturity of Decision-Making method (MDM). The main goal is to test the method proposed with the use of online surveys by stages and, through this experiment, indicate both positive and negative points.

1 INTRODUCTION

The availability and application of Information and Communication Technology (ICT) in order to allow citizen participation in governmental issues is called e-participation. Within the assorted strategies employed to make e-participation feasible, the following can be included: community development, public counseling and debate, voting, and deliberation. This last strategy represents the finalization of a decision-making process, where individual opinions are considered and a group consensus is reached on a certain theme.

A wide range of applications, software and tools are available to support the implementation of e-democratic processes (Maciel and Garcia, 2007a). According to Tambouris, Liotas and Tarabanis (2007), there are many tools to support these processes, such as: Weblogs, Web Portals, Search Engines, Webcasting / Podcasting, Mailing Lists / Newsgroups, Chat Rooms, Wikis, Online Survey Tools, Deliberative Survey Tools, Content Analysis Tools, Content Management Tools and Collaborative Management Tools.

A priori, there are a few pertinent considerations to be made concerning some of these tools and the implementation of an Internet-based, deliberative e-democratic process.

Emails or discussion lists render sharing information easier between the various users, not to mention email being a widely used tool. On the other hand, organizing shared information by email is a complicated task since textual answers are tacitly linked to others. Because we are dealing with textual communication, there is yet a possibility of having different contextual interpretations of the same content, due to the "interpretive flexibility" of the medium.

The use of chat rooms allows for communication in real time by the participants, although it presents problems concerning the information structuring similar to those concerning email. The visual resources, such as emoticons, help communication.

The use of online surveys, with structured issues about the theme being discussed, constitutes another option. By means of a deliberative survey, it is possible to arrive at the result of a popular counsel. It is believed that sharing survey information is also rendered more difficult, but if the instrument

awakens participants' interest, there can be parallel discussions mediated by other communication resources. The use of polls in researches of public opinion allows voting with predefined options. Obtaining results is easy and simple, but the predefinition of options limits participation with this resource by still not allowing for debate on the options.

The use of a specific web application designed to implement an e-democratic process, which allows for the integration of different communication resources as well as for the implementation of information structuring levels/steps. However, a web application depends on direct user access to the web address, thus needing access encouragement, e.g. through regular email notifications.

There is also need for these environments to provide content (such as laws, formal documents or reports) regarding issues in debate, for it is necessary that the citizens be informed in order to engage in profitable discussions. Specific content management tools may allow for a better structuring and standardizing of these contents.

The deliberative decision-making process of the group can be a result of counseling and voting mediated by technology. The involvement of citizens in this process is crucial and measuring participation in this process allows for assessment of the effectiveness of participation. Measuring the maturity of this decision, i.e. assessment of individual participation and its consequent reflection on the group's decision, can be accomplished through the maturity level method discussed in this paper. To accomplish an examination of the relative potential and difficulties in achieving and measuring e-participation, we found it necessary to have a reasonable level of information structuring. For this purpose, online surveys were built and tested in stages, structured according to the Government-Citizen Interactive Model (Maciel and Garcia, 2007a) in a way that supports the Maturity of Decision-Making method (MDM) (Maciel; Roque and Garcia, 2007). In our propose, the discussion have a distinct structure, supporting the decision-making processes. As a hypothesis of this research the following points will be investigated: It is possible to satisfactorily measure the Maturity Level using online surveys.

This article is structured as follows. After the introduction, in Section 2, correlated research about the assessment of ICT is briefly discussed. In Section 3, the method for measuring decision making is proposed. The methodology and case studies are presented in Section 4. Section 5

discusses the tested hypotheses. Finally, the last section includes conclusions and bibliographic references.

2 RELATED RESEARCHES

Some researchers have sought to assess the use of ICTs by analyzing, among other resources, applications and technologies available to users and the forms of communication used. The works described in this paper were classified according to the following approaches: structure and analysis of language, group dynamics and behavior, examination of participation measures and factors, and centered in the use and assessment of different interaction resources used in these environments. Many of these lines of research tackle the issue of virtual communities.

Many authors seek to improve the structure and linguistic analysis in virtual surroundings, touching on the use of synchronic and asynchronic resources (Roberts, 1998), debate management (Voss and Schäfer, 2003), utilization of hybrid forums (Mannoyer-Smith, 2004), non-receptive communication (Wagner *et al.*, 2005), the content analysis of messages versus answers (Arguello *et al.*, 2006) and textual classification of debates (Cheng; Yeung and Li, 2006).

Group dynamics and behavior are investigated based on the number of activities carried out by "stickiness" members (Ho *et al.*, 2000), the influence of anonymity (Friedman and Resnick, 2001), group density (Millen and Patterson, 2002), tensions generated by members (Boyd, 2004), anonymity and unequal participation (Nielsen, 2006), the difference between active and inactive members (Falkowski and Spiliopoulou, 2007), the concept of collective efficiency of the group (Carroll; Rosson and Zhou, 2005) and the establishment of a dynamic system for member motivation (Mao; Vassileva and Grassmann, 2007).

The social and technical modeling and the resulting group and interface organization, as well as the use and assessment of interactive resources used by different environments and user satisfaction, have allowed for the investigation of the data from member profiles and the social dynamic established within the group (Hummel and Lechner; 2002), the study of resources used (Girgensohn and Lee, 2002)(Milen and Fontaine, 2003) and their modeling (Kavanaugh *et al.*, 2005), the acceptance and use of the environment by users (Leimeister and Kremer, 2005), the principles of sociability and usability

associated with those resources (Maloney-Krichmar and Preece, 2005) and the emergence of new styles of conversation in real time (McDonald, 2007). The studies are fulfilled in different forms, whether by interview assessment or the use of questionnaires and/or analysis of registration logs, ethnographically or empirically.

Participation measures and factors have been investigated in order to verify the role of financial incentives in participation (Deci; Koestner and Ryan, 1999), to notice the aims and needs of users (Kim, 2000), the reasons which lead members to participate (Hemmettsberger and Pieters, 2001), the feeling of recognition by individuals (Chan *et al.*, 2004), the theory of gratification and use (Sangwan, 2005), the influence of posts and visualizations of the content (Koh *et al.*, 2007), the effectiveness of web services (Welch and Pandey, 2007), the measure of interactivity among members (Adele and Ehikioya, 2007) and the need, identification and confidence of participant members (Han; Zheng and Xu, 2007).

The relation between participation and the use and assessment of ICT in decision-making processes by means of the establishment of an adequate metrical structure to measure participation is the proposed focus of this research. Through correlated works, distinct methodologies and approaches, both technical and theoretical, were identified that can offer support to the establishment of maturity levels of member participation in the decision-making process. The incorporation of practices established in successful case studies also include: a) diagnosing the interest users display in the debate and the consequent voting of social themes through online surveys and later of a community projected for such, b) a different way of managing information in virtual environments, c) the structure and analysis of the discourse through information available in the environment, and d) the establishment of a recommendation system based on the level of maturity of individuals and discussion groups. The organizational theories inherent to decision-making (Simon, 1977), the social actor-network theory (Latour, 1999) as well as social and technical issues concerning the dynamics and behavior of the members in a group, considering the analysis conducted in previous works in this area, will lend support to the investigated issues and will allow participation analysis beyond the establishment and measure of the maturity level proposed.

3 MATURITY OF DECISION-MAKING METHOD

To measure the degree of Maturity of Decision-Making (MDM) in the decision-making in consultative and deliberative processes $Y = f$ (MDM) takes as arguments an indicator set of the method for decision-making (Maciel; Roque and Garcia, 2007), namely:

$$MDM = \{Int_Part; Part_Discussion; Part_Decision; Part_Gen\}$$

Where:

Int_Part – registration (RC), candidacy as moderator (CM). These indicators have weight 1 in the MDM degree.

Part_Discussion – number of demands posting by topic (QPD), number of opinions postings in the discussion by topic (agree - QPOF, not agree - QPOC, neutral - QPON), number of valid justifications posted in the discussion (QJV), performance of moderator (AM). These indicators have weight 3 in the MDM degree.

Part_Decision – participation in voting (PV). These indicators have weight 4 in the MDM degree.

Part_Gen – participation in the entire process, used of other spaces, respect the use rules, trust; number of invalid justifications posted in the discussion (negative point) (QPJI). These indicators have weight 2 in the MDM degree.

The counting process of the data is uniform, and to each task executed in the MDM method it attributes one point, as specified in a formula, where f is the added of each indicator points. For example, to the *Int_Part* indicator, is attributed one point if the user performs your registration (RC) and one point if he is candidacy as moderator in, at least, one thematic (CM). Then, if the user participates in these two events, will take two points ($Int_Part = RC + CM$), considering that this indicator have weight 1. Some indicators are limits to score. For example, for up to three posts of views (QPOn), receives a point and above this, receives two points in this variable.

With the use of techniques of observation and statistics of use some indicators will be investigated, which has a name, a specific purpose in question form, an application method, a measure and a formula, and a data source. The variable associated with the indicators, as well as the way to measure them, will be an object of further studies, since it intends to consider other important principles, such as reputation. Through the application of the MDM method it will also be possible to infer statistically

and to accomplish adjustment of the measures. The increasing scales proposed for the MDM method is show in Table 1.

Table 1: Levels in the MDM (Maciel; Garcia; 2007b).

Levels	Description
Immature	Interest in participation and/or moderation, however without posterior interest in the process. Indirectly, it shows the interest of a given public in a certain theme proposition.
Poorly Mature	A participatory consultative process that involves an interest in discussion or in voting.
Sufficiently Mature	A participatory deliberative process that involves an interest in voting rather than in discussion.
Mature	A participatory process, effective and deliberative, whereby the citizen participates in many activities, with a minimum frequency. In general, there is reciprocity between users, with information flow, respect and trust between participants.

It is believed that a “sufficiently mature” decision is satisfactory in an e-deliberative process, since it represents the occurrence of active participation in the debates and voting processes. However, it is necessary to consider the “subjective” factors inherent to decision making, such as trust between members and the need for them to be informed, especially when many users acting in the same group are considered. In this sense, group 4 becomes relevant. Finally, through a questionnaire, the satisfaction of the participants will be measured and analysis.

4 METHODOLOGY

The methodology suggested to measure a structured deliberative e-democratic process, containing consulting and voting, explores the application of online surveys by stages. Figure 1 below represents this process.

Users were invited to participate, voluntarily, by email. The first survey available was designed to fill in general information from the interested participants as well as a public consultation on matters to be discussed. In the second survey, individual opinions were shared and discussed. In the third survey, all themes and referred opinions were structured and made available so that this way the participants could take a stance on a form of

voting. This stage also included questioning the level of user satisfaction for the survey. Finally, the deliberation report is generated.

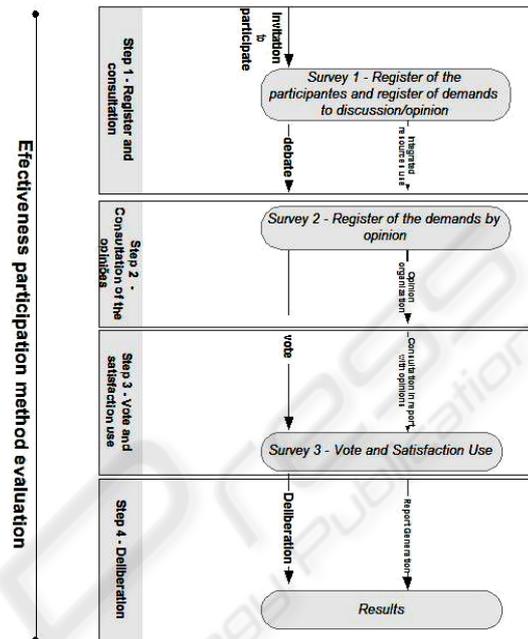


Figure 1: Methodology using surveys.

4.1 Online Survey

Sample: doctoral students of computer science of two different universities, the Fluminense Federal University in Niteroi, Brazil, and the University of Coimbra in Coimbra, Portugal. Users were invited and 27 of them volunteered to take the survey. This sample was chosen due to the fact that education is an important government field. It is also worth emphasizing that, regardless of the target public, the aim was to test the method proposed with the use of surveys and, through this experiment, indicate both positive and negative points.

Instrument: three online surveys were developed with the support of an automatic tool. See a page of one of the surveys in the diagram below (in Portuguese Language).

Question# 225;rio de Consulta P8.#250;blica

1. Objetivos e Dados de Identificação

Objetivo do Instrumento:
O presente instrumento de coleta de dados faz parte de uma pesquisa desenvolvida no âmbito da Universidade Federal Fluminense – UFF (Itaboraí, Brasil), em parceria com a Universidade de Coimbra – UC (Coimbra, Portugal) que investiga questões pertinentes a tomada de decisão, resultante, principalmente, do registro, discussão e votação de temas de interesse público através do uso de Tecnologias da Informação e de Comunicação.

Informações sobre o instrumento de coleta de dados:
- Caso queira somente responder parte do questionário sem levantar questões para discussão, mas mostrando interesse em fazer parte do grupo que irá compartilhar as respostas no etapa 2 de pesquisa, preencha pelo menos os campos de identificação.
- Seus dados pessoais permitirão a análise demográfica do grupo e dos clusters por ele representados, sendo assim, sujeitos pela identificação dos questionários. Todavia suas opiniões não serão utilizadas individualmente no registro de pesquisa.

1. Nome: _____

2. e-mail: _____

3. Data de Nascimento:
Data: DD / MM / YYYY

* 4. Localização
Cidade: _____ Estado ou Distrito: _____ País: _____
Localidade: _____
Reside: _____
Data: _____

* 5. Instituição e/ou departamento:
 UFF
 UC-UFF
 UC
 DEB-UC
Outra(s): _____

Page 1

Figure 2: Survey Online.

An example of survey 1 questions:

- a) Would you like to present the group with demands (subjects) which you think are important to discuss in the institution to which you belong, according to the themes predefined above?
- b) What is your opinion on the demand registered above?
- c) Do you consider your opinion:
 contrary to the demand
 favorable to the demand
 neutral with regards to the demand
- d) Do you suggest any document to back your opinion? Cite sources, web address or attach them to the email.

In survey 2, participants registered their opinions about the subjects proposed, as shown by the example. The opinion shows in this example is coming by survey 1.

Regarding the subjects below, state you opinion:
 a) Demands in education: improvement of the basic educational system.
 Opinion 1: The poor quality of basic and elementary education reflects on the schooling of skilled professionals. Primary concern should be with this stage of education and not with seeking solutions to camouflage the problem. It is outrageous that an elementary school teacher makes less than the school bus driver. A primary school teacher must have good schooling and must make as much as an engineer or doctor.
 What is your opinion?

In survey 3 the demands were placed in voting and user satisfaction. An example of the questions:

- a) Considering demand X and the opinions registered for it, your vote is:
 contrary to the demand
 favorable to the demand
 neutral regarding the demand
- b) Do you consider this proposal a viable means to accomplish deliberations through the Internet?
 Yes No

Application: the application of the three surveys was accomplished in 30 days. In each step, two notifications were sent by email, one inviting participants to answer the survey and the other reminding them of the deadline of the stage.

4.2 General Data Results

From the very beginning of the survey application, it was noted that the group was interested in discussions related to public matters. Table 2 below presents some data regarding the three surveys of the participation process in general.

Table 2: General Data.

	Survey 1	2	3
Questions Number	11	14	22
Nr. de Skipped questions (average)	11	10,8	0.04
Participants Number	27	12	13

The largest evasion occurring from step 1 to 2, of 66.66% of users attests that the survey use induces the participant to participate even if he/she displays no interest. Be it curiosity or momentary motivation, filling out information was only done in the first stage of this research, because from that moment on the users were better acquainted the survey better. When asked about subject of interest for a collective debate, 7 participants filled in the theme registration and registered their personal opinion about the subjects. All in all, there were 11 subjects presented for discussion, all of which were considered and structured for step 2, the discussion phase. In the second step, 44.44% out of 27 participants confirmed their interest in participating in the discussion, with the personal opinions of each of the subjects from step 1 being registered. Regarding the initial participants, there was a small increase in voting participation, related to the debate, 48.15% of participants having voted for the registered subjects. These participants also answer some questions about the satisfaction use with survey.

5 MDM METHOD ANALYSIS

The calculation of the maturity level points was conducted manually, with the aid of the data available in an electronic chart, considering the indicators suggested in MDM. The data was calculated by participants, who were later classified in Groups according to the MDM index. The table below presents the groups, point intervals and number of participants classified in each group.

Table 3: MDM Survey Groups Classification.

Groups	Range	Nr.Part.
Group 1: Immature	1 until 28 points	11
Group 2: Poorly Mature	29 until 57 points	3
Group 3: Sufficiently Mature	58 until 86 points	8
Group 4: Mature	87 until 115 points	3

Out of the 27 participants of the consultative and deliberative process, 11 displayed so-called “immature” participation, since they only participated in the first step or in very small degree. The “sufficiently mature” level of participation was achieved by 8 of the participants, who participated from the very beginning of the process, registering demands, debating, voting, and evaluating the process as a whole.

In the category considered “mature” were classified 3 users. Such a feat was acquired from the fact that these persons registered more demands than the others, even though his/her participation in the debate and voting process was equal to the others. Group 4 was suggested in the method considering that, in a deliberative process, there is interaction between members and it is necessary to measure the confidence generated between members, the forms with which one socializes with the others, his/her access to documents with information contained in libraries and other sources. It was not possible, by using the survey, to measure such indicators, seen as important in collaborative virtual environments.

Another issue that deserves our attention relates to the fact that the process is evaluated only in general terms and not by demand. If it were accomplished by demands, i.e., if we tried to bestow MDM for each participant by demand, the effective participants of step 2 would have similar points, since they participate in most of the discussions. Because the process was always conducted “jointly”, in other words, the survey presented a set of

questions by stages, most participants responded to almost all of them; their choice was not based on certain demands to state their opinion, following their greater interest.

If we do not consider the participants who only registered, concentrated in Group 1, the decisions deliberated by the group, generally speaking, can be considered “Sufficiently mature”. However, if the demands are analyzed separately, one notices that some of them have not reached a sufficient maturity level. Therefore, it is suggested that the method should be applied by demand.

The calculation process must be achieved manually, which would be completely unfeasible were there a larger group. It is believed that the MDM is ideally calculated automatically in an application. In light of these verifications, the hypothesis is not supported, which assumed that it was possible to measure the maturity level satisfactorily with the use of online surveys. The maturity level can still be measured, but has not presented satisfactory results, aside from the limitations it displays.

Self-assessment of the participant was also requested regarding his/her participation in the consultative and deliberative process, seeing that 23.1% considered their participation “very good”, 46.2% considered it “good” and 30.8% considered it “regular”. It must be added that this self-assessment was requested to participants who participated of the final stage of the process and can be analyzed with regard to the index generated by MDM. The users who participated in this step 3 were mostly classified in groups 3 and 4, which only confirms the positive self-assessment, since they participated actively in the process.

5.1 Satisfaction Use

Because we are dealing with a different way of undertaking debate and voting, the users were asked to comment on their level of satisfaction in using the automated application. Crossing this information allows us to analyze other issues of this research.

The first factor is the lack of interaction with other participants, since they use a web application to answer the survey but not to communicate amongst themselves; therefore, they are not able to share their opinions as soon as they are registered. This was considered a negative factor for 77% of participants. Another factor is the need for more information about the process, in which 61.3% of participants felt the lack of more information about

certain subjects, originating from websites, documents, or other means of communication.

When questioned if the form in which the demands were phrased was prejudicial to the process, 84.6% believed that this impaired understanding, 61.5% believed it impaired discussion and 53.3% believed it made voting harder.

In step 3, a report with participants' opinions was presented. It showed that 61.5% of participants confessed that they did not consult the document sent by email before voting. One of the possible causes is the lack of integration of this information within the same location. This is confirmed by the fact that 53.9% of participants disagree that the opinions of the other participants are important for decision-making regarding the final vote, thus demonstrating that the vast majority already has a fixed opinion on the matter. 61.6% think that the opinions of others do not influence the final vote.

The need for a moderator for the discussions was felt by 46.2% of participants. The role of this moderator is one of considerable responsibility, since this person exerts certain influence over the decision-making process.

When questioned on the use of questionnaires as a viable form of accomplishing technology-mediated consultation and voting, 53.8% agreed on "yes", and 38.5% believed that they are "in part". For 84.7% of participants, the use of shared resources, such as mailing lists, chats and surveys, would make this process easier. See the survey usability evaluation below.

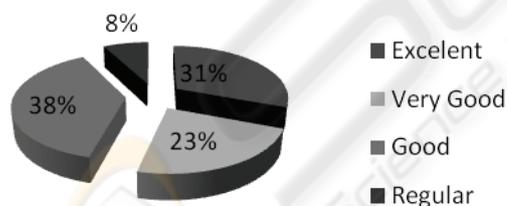


Figure 3: Survey usability.

As for the layout of the project and the use of the structured survey for debate and voting, most users (38.5%) considered it "good", 15.4% considered it "very good" and 30.8% considered it "excellent". Two participants, i.e., 15.4%, believed it to be "regular". This data indicated that users of online surveys feel user satisfaction in the automated application available on the web and unanimously agree that the structure of the questionnaire in stages rendered the decision-making easier. In general,

users thought the time spent on the consulting and voting was sufficient for deliberation.

A total of 93.3% of participants believe that a virtual community would facilitate such consultative and deliberative process. This discovery motivates us for the next stage of this investigation, in which a virtual community modeled for debate and voting of public issues will be implemented (Maciel and Garcia, 2007a) and tested with MDM method.

6 CONCLUSIONS

With the use of ICT, particularly by means of an online survey, an e-democratic deliberative process was suggested. Some considerations are worth making concerning this process.

The way in which certain demands are written interferes in the process. An interpretative flexibility is noted as a result of this phrasing, which, in turn, also interferes in the record of opinions and can lead the user to vote favorably, contrary, or neutrally with regards to a certain demand. A particular degree of understanding of the subject is necessary so that the participant can exert influence over the discussion and consequently have some bearing on the opinions of others. The presence of contrary opinions favors discussion, but what with the use of surveys this possibility becomes somewhat limited since the discussions are not posted openly. Therefore, the right to offer a rebuttal becomes restricted and many steps of surveys are necessary in order to sustain a more accentuated discussion. The moderator's performance also becomes more difficult with the use of surveys. Another important issue is that the register of demands must remain open during counseling, so that participants may suggest new subjects for discussions at any moment. The employment of surveys presents in itself a temporal limitation and makes such registrations difficult. Besides, the MDM can be previously tested. For measuring the use of surveys it has presented considerable limitations, such as the need to disregard a few indicators, the unfeasibility of demand-based application and the need for manual calculation.

However, survey use has generally proven to be satisfactory because it manages to structure the discussions providing user satisfaction to participants. Nevertheless, since the use of technology is not neutral, issues concerning the role of the administrator in configuring the survey, the requirement of a moderator for the discussions, and

increased sharing of posted information deserve further consideration.

As a future project, will be tested another e-democratic tool that permits automatic measuring of the effectiveness of e-participation, the Democratic Citizenship Community (Maciel and Garcia, 2007a). The results of the application of this survey allow for some modifications in the modeling suggested for the virtual community.

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