Negotiation Strategies Based on Decision Conferencing

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INTRODUCTION

Our current democratic institutions stem from times in which transportation and communications were difficult and time consuming. With the time, politics have evolved little and politicians have developed a style in which, except at political campaigns, they have little feedback from citizens. Most ideas so far relating Internet and politics are directed toward facilitating traditional political methods through new technologies. Our feeling is that there are ways to transform, rather than facilitate. This transformation is possible because when the way in which the citizens interact with their representatives is modified, and this transformation makes possible that citizens play an active role, they could make decisions of major quality and more agreed by consensus, which is not possible with the mere automatic use of the new technologies, since it is not the same thing to allow that a citizen could vote from his or her house, facilitating the use of the traditional political methods, that in addition to be able to guide to this one in the different phases of the decision making, doing that his or her judgments and preferences are taken in account by the system. We propose migrating to Internet methodology of decision conferencing to support group-decision conferences through our architecture, QUIXOTE, born of Toward Electronic Democracy (TED) project of the European Science Foundation (ESF).

Thanks to our architecture we distribute rationality to better resolve political decision making, helping groups through the Web facilitating them the use of decision and negotiation analysis methods.

BACKGROUND

There have been several attempts to give a new approach to the democratic processes, and to the way in which the citizens are related to their governors. All this to revitalize the democracy and to make that the opinion of the citizens will be really considered, being this is something very necessary as pointed out by authors such as Pateman (1970) or Putnam (2001). Until now, attempts to transform democracy through the Internet have chased just to facilitate through the new technologies the standard political methods, which we think leaves much to be desired. For this reason, our intention is of transforming these processes making that the citizens interact in all the phases of the decision making. With this we could make it possible to reach solutions more agreed by consensus and of major quality, being this necessity is something already pointed out by the United Nations (2004) in its reports on the degree of preparation of the different countries for electronic democracy and government.

Therefore, to change our representative democracy to a deliberative one we use several tools, as decision analysis, thanks to which we can identify and construct all the elements of interest of a decision problem determined, being able to advise citizens on the consequences of their actions and choices since we give a treatment adapted to the uncertainty inherent to the problems of decision making. With this we could make better and more informed decisions since we explored all the implications and subjective suppositions of the different citizens. In the same way, thanks to the structuration of the decision problem, the clarification of the different aims and the qualitative and quantitative study of the possible choices, we can do that the citizen has a major knowledge of the decision problem which he or she faces, showing him or her, therefore, the best strategy to follow according to his or her interests. Moreover, inside the tools of the decision science, we also use the negotiation analysis, with which we will be able to treat those cases in which there are different parts implied that can reach joint agreements.

To this set of tools we have to add the cryptography, thanks to which we can assure that all the processes and the interchange of messages between the system and the citizens, is realized in a safe way, being this is an indispensable requirement in this type of system.

QUIXOTE ARCHITECTURE

We build an asynchronous Internet-based implementation of decision conferences to support group decision processes, migrating with this way to the Internet the methodology of decision conferencing (McCartt & Rohrbough, 1989). With this methodology we can focus on a particular task or problem combining participants'

judgments with data. The main tasks to develop in this phase are:

- Represent the diversity of perspectives on the issues
- Generate shared understanding of the issues
- Develop a sense of common purpose
- Create the structure of a model that of the decision problem
- Develop a better appreciation of uncertainty

In QUIXOTE, this decision analysis would be carried out by a decision analyst on a master system for the decision-making problem owner, where the system would provide support for the entire decision-making cycle (Clemen, 1996) using several modeling techniques to construct the preferences in certainty and uncertainty, identify and structure the problem, and add the judgments and behaviors of the citizens. At various stages of the process, some or all of the models would be fed into a server, which could be accessed by different stakeholders and the general public. When an issue is being addressed the server provides pages inviting comments and submissions, for later develops pages actively which allows users to interact with the model to explore the implications of their individual perspectives and judgments, with what the citizens could construct their preference models. All is supported by the Internet with confidence built in through a cryptographically secure open truthful exchange (CSOTE) approach (Rubio, 2004; Rubio, Rios Insua, Rios, & Fernandez, 2005).

The difficulty lies in the different values and beliefs of the stakeholders, which would opt for different alternatives. For that reason is necessary to enter into a negotiation round in which a more consensual solution might be sought. Also we have to consider the contexts in which no consensus is reached, where we appeal to a voting scheme.

DECISION CONFERENCING

Once users have built their preference models, they will assess their utility functions (French & Rios Insua, 2000) privately and communicate it to the system. The system allows for the specification of basic properties of multiple objectives as number of objectives, their scale and range, whether the objective is to be minimized or maximized and the assessment of each component utility function with the probability equivalent method (Rios & Rios Insua, 2004; Rubio, Rios Insua, Rios, & Fernandez, 2004). Later, with the preferences of each participant, we may proceed to compute his or her optimal alternative. For that purpose, the system includes a module that allows users to evaluate the influence diagram, with which we structure the decision-making problem, based on his or her utility function, to obtain his or her preferred maximum expected utility course of action. Frequently, the various parties involved will reach different optimal solutions and for that reason a round of negotiations may be undertaken to try to reach a consensus. This negotiation is done by the CSOTE method and a modification of the balanced increment method (Rubio et al., 2004), where at each iteration the system offers a solution to participants and if this is accepted, it stops, that being a consensus. To help the negotiators to reach a consensus the balanced increment method show the ideal expected utilities achievable within the nondominated set of solutions, which guarantees that there is no other alternative unanimously preferred by the citizens.

THE CSOTE METHOD

One of the most important issues related with e-democracy is the confidence and trust among system users. For this reason, we have built on what we call the CSOTE framework, in contrast with the FOTE and POTE frameworks described by Raiffa (2002). By CSOTE we understand cryptographically secure open truthful exchange of information among participants and the system, enhancing reliability of all processes, achieved through confidentiality of system data which will be accessible to only authorised parts, communications security protecting bidirectional channels user system, data integrity so that they are only modifiable by data owners and accessibility mitigating system attacks. All these issues may be achieved through cryptographical methods, and specifically with public key cryptographical methods (Goldreich, 1999; Lee, 2001; Schneider, 1996), with which we develop a more open, flexible, and reliable framework for negotiations in which the involved parts may reveal their real objectives and achieve satisfactory agreements. This also aids us in automating negotiation processes as we may support all the issues we are interested in.

Specifically, we can use these methods in the following phases of the negotiation: interaction with the system, negotiation phase, and voting phase if there is no consensus. In the interaction with the system a participant must send his information to the system and, possibly, may wish to obtain a summary of the opinions of other users. For this purpose, we use, among others, the following methods:

- **Partial Secret Revealing Techniques:** They are based on the global knowledge of a function, with