e-Participation and Decision Analysis

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Abstract

Decision analytic methods are now used frequently to help articulate and structure debate and deliberations among citizens and stakeholders in societal decisions. Methods vary, but, essentially, a public authority or agency, when faced with a significant set of issues, may organise one or more workshops with stakeholders and citizens as participants. During these, many perspectives are discussed and a decision model or family of models built to explore the balance of the uncertainties and various objectives. The outputs of the workshops are used by the authorities to guide their decision making, sometimes purely as inputs, other times as a morally, if not legally binding determination of the way forward.

Such methods of public engagement and participation are, by and large, conducted face-to-face. However, the advent of the World Wide Web brings the possibility of conducting citizen and stakeholder interactions in a distributed, possibly asynchronous fashion. We discuss the many pitfalls and hurdles that have to be addressed and overcome if such e-participation is to be a valid tool within a modern democracy. Our conclusion is that the difficulties are many and varied, but that the pressures towards e-government and better regulation in general mean that such methods will be used in the near future. Thus, we outline an urgent programme of research and debate in which we believe that the professional decision analysis community should engage.

Keywords: decision analysis; decision conference; deliberative or substantive democracy; e-democracy; e-participation; facilitation; negotiation analysis; public participation; stakeholder workshops.
1 Introduction

In a recent paper, Gregory et al. (2005) describe the use of decision analysis methodologies to structure and facilitate public and stakeholder participation in societal decision making and deliberative democracy. Similar ideas are offered by, inter alia, Mustajoki et al. (2002), Renn (1999), Sheppard and Meitner (2005), and Winn and Keller (2001). The broad idea is that public authorities, when faced with a set of issues, should draw together a range of stakeholders in a workshop or a series of workshops and use decision analysis to explore the issues and formulate policies. Essentially the ideas build on and broaden the concept of a decision conference (French, 1988; Goodwin and Wright, 2003). This use of decision analytic workshops should be seen as part of a much wider series of moves towards public engagement and participation in many Western democracies (Beierle and Cayford, 2002; Renn et al., 1995; Rowe and Frewer, 2005).

In this paper, we wish to explore a range of issues that arise if we take the next natural step and explore the use of web-based interactions to support e-participation and deliberative e-democracy. Many exploratory studies and experiments are already underway (French, 2003b). The European Science Foundation programme Towards Electronic Democracy: Internet Based Complex Decision Support (TED) has been examining the potential for decision analytic methodologies to provide frameworks for public participation via the web. To be clear at the outset, we are not concerned with the technologies of e-voting, except in so far as there may be straw or legally binding votes within a much broader participation process. To some extent, e-voting refers only to facilitating and automating standard democratic instruments. We rather concentrate on how we may potentially transform democratic processes, using decision analysis to structure and articulate participative deliberations, and supporting these through the web.

In many ways, this paper does little more than raise questions; but we believe that they are very important questions that need urgent answers. In summary, they ask: how do we implement a decision analytic process over the web so that the participants are able to input their views, beliefs and preferences, are informed by the process and are able to participate in developing a recommendation on choice to be made? Moreover, we ask these questions in

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1 http://www.esf.org/ted or http://infodoc.escet.urjc.es/ted
the context that there are many participants from a varied background of cultures and educational experiences.

We are aware of political imperatives towards e-government, generally, and public participation which, together with pressures from the information and communications industry to sell their wares, mean that e-participation and e-democracy are coming, and coming fast, whether or not the processes involved are meaningful and valid. Thus, we conclude by recommending an urgent programme of research, debate and discussion within the decision analysis community to identify valid mechanisms of e-participation.

In the next section, we review briefly the current state of the art in the field of public participation and deliberative democracy. Then, we turn to the subject of group decision making, reflecting on the implications of Arrow’s Impossibility Theorem for democracy and participation. We argue that group decisions are best thought of as a social process and discuss how the decision analytic process is implemented within decision conferencing. In section 4, we introduce a series of questions that seem to us to need answering if e-participation is to be introduced in any valid sense. Section 5 contains our conclusions and our recommendation for a far reaching discussion and research programme. Note that we are concerned with the relevance of decision analysis within e-participation. A broader introduction to the use of other non decision analytic instruments within e-democracy is provided by Bannister and Walsh (2004).

2 Deliberative democracy and public participation

The Athenian ideal of deliberative democracy2 may never have really existed; women and slaves had no right to vote and many of the poorer men could not leave their work to attend meetings (Crick, 2002). Nonetheless, to many it serves as a model for societal decision making in which all citizens are able to input their views and have an influence on policy. Across many Western democracies, disillusionment with central government and regulatory agencies handling of issues has led to greater use of consultation and stakeholder3 participation in public decisions. Most politicians’ motivation to promote this movement

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2 Sometimes called substantive or direct democracy.

3 ‘Stakeholder’ is a much defined term, but one on which there is little clear agreement. We adopt the definition that stakeholders are anyone who may be or believe that they may be impacted by an issue or decision.
towards more participation, probably relates more to gaining greater public acceptance of the ultimate decision than to any democratic ideal. Moreover, whatever the cause, there is undoubtedly wider use of participatory methods in societal decision making. There have been many academic studies covering such issues as the philosophical underpinnings, categorisation of different types of activity and case studies (Beierle and Cayford, 2002; Chess and Purcell, 1999; Renn, 1998; Rowe and Frewer, 2005; Slovic, 1993; Webler, 1999). There is also a relevant literature in discussions of public engagement with science and, more generally, societal risk communication (Bennett and Calman, 1999; Berry, 2004; Langford et al., 1999; Leach et al., 2005). As we have noted, Gregory et al (2005) have reviewed the use of decision analytic methods within public participation. There are, however, two areas in which the literature is very sparse. Firstly, there are very few comparative studies (Bayley and French, 2005; Rowe et al., 2005). While there have been many empirical investigations about the advantages and disadvantages of specific participatory instruments, there are very few studies which compare the relative merits of two or more instruments. Secondly, there seems to be a relatively small literature on how to design participatory processes appropriate to specific contexts (Bayley and French, 2005). A fuller literature survey is provided in French et al (2005).

Terminology in the area has yet to become standard. Indeed, some might say it is currently somewhat confusing with several different terms by different authors being used for the same entities and, conversely, the same term being used for different entities by different authors (Rowe and Frewer, 2005). Usually, we shall not need to be so detailed that this is an issue, but we do believe that one respect we need be precise. We need to distinguish a participatory process from participatory instruments (or techniques). For us, a participatory process is the entire series of interactions between authorities, stakeholders and citizens from the initial exploration of issues of concern, up to the conclusion of the deliberations and resolution of the matter. During the process several participatory instruments (e.g. stakeholder workshops, opinion polls, or open meetings) may be deployed to enable the participants to interact. In the specific context we are addressing in this paper, some (or all) of the instruments would use heavily IT to support its operation.

Following Holtzman (1989), we take a decision process – and, hence, a participatory process – to be broadly structured as in Figure 1. The first stage is to formulate one or more decision models that reflect the decision problem. We, then, analyse the decision model(s), i.e. to explore what they tell us about the possible choice and see where the balance of advantages
and disadvantages lie. The third stage is to *decide* upon a policy to implement. This involves interpreting the policies recommended by the analysis phase into real world actions. Since any model is a simplification of the real world, there will be a need to reflect on the recommendation and see if it makes sense once the complexity of reality re-enters the discussion. There is a need to assess whether the model(s) have brought enough understanding to make the decision: i.e. is the analysis *requisite* (French and Rios Insua, 2000; Phillips, 1984)? Thus there may be a feedback or refinement path. One point that should be made, but seemingly seldom is in the literature on participation, is that the appropriateness of any instrument will depend upon the phase in which it is deployed. For instance, some argue against open web discussion forums because anyone can express a view and the instrument therefore fails any test of legitimacy and fair representation. But if the site is used in the problem formulation phase to identify factors which may have a bearing on the matter, would that be relevant?

We recognise that there are many variants of democracy, ranging from representative parliamentary democracies through to the Athenian ideal of direct democracy. Correspondingly, there are many variants of participation. For simplicity, within our discussion we will consider just two. In the first, the participation process is part of a direct democracy and concludes with a binding vote between all citizens on what should be done. In the second, the authority and responsibility for the decision remains firmly with a government agency. They will take the decision. However, in the process leading up to that point, they interact with citizens and stakeholders. In the former case, there is a clear imperative to ensure fair representation of all citizens in the process and the highest levels of security. In the latter case, these constraints may be softened somewhat by the agency concerned modifying the decision if it feels that there has been systematic under-representation of groups, though we recognise that any such pragmatic modification is hostage to many questions of democratic ideals and legitimacy.
Stepping back, we also recognise that our discussion relates to democratic processes, the constitutional mechanisms that are gone through in the run up to a societal decision and implementation of a policy. There are many other perspectives on democracy (Crick, 2002). For instance, the ones that look at political and moral imperatives that suggest the citizens should have some influence in societal decision making or the ones that discuss the drivers of individual behaviours such as altruism and sociability. Our discussion concerns the mechanisms of participation as they might be articulated through decision analysis.

3 Group decision theory and e-participation

We are with Gregory et al (2005) in believing that decision analytic methodologies provide an effective and valuable means of articulating and structuring deliberations within public participation. Moreover, we agree that the schools of decision analysis stemming from the subjective expected utility (SEU) model, including multi-attribute value and utility models, provide the most coherent forms of decision analysis with which to do this (Clemen and Reilly, 1996; French and Rios Insua, 2000; Keeney and Raiffa, 1976). In passing, we note an issue relating to principles of democracy to which we shall return later. What happens with citizens who eschew this decision analytic paradigm and subscribe, say, to an outranking approach (Roy, 1996) or any other incompatible paradigm. Are they to be disenfranchised?

Participation inevitably means that we are discussing a group decision context; and the paradoxes and impossibilities that abound in group decision making and democratic systems are well known (Bacharach, 1975; French and Rios Insua, 2000; Hodge and Klima, 2005; Raiffa et al., 2002). The following modes of group decision analysis have been proposed, some seemingly in ignorance of the plethora of negative theoretical results.

GDM 1. Elicit each group member’s subjective probabilities and utilities, combine the individual probabilities and utilities into group probabilities and utilities, respectively, from the group expected utilities form these and choose according to their ranking (Bacharach, 1975; French, 1985).

GDM 2. Work with each individual and develop a personal decision analysis to guide their choice. In the light of this understanding, each individual votes within the group and a group choice is made according to the vote. In variants of this, the numerical values of the individuals’ expected utilities are used to indicate strength of preference and this information is incorporated into the voting Rios and Rios Insua (2005).
GDM 3. A supra decision maker is imagined to exist. He observes the entire elicitation and decision analysis process for each individual and altruistically uses this knowledge to construct a single decision analysis for the group. The choice is made according to the supra decision maker’s analysis (Keeney and Raiffa, 1976).

GDM 4. Gather the group together in a facilitated discussion of the issues. Through discussion between the members, seek to agree on group probabilities and utilities without formally eliciting individual ones: i.e. seek to elicit the group values directly without any intermediate step for the individual members. Note areas of disagreement. Develop a group analysis and explore the areas of disagreement via sensitivity and robustness analysis. Seek to reach a decision by consensus without formal voting (Eden and Radford, 1990; French, 1988, 2003a).

The many paradoxes and impossibilities stemming from Arrow’s Theorem and, to a certain extent, co-operative game theory have over the years essentially led most decision analysts to doubt the efficacy of GDM 1 and GDM 2. Although one can define algorithms to move the numbers and votes around so that, ultimately, a group ranking is mathematically defined, if one examines the assumptions that underpin the algorithms, one finds inconsistencies or, even, nonsense. Approach GDM 3 is more promising at first sight: all interpersonal comparisons are made within the mind of the supra decision maker and it is the issue of defining valid interpersonal comparisons objectively that tends to cause the paradoxes and inconsistencies that lead to the problems with GDM 1 and GDM 2. In some cases the supra decision maker actually exists: there is an arbiter, formally responsible for recommending a decision which balances all stakeholder perspectives. However, in most cases, the supra decision maker is a fiction which creates a fatal flaw in this approach. He has to be constructed by agreement among the group and this leads to a further group decision, arguably as hard as the first, and an infinite regress. Thus, most decision analysts have looked to GDM 4, developing the use of facilitated workshops or decision conference in which behavioural aggregation of individual perspectives is driven by sensitivity analysis on a putative model (Dryzek and List, 2003; French, 2003a; Phillips, 1984). Gregory et al’s (2005) approach to public and stakeholder participation is largely driven by this viewpoint.

The modes GDM 1 to GDM 4 essentially assume that the group want to co-operate and reach a consensus. There is a further mode that recognises that individual citizens and stakeholders may be more self-serving and wish to negotiate a good endpoint for them.
GDM 5. The theories of bargaining, negotiation and, perhaps, arbitration are deployed to define a process in which the group interacts and discusses a series of solutions, usually generated to converge to a point on the Pareto boundary which corresponds to a policy which they all can accept.

Variants of GDM 5 can lean more to the algorithmic or more to a structuring of a softer facilitated social process which can be run in workshops. The latter leads to public participation processes similar in many ways to those discussed by (Gregory et al., 2005).

It is clear that naïve approaches to e-participation and e-democracy will favour modes GDM 1, GDM 2 and the more algorithmic versions of GDM 5. It is easy to design web-systems to implement algorithms: after all, that is what the web and computers do. Moreover, numerically, the algorithms will converge to a solution, whether or not it is one supported in some more fundamental way by the preferences and beliefs that the participants have input. Although academics and professional decision analysts may not find the underlying mathematics difficult, to the general public and most politicians, it will be far from transparent. The emperor’s new clothes can be sold and the buyers are not likely to be able to see through them! Thus our first concern in this paper is to emphasise that the paradoxes and impossibility results that have led decision analysts to develop participatory processes based upon mode GDM 4 and social processes based upon GDM 5 also should lead us to the same conclusion in the design of e-participation and e-democracy systems.

We might also note at this point that in circumstances in which a government agency has the legal responsibility and accountability for taking the decision, but does want to take into account the views of citizens and stakeholders, then the assumption of a supra decision maker in GDM 3 becomes plausible. The supra decision maker actually exists: he is the agency. In these circumstances, we can imagine e-participation systems in which individual citizens interact with a decision model, leaving their personal preferences and beliefs for the agency to later draw together into an analysis that will drive their decision. However, in true democratic approaches to e-participation, the problem of the non-existence of the supra decision maker still exists.

4 What is needed to develop e-participation?

Clearly, if we are to create valid e-participation and e-democracy systems, we need to find how to implement in broad terms the social processes implicit in Gregory et al’s (2005) discussion into web-systems. Surely, we should use decision analytic methodologies to
provide the infrastructure for the analysis, but we should also recognise and address all the
behavioural, cultural and psychological issues which the facilitator handles, and, moreover,
we should recognise that discussion and consensus building will predominate over
algorithmic aspects. In this section, we list a wide range of questions that need to be
addressed before this can be done.

4.1 The web versus a room

It is stating the obvious, perhaps, but meeting on the web is not the same as meeting in a
room. We shall explore several aspects of this in the following, but here we note the
difference between the bricks and mortar of a room and the technology of the web. Of
course, videoconferencing may be used to an advantage to somehow recreate the room
environment, but we are more interested on asynchronous usage of the web to support group
decisions. Indeed, this is the first and most obvious difference, interactions on the web can
be spatially and temporally dispersed: discussions can be asynchronous or synchronous.
There is much less chronological ordering of interactions in web-meetings and many more
people can ‘speak’ at the same time. Each participant can, to some extent, at least explore the
material in his or her own order, whereas in face-to-face meetings all hear and see the same
interactions in the same order. With the web, participants can read back over discussions
several times and can move and learn at his or her own pace. In a web-meeting, pretty much
everybody has a computer in front of them and, therefore, can conduct side analyses of the
issues if they want, or use the web to gather further information not (currently) available in
the web-meeting. Computer displays can be tailored locally in a web-meeting to display
fonts or colours more clearly to individual users, in a way not possible with plenary
presentations in a room.

We are not, here at least, arguing that any of these differences are necessarily an advantage or
disadvantage, nor that we have established an exhaustive list. Rather, we simply mean to
indicate that meeting in a room is different to meeting on the web. Thus, there is no prima
facie reason to expect that the processes, procedures, agendas, etc. developed for face-to-face
decision conferences and participation workshops will translate simply in some one-to-one
fashion into processes, procedures, agendas, etc. for e-participation events. The move from
the consultancy-led, ‘off-line’ decision analyses of the 1960’s and 1970’s to methods of
conducting decision analyses live with the problem owners in decision conferences and
stakeholder workshops of recent years was non-trivial. Whatever logic, trial and error
experiments or similar that were used, need to be repeated or re-examined if we are to develop e-participation in a similarly effective and justified way.

4.2 The diversity of the population

Decision conferences were developed to support groups of decision makers faced with a common set of concerns and issues. Such groups of decision makers do not just form randomly. They come together or are already working together because of some common interests. For instance, while there may be many individual, maybe quite different, perspectives represented on a board of directors, they will be correlated with a general common objective ensuring profitability of the firm. Even in stakeholder workshops run as part of a public participation process, the participants are not usually as diverse in terms of their objectives as the whole of society. In our experience, their willingness to attend such events, their selection in the first place by the authorities, and other factors correlate their objectives or, at least, their willingness to reach consensus. e-Participation events will draw their participants from across society and they will be self-selecting. They are much less likely to have common interests. Consider an e-participation event designed to discuss funding of medical research. Animal rights activists are unlikely to share any key objectives with representatives of pharmaceutical companies. In short, the diversity of the participants’ objectives is likely to be greater in e-participation than in decision conferences and the difficulty in convergence to consensus, correspondingly, larger.

Societies are becoming more and more multi-ethnic and multi-cultural. This too has serious implications. Firstly, it is known that different cultures have very different attitudes to and understandings of uncertainty (Hofstede, 1994; Wright and Phillips, 1980). Such differences can occur in decision conferences, but previous experience of working together has usually softened the edges. Cultural background affect the understanding of words and images. GIS related interfaces are being used in some explorations of e-participation (Carver et al., 2001); yet Walsham and Sahay (1998) indicate that the cultural understanding of maps can affect the usefulness of GIS based decision support. Offence is always possible between different cultures by the unintentional choice of words. In face-to-face encounters, body language can help anticipate and recognise such issues as they happen. In a large web-meeting there may be fewer safety nets.

We have already noted that within our profession, there is far from universal agreement on the validity of the SEU decision analytic methodology. This is not (just) some esoteric issue
that fuels academic debates, in part it relates to cultural differences. For instance, the differences between the French outranking school of decision analysis and the Anglo-American one based on SEU theory arises, in part, because of subtle cultural differences in the understandings of what a decision is (process versus point of choice) and, arguably, in the understanding of intentionality. Certainly, some Eastern religions have considerably different views on predestination of events than are embedded in Western cultures. Thus, structuring e-participation around the methodology of a particular form of decision analysis may favour some citizens and stakeholders over others.

4.3 Communication and understanding

French (2005) has argued that the key to making the SEU paradigm a methodology for decision support in large groups dispersed over the web is the development of better means of communicating the reasoning and import of an analysis. Also, much of the work on public engagement has identified the importance of addressing communication issues, particularly with respect to risk (Bennett and Calman, 1999; Fischhoff, 1995; Gigerenzer, 2002). Communication, true communication in the sense of building shared mental models, is difficult. It is difficult face-to-face, when one has all sorts of cues passing between listeners and speakers; in a web discussion, it is much more difficult.

Firstly, despite the work that has gone on over many years about effective presentation of data and analyses (Chambers, 1994; Chapman and Mahon, 1986; Tufte, 1997), practice is still far from perfect. Within e-participation, data presentation will need be much better. The web is essentially graphical, yet one only has to look at a few web-sites to realise how poorly we use its power. We need to improve, and not only in terms of data presentation. Good decision analyses provide understanding, not simply answers (French, 1988; French and Rios Insua, 2000; Phillips, 1984). While most decision analysts are adept at explaining an analysis and what it is saying either to a meeting or in a report, their audiences have typically been well educated. How decision analyses should be communicated to the general public is still a largely unanswered question.

Secondly, pedants apart, words are not used just with their dictionary definitions. They have local and cultural meanings that some participants may not understand. For instance, one of us (SF) in an environmental decision conference had a lot of difficulty in eliciting value judgements from a representative of an environmental group until he discovered that while the rest of the participants had fallen into the shorthand of referring to elicitation as ‘scoring’
the alternatives, this person objected to using a word with connotations of success (scoring in a game) in the context of environmental impacts which were usually detrimental. In face-to-face discussion, particularly facilitated discussion, the meaning of words is negotiated. How that is achieved on the web is far from clear.

4.4 Facilitation

In a very real sense, many of the points made in sections 4.2 and 4.3 relate to the need for a facilitator in decision conferences (Ackermann, 1996; Macauley and Alabdulkarim, 2005; Phillips and Phillips, 1993). A facilitator is someone with no responsibility or accountability for the consequences of the decision *per se*, who joins the group to structure, smooth and enhance the deliberative processes. Typically, a facilitator has been trained in group dynamics, psychology, cultural issues and communication and he uses this knowledge to help the group in their work. Facilitation has been fairly well studied in face-to-face contexts, but is less well understood in web-based meetings (Macauley and Alabdulkarim, 2005). In addition to psychological skills indicated above, an e-facilitator also needs very advanced IT competences. Apart from the lack of physical cues to help the facilitator in web-meetings, we face a problem of scale. Decision conferences and stakeholder workshops typically have 15 to 50 participants; 100 or more participants would be exceptional. But effective e-participation would mean 1000s of participants. Thus, the scale of the problem is much greater, particularly as the potential for misinterpretation between participants rises as some power of their number. It is unlikely that there would be funding to maintain a ratio of facilitators to participants in the order of 1 to 30 or so. Inevitably, one will be working with teams of facilitators which brings its own issues of co-ordination and coherence of approach.

The facilitator’s art relates to his or her skill in selecting an effective intervention (including that of being inactive) to move the group’s work on in a productive manner and, moreover, one that draws on content from within the group and not simply one that is led by the facilitator. There are some guides available to help facilitators learn their art in face-to-face activities (Eden and Radford, 1990; Phillips and Phillips, 1993; Seifert, 2002); much less guidance is available for electronic facilitation (Macauley and Alabdulkarim, 2005). As we have indicated the scale of the task in facilitating perhaps 1000’s of participants will add to the difficulties. We have also noted that the e-participation may be conducted asynchronously, which adds further difficulties in smoothing the interactions between
participants. One does not just have to watch the effect of a participant’s statements as they are made, but has to maintain a watch for any effect in the hours and days after.

4.5 Legitimacy and trust

Let us suppose that all the issues above are successfully addressed and one can create an e-participation process to the satisfaction of the facilitators and analysts, would the public trust it? Would they perceive it as legitimate? There are several levels of trust that we should consider. Would they believe that all the interactions on the web-site are genuine? Would they accept the analyses on the web-site as reflecting a set of beliefs and preferences or would they perceive the system as distorting or oversimplifying their views. In a workshop, the participants see and hear all the interactions and can count shows of hands themselves; what would give them the same assurance over the web? Any democratic system is subject to some risk of manipulability or tactical voting (Gibbard, 1973; Hodge and Klima, 2005). Will citizens trust other citizens to reveal their preferences honestly in the manner that a decision analytic approach would assume? Face-to-face interaction provides many cues to support trust; the web does not provide so many.

There is also a trust issue in the sense of trusting the system to implement an algorithm correctly. Even in the relatively simple area of counting votes, debates in the literature of e-voting suggest that guaranteeing that the system transparently adds up the votes correctly is a non-trivial task. How much greater is it, when the system ‘solves’ an influence diagram with complex probability and utility structures? What quality control is needed to ensure that the results are trusted? Would the code need to be published in some sense? Counting is such an ancient skill that intellectual property issues are not so relevant in voting, but many decision analytic codes are covered by copyright. Open source codes may well be needed, but they take time to write and quality assure.

Would the facilitation team be trusted? They need to steer the deliberation in some neutral way, discarding irrelevant details to ensure that the decision analysis is tractable. They, in a very real sense, fix the rules of the deliberation.

We should also ask whether the politicians would trust e-participation systems too? Firstly, they have to accept those changes in political power structures to which the use of such systems would lead. That may be a step too far for some. But like the citizens, they also have to trust the processes and systems. They would need to trust the facilitation team.
There is also the issue of legitimacy. Even if society trusts an e-participation process in the sense of reflecting the deliberations of the participants, it does not necessarily follow that they see it as legitimate in the sense of reflecting the whole of society. There are issues relating to the digital divide: has every citizen easy access to the web? In fact, such issues always exist for any participation process: have citizens equal access to it? Many face-to-face interaction processes disadvantage rural communities because they are generally held in cities with good transport connections, but ‘good transport connections’ often means ‘between cities’ not with the local region. There are costs for any meeting in terms of getting time-off work, travel costs, opportunity costs. So it seems to us that the issue of ease of participation via the web is certainly a moot point, but similar points relate to all participation. There are issues relating to ‘fair’ representation and the potential for hijacking of an e-participation process by a pressure group. Even if the e-participation is used to inform an agency’s decision rather than determine the decision itself, there is an issue for the agency in assessing how much the deliberations reflect the views across society. Last, but not least, there is the possibility of the authorities actively seeking to engage the public and stakeholders over the web. There is a need here to identify mechanisms which are successful in motivating the public to participate in a time-consuming activity, so legitimising the whole process.

We might note at this point that participation generally brings a move from a discussion of the science of the issues to a discussion of the values. In the past, many agencies and public authorities have provided the public with expert assessments of what might happen if this or that policy is adopted. They have given rather less emphasis to value judgement issues in the debate. Politicians have made claims to decision making based upon the ‘best available science’. The wider the participation in the debate, the more value issues enter the debate – in our view, a move for the better (Fischhoff, 1995). As e-participation brings wider participation, we might expect this trend to continue.

### 4.6 Hybrid processes

We have been writing as if a participation process would be conducted entirely across the web as opposed to conducted entirely via stakeholder workshops. But, surely, it is likely to be a hybrid process arranging a number of participation instruments throughout the deliberation process indicated in Figure 1. We have noted that there has been few comparative studies of the effectiveness of different instruments. There have been virtually no studies investigating interaction effects between different participation instruments. Does
running a web-discussion before a stakeholder workshop elicit a broader, more embracing range of issues to be considered in the deliberations? Once such studies have been undertaken, how does one use the knowledge obtained to design an effective process? Bayley and French (2005) have discussed the issue, offering a resource allocation model to help structure the design.

4.7 Validity

Gregory et al (2005) discuss the issue of the validity of the process noting that concepts such as construct validity do not translate trivially to the context of public participation. Moreover, they only cover some of the issues relating to validity. e-Participation involves the use of information systems and there are host of discussions of different models and metrics for evaluating information systems (DeLone and McLean, 1992, 2003; Galliers et al., 1999; Zhang and French, 2006). There are many questions to be asked about how well a process relates to democratic principles such as legitimacy, representativeness, etc. There are also political questions relating to how well a process relates to the development of a community coherence and engagement of the public. In short, to evaluate whether a decision analytic based participation process is valid there is a very wide range of issues that needs to be addressed. While there have been many discussions of individual issues, to understand the validity of e-participation processes there is a need for a more comprehensive discussion drawing all the issues together coherently.

4.8 What do we, then, need from a technical viewpoint to build e-participation?

Finally, in addition to all the questions of principle discussed above there are some rather pragmatic issues. We believe that the majority of the technology exists to build a web-site to run an e-participation process. We have the algorithms and tools needed. But that does not mean it can be built instantly. It would be a very complex site involving substantial programs and technically complicated interfaces, even if their use needs to be transparent to the user. At a minimum, it would need the following components just on the decision analytic aspects which are used to structure the process. At its heart it would need a decision analytic software system with the power of, say, DPL, @Risk, VISA and other programmes rolled into one. The system will need elicitation interfaces which are much more focused on the naïve user, maybe using some of the ideas pioneered in MAUD (Humphreys and McFadden, 1980). Indeed, as explained in Efremov et al (2006), a compromise might be sought between ease-of-use and understanding and too much sophistication in the methods deployed. There might
be a need to ‘lock’ parts of the model so that, say, exploration could be focused on the values of the participants with subjective probabilities locked at values set by previous discussion. In other words, there would need to be model management systems such as developed by Nunamaker et al (1988). Since the majority of users would not be able to interpret the output of the analysis, particularly into a qualitative understanding of what factors are driving it, the system would benefit from an automatic explanation module that explained how the participant’s judgements have led to the conclusions (Klein, 1994; Papamichail and French, 2003). Depending on the aggregation style (GDM 1 -- 5) adopted, we might also need further negotiation, bargaining and arbitration tools: see, e.g. http://www.interneg.org/ or http://infodoc.escet.urjc.es/ted. Finally there is also a need for sensitivity and robustness tools as described in Rios Insua and Ruggeri (2000). To complement all this, there would be a need for training and software manuals aimed at a wide variety of users, many innumerate. The nearest such site to our knowledge is the decisionarium\textsuperscript{7} one at Helsinki University of Technology (Hämäläinen, 2003), but it is currently aimed at students of decision analysis. The above assumes that a decision analyst formulates and structures the model. A true e-participation site would provide tools so that participants could structure their own models in order to reflect their perceptions. There are some tools to help in this, but many more are needed (Chen and Lee, 2003). Around this decision analytic core tools would be needed to facilitate discussion. Discussion forums at the least, but ideally with facilitation tools built in to alert the facilitator to flames and areas of heated debate which might need his attention. They could be complemented with tools identifying communalities among users, possibly based on approaches such as in Lourenco and Costa (2005). These could be a gateway to moderate automatically discussions. This, of course, notwithstanding the issues concerning security, which, in turn, entail trust, as mentioned above. Although, there are many interesting Internet voting technologies as PNYX (http://www.scytl.com) the kind of more complex interactions would undoubtedly require more sophisticated security mechanisms.

Even with all the components of such a site in existence, simply engineering them into a coherent, robust whole would be a major task requiring many man-years of development effort. Along its development, tests, case studies and training examples should be compiled to facilitate its use more widely. And then what of the machine to run it on? It would need to have the power to conduct tens, perhaps 100s of decision analyses simultaneously as individual participants explored their perceptions in comparison with those of others. Of course, rather than building a generic tool, we could try to build problem specific tools, such
as the one for supporting participatory budgeting experiences, as in PARBUD, see Rios and Rios Insua (2005).

In summary, developing an e-participation site which builds on the face-to-face methodologies discussed by Gregory et al (2005) is not an easy task. However, given the increasing demand and interest for participation in public decision making, we have no doubts that this should be seriously investigated and developed in the near future.

5 Conclusion

This paper is arguably a catalogue of questions, important questions if valid e-participation methods are to be developed and used. We are concerned that the political and commercial imperatives towards the adoption of some e-participation will lead to their use before we understand what they are actually achieving. It behoves the decision analysis and other communities to enter into much debate and discussion so that we can advise on valid approaches and help society use e-participation wisely.

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