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A collaborative platform for cognitive decision making in the Knowledge Society

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ABSTRACT

Two key aspects of the Knowledge Society are the interconnection between the actors involved in the decision making processes and the importance of the human factor, particularly the citizen's continuous learning and education. This paper presents a new module devoted to knowledge extraction and diffusion that has been incorporated into a previously developed decision making tool concerning the Internet and related with the multicriteria selection of a discrete number of alternatives (PRIOR-Web). Quantitative and qualitative procedures using data and text mining methods have been employed in the extraction of knowledge. Graphical visualisation tools have been incorporated in the diffusion stage of the methodological approach suggested when dealing with decision making in the Knowledge Society. The resulting collaborative platform is being used as the methodological support for the cognitive democracy known as e-cognocracy.

1. Introduction

In the 21st century, in the context of the electronic government of the society, greater participation of all the actors involved in the decision making relative to the government of the society is being demanded by both the administration and the citizens. In order to give an appropriate response to the new challenges raised by decision making in the Knowledge Society, different models of citizen participation and new collaborative tools that give methodological and technological support are being considered.

The software PRIOR, which is used as the methodological support of one of these models (e-cognocracy Moreno-Jiménez, 2003, 2006; Moreno-Jiménez & Polasek, 2003, 2005), has been updated in order to meet these challenges and needs. PRIOR (Aguarón et al., 1996a,b), developed by the Zaragoza Multicriteria Decision Making Group (http://gdmz.unizar.es) and employed in the multicriteria selection of a discrete set of alternatives, has been extended by adding two modules associated with the Internet (the Web) and the democratisation of knowledge (Knowledge), two of the most important aspects of public decision making in the Knowledge Society.

Decision making is one of the essential characteristics of the human being and it is the key factor of the Knowledge Society – a space for the talent, ingenuity and creativity of the human being. In this context, the scientific resolution of public decision making problems should be oriented towards the training, learning and education of the actors who are implicated in the resolution process, and in the decision making in general.

In order to facilitate the learning and educational processes of the individuals and, at the same time, of the society itself (social or collective intelligence and wisdom), it is recommended that decision making includes the specification of the arguments that support the decisions that are taken. In the resolution of highly complex problems that are dealt with in the field of social science, and in particular, in public decision making problems related to the government of society, it is advisable to take into account the creativity and innovation of all the actors involved in the resolution process and, in general, the mental capabilities of all the citizens interested in the decision making process, the more the better. Two new steps are recommended for inclusion in the practical application of the scientific methodology used in multiactor and collaborative decision making contexts (Altuzarra, Moreno-Jiménez, & Salvador, 2010): (i) an exploitation of the mathematical model employed in the decision making, identifying patterns of behaviour, critical points and opportunities for making decisions in the resolution process and (ii) the inclusion of a deliberative process through the Internet in which the decision-makers incorporate the arguments that support the different positions that are taken (Moreno-Jiménez, Piles, Ruiz, Salazar, & Turón, 2011; Turón, Moreno-Jiménez, Piles, Ruiz, & Salazar, 2010).

The consideration of this last aspect has led to the extension of the social software known as PRIOR-Web (Aguarón, Escobar,

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Moreno-Jiménez, & Turón, 2010), through the incorporation of a new module that uses data and text mining tools aimed at the extraction and diffusion of the relevant knowledge in the problem resolution, that is to say, the identification and democratisation of the arguments that support the decisions. The resulting collaborative platform, denominated as PRIOR-W&K, is presented in this paper, the structured of which is as follows: Section 2 briefly reviews what is understood by scientific decision making in the Knowledge Society. Section 3 offers a description of PRIOR-W&K, concentrating on the module incorporated for the extraction and diffusion of knowledge and the security issues associated with the use of the Web in valuation and discussion processes; Section 4 includes the application of the collaborative platform in a case study and Section 5 summarises the most important points discussed in the paper as well as considering possibilities for the future.

2. Background

The following paragraphs briefly explain some of the key aspects of the Knowledge Society and the cognitive approach suggested for the scientific resolution of highly complex problems, particularly those associated with the main element of both contexts: the human factor. The cognitive orientation for the democracy model known as e-cognocracy is supported, from a methodological and technological point of view, by the collaborative platform PRIOR-W&K, which will be introduced in the next section.

2.1. Knowledge Society

The Knowledge Society can be understood as a space oriented to the talent, intelligence, ingenuity, imagination and creativity of the human being, the true figure of this new society. Two key aspects of the Knowledge Society are the interconnection between the actors involved in the decision making processes and the importance of human factor, particularly his continuous learning and education.

Interconnection (García Lizana & Moreno-Jiménez, 2008) does not only refer to a technical question associated with communication technologies. It is mainly a philosophical concept that reflects the new vision that the individual has of the context and his interaction with it. Synthesising represents the holistic vision of the reality. The importance of the human factor in the decisional processes and the necessity of incorporating different perceptions and interpretations of the reality (knowledge) has lead to the search for approaches and procedures which are more open and flexible than the traditional ones, and which allow the scientific treatment of the objective and rational alongside the subjective and emotional (the objective treatment of the subjective).

In line with the main objective of the Knowledge Society -the conjoint construction of a better world- we must develop collaborative tools and platforms, which allow the integration of the skills of all the actors involved in the resolution process. These tools are oriented (Moreno-Jiménez & Polasek, 2005) to educate people (intelligence and learning), promote relations with others (communication and coexistence), improve society (quality of life and cohesion) and construct the future (evolution) in a world of increasing complexity.

In the transition towards the Knowledge Society, communication is growing, thanks to the digital revolution, which is not only facilitating human contact and relationships but has also ushered in an era of "interconnected intelligence" that will make it possible to link technologies between themselves, and, more importantly, connect people, who are using ingenuity, intelligence, knowledge and creativity to find new ways of creating wealth and advancing social development.

This envisages a society that does not tend towards information as a tangible representation of data and ideas processed for the final user, but towards knowledge, understood as a cognitive process where the information is framed around the individual and their circumstances and then applied to decision making and the solution of problems. In short, the Knowledge Society (space for the human ingenuity) seeks the promotion of communication, interconnection and interaction among people, and not only to supply processed information, but to encourage the development of learning and intelligence.

The interconnection between individuals will favour the establishment of a global Knowledge Society which highlights the individual and social learning as its essence, and which considers the exchange of knowledge as basic instrument. The role of the network, and in general, of the new communication technologies will be that of promoting this common and global virtual space, that generates conversation, communication, and exchange of ideas. All of this has an immediate and undeniable interest for the collective process of decision making.

2.2. Decision making (AHP)

Decision making is one of the fundamental characteristics of the human being and it provides an illustration of our level of development and freedom. In the 20th century, scientific decision making passed through different stages and paradigms, which (obviously) cannot be considered as separate, isolated events: the appearance of a new approach does not exclude the previous one; it must be seen as complementary. Until the mid 70s, decision making followed a normative approach, based on substantive rationality and orientated towards the product (the decision itself). For the next 20 years, the approach taken was descriptive, based on procedural rationality and orientated towards the process (decisional process). Since the end of the last century, the approach followed has been more cognitive, based on an evolutionary rationality and orientated towards what has been called 'the third P' (Moreno-Jiménez., 2002), the Person (education of the individual).

The aim is to offer a support for decision making in which the actor's different visions of reality are harmonised with the fundamental values existent in their environment (cultural, ethical, aesthetical, social, etc.). A methodology is required that allows us to capture the value of things, to integrate that values into a decision process in harmony with the fundamental principles and to establish the priorities associated with the performances (Saaty, 1996). Logically, the valuations are subjective, and therefore it is necessary to open communication channels between the consciousness and the unconsciousness, and to scientifically combine the objective with the subjective (objective treatment of the subjective), in a context with multiple scenarios, actors and criteria.

The application of the scientific method in the Knowledge Society requires rationality paradigms, which allow us to structure the decisional process in relation to the process of human mind and with the procedures followed by the systems in the resolution of problems. These paradigms, where tangible and intangible aspects are combined in a valid scale to make decisions, must be (Saaty, 1996): (a) simple in its construction; (b) adaptable to individual and collective decisions; (c) able to relate thoughts, values and intuitions; (d) orientated towards seeking consensus, and (e) not require a high level of specialisation for their application.

At the beginning of the twentieth-first century, the importance of the human factor in decision making processes is, once again, be highlighted (Moreno-Jiménez, 2003). In order to facilitate the participation of individuals, it is necessary to develop new scientific approaches that allow us both to capture the perception of reality