Providing Argument Support for eParticipation

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ABSTRACT. As governments seek to consult their citizens over matters of policy, it becomes increasingly important that citizens receive the relevant information in a medium that they can use, and will want to use, in forming their opinion upon consultative issues. In eParticipation, there is a clear requirement to understand how technology can support informed debate on issues, but there are two main obstacles in achieving this. The first is that the deliberation is often on complex issues and therefore typically there are many number arguments and counter arguments to consider which, when presented in linear text can be confusing for the public at large. Secondly, it is not obvious that many people actually have the necessary critical thinking skills to deliberate on issues. Argumentation Systems have been used successfully mainly in the domains of Law and Education where they have been developed in response to a need for innovative and effective ways of teaching critical thinking, presenting and defending a point of view and providing complex information in an organised and easily accessible fashion. Their use in the political domain is only just emerging. The purpose of this paper is to make clear how eParticipation can gain from the use of Argumentation Systems.

KEYWORDS. Argumentation systems, digital democracy, eParticipation, information and communication technology, online deliberation, public participation

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INTRODUCTION

"The problem faced by contemporary democracy is horribly simple" writes Stephen Coleman "...governments have come to believe that the public don't know how to speak; the public has come to believe that the governments don't know how to listen." (Coleman, 2005, p. 1). He argues that democracy functions best when there is a considered and respectful exchange of views and ideas between the electorate and their representatives; that is to say, a participatory form of relationship. Yet figures from an online polling survey (*ibid*, p. 3) show that the bond between a voter and their representative is very weak indeed; 72% of the sample surveyed reported feeling 'disconnected' from Parliament of whom 46% felt 'very disconnected'. Re-establishing that connection through consultation with the public has had mixed results.

If we accept, as many authors have already argued (Barber,1984; Fishkin,1991), that public deliberation and discussion on political issues are critical parts of our democracy, then there is a need to investigate what role information and communication technology (ICT) can take to support such processes. Barber, whilst presenting the concept of strong democracy, forcibly argues that democratic discussion "entails listening no less than speaking, it is affective as well as cognitive and its internationalism draws it out of pure reflexion into the world of action" (Barber, 1984, p. 174). This implies a need for a technology-based environment where there is support for the individual citizen to access factual information, formulate opinions based on the views of others, contribute their own opinion, but also provide the rationale behind their ideas with the necessary arguments, which in turn can be challenged (Macintosh, 2007, p. 90). However, the capacity of information and communication technology to simulate participation has not been as significant as was originally believed (Becker & Ohlin, 2006; Lusoli, Ward & Gibson, 2006). Simply making a comment facility or discussion forum available on the web does not necessarily make contributions more deliberative (Schlosberg, Zavestoski & Shulman, 2008). Indeed, in their recent study of the US e-Rulemaking project these same authors argue that government agencies which seek informed public comment using the Internet need to develop new ways to facilitate deliberation (ibid, p. 51). Elliman, Macintosh and Irani (2007, p. 33) point out the technological difficulties of the situation when they say: "Democratic political participation must involve both the means to be informed and deliberative mechanisms to take part in the decision-making. Deliberative eParticipation is an information intensive process, which needs to be interactive, incremental and dynamic. It requires meaningful messages to be extracted and represented from large assemblages of information produced by multiple stakeholders often with conflicting agendas".

Rather than accept defeat over the attempt to engage people in the policy-making process, the purpose of this paper is to promote the case of exploiting the capacities of Argumentation Systems (AS) as a facilitator for public deliberation. Such systems exist outside the political domain and have been used successfully mainly in the domains of Law and Education (Kirschner, et al, 2003). They have been developed in response to a need for innovative and effective ways of teaching critical thinking, presenting and defending a point of view and providing complex information in an organised and easily accessible fashion. Their function

is essentially to enable people to appreciate practical problems in their entirety and then articulate a reasoned solution, which is required for deliberation. This 'deliberative' component is generally ill catered for in current participation projects, which generally employ generic groupware systems, such as discussion forums and online surveys, where specific technical support for argumentation is not provided.

Argumentation Systems are computer software applications for helping people to participate in various kinds of goal-directed dialogues in which arguments are exchanged. Bex, Prakken, Reed & Walton (2003), divide argumentation support tools into two distinct types. Firstly, those that contain knowledge about a problem domain and can perform reasoning to suggest solutions to the problem. Secondly, those they term 'sense-making' systems (Kirschner et al, 2003) that impose structure on the problem, typically by using visualisation techniques, as well as supporting communication/interaction between users of the system. Since the goal of participation is to engage citizens in dialogues with government about such matter as public policy, plans, or legislation, where citizens are given an opportunity not only to offer suggestions, but also to support these suggestions with arguments, the potential of argumentation systems should be readily apparent. Such systems support and facilitate the making of practical decisions, ensuring that the decision-making process is efficient, transparent, open, fair and rational. Not surprisingly, these issues have much in common with the goals of 'good governance' and e-participation (Malkia, 2004; Gordon, 2005). The theoretical subfield of computer science which studies the foundations of Argumentation Systems is young and goes by many names, such as Computational Models of (Natural) Argumentation or Computational Dialectics. Much work has been conducted as part of Artificial Intelligence, especially in the interdisciplinary field of Artificial Intelligence and Law.

To provide substance to the claim that Argumentation Systems can facilitate eParticipation, this paper is divided into four sections. Argumentation cannot be understood or evaluated without some appreciation of the theory of argumentation. Moreover, it is a requirement of good software engineering that tools should be based on carefully considered computational models of the application domain and its tasks. Accordingly, the first two parts are devoted to the technological aspects of these systems. The first section provides a brief introduction to the theory of argumentation based on the work of Douglas Walton (2006), whilst the following section introduces various efforts to develop formal, computation models of argumentation. The third section aims to demonstrate how eParticipation can benefit from Argumentation Systems. This is done by describing a number of argumentation support tools which have been used to enhance an individual's influence upon matters of policy. The final section discusses the situation to date and indicates some of the constraints and limitations of argumentation systems for eParticipation.

ARGUMENTATION THEORY

An argument links a set of statements, the premises, to another statement, the conclusion. The premises provide some kind of support for the conclusion such that, if the premises are accepted, then the argument if it is a good one, lends some weight to the conclusion. The goal of argumentation is to determine the acceptability of claims, rather than their truth. Whereas lo-

gical consequences are necessary, by virtue of their form, irrespective of their content; arguments, in contrast, are substantive and 'defeasible'. They are substantive because they depend not only on the form of the premises, but also their content and acceptability. They are defeasible because their conclusions are only plausible, not certain, and may be defeated in various ways by, for example, providing superior counter-arguments, or by revealing implicit premises which turn out to be untenable.

Considerable time has been spent in classifying various patterns of argument, based on an analysis of their structure and content as reconstructed from natural language texts. These patterns of argument, historically rooted in Aristotle's 'Topics' (Slomkowski, 1997), have come to be called 'argumentation schemes'. Although they are the result of empirical case studies, they also have a normative side and have been profitably applied in research (Reed & Walton, 2001). They are a useful tool in two important respects: for guiding the reconstruction of arguments put forward by other parties, so as to open them up to critical analysis and evaluation; for constructing fresh arguments to put forward in support of one's own claims, or to counter the arguments of others. These uses are clearly relevant to supporting deliberative participation in judging between competing policy options. Argument schemes may be domain dependent, and consequently there are an unlimited number of such schemes. Many schemes, however, are general purpose. Walton and his colleagues have taken on the task of collecting and classifying general purpose schemes (Walton, Reed & Macagno, 2008). To date their collection contains about ninety-six schemes, each scheme associated with a set of 'critical questions' for evaluating and challenging arguments used with the scheme. As many of these schemes are used in the presentation of policy, this work is of potential value to those involved in supporting citizen engagement. For example, one such scheme is the 'Argument from expert opinion' a type that is indispensable in providing an informed view; however, it is also a type that is open to abuse, when people pay unquestioning regard for an opinion simply by virtue of its source. Having the critical questions to hand, such as, 'is the expert biased?' helps segregate the valid advice from the prejudiced, and thereby supports the creation of sound and impartial policies.

'Validity' is an important factor in the evaluation of arguments. An invalid argument provides no support for its conclusion, and thereby has no weight. Yet there is a problem with defining validity. Walton's theory of argumentation takes a contextual, procedural view of argument validity: an argument is 'valid' if and only if it furthers the goals of the dialogue in which it is put forward. From this perspective, the validity of an argument can depend on the state and history of the dialogue. To give a practical example: an argument in favour of some proposal made during the brainstorming phase of a deliberation might be valid during the process of selecting some of these brainstorming ideas for a more in-depth evaluation in the next phase of the deliberation, but not valid in this later phase if this particular proposal had not been selected. Thus, the theory provides sufficient fluidity to capture the essentially complex nature of political discussion, which would be an impracticable task within a classical logic framework. Doing so provides a standard by which competing arguments can be assessed when attempting to find a secure footing upon the shifting grounds of the political landscape.

Another feature of Argumentation Systems are dialogue types. Dialogue types in argumentation theory are normative models of communication, defined across the following dimensions: the purpose or goal of the dialogue; the roles of the participants; the speech acts available; the termination criteria; a process model and a 'protocol' for regulating this process. Whether or not an argument has been used properly depends on the type of dialogue. Walton (2006, p.183) has developed a taxonomy of six dialogue types, of which two are of especial interest to participation:

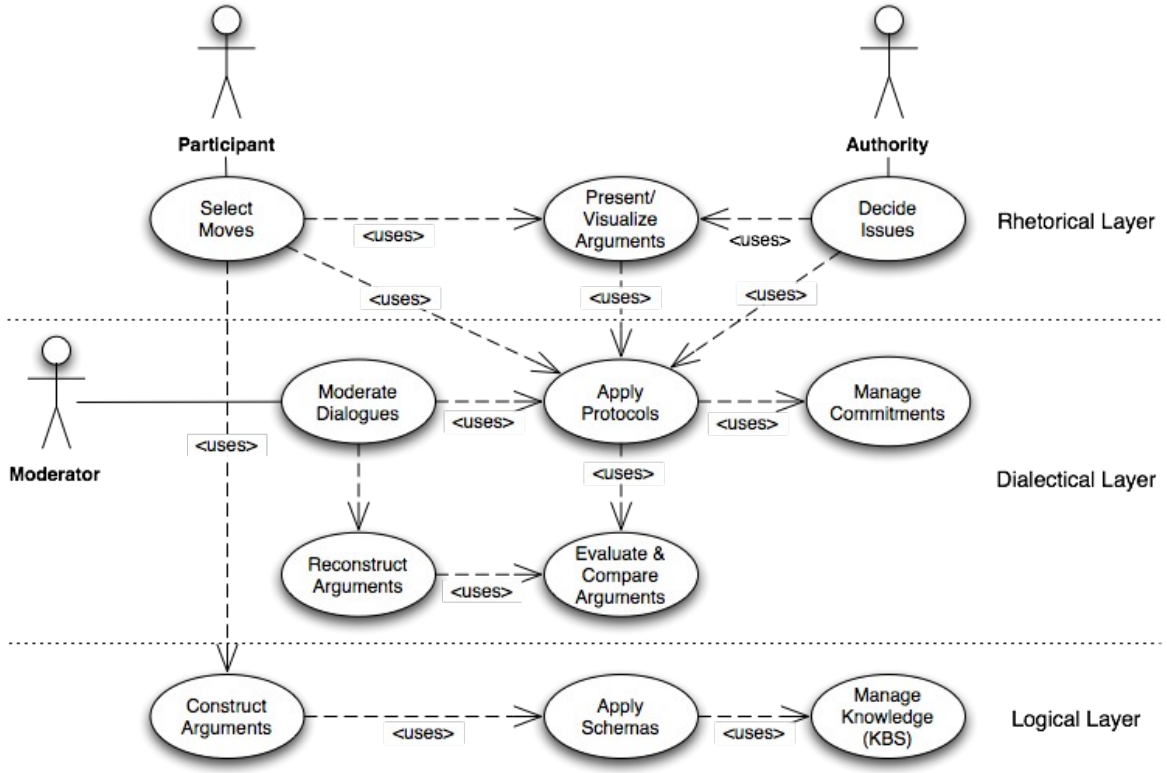
- ***Persuasion*** dialogues debate the truth of some statement. The proponent claims that some statement is true; this claim is challenged by the respondent. There are several subtypes of this dialogue type: in a 'dispute' dialogue, the respondent not only challenges the proponent's claim, but also claims some opposing, contradictory statement to be true – both parties have a burden of proof, for their respective claims; in a 'dissent' dialogue, the respondent only doubts the proponent's claim - the proponent has the burden of proof and must produce the stronger arguments, whereas the respondent needs only to cast doubt on the proponent's claim.
- ***Deliberation*** dialogues are about choosing some course of action which takes into account the interests of multiple stakeholders. In a deliberation dialogue, one of the first tasks is to identify the stakeholders and their interests. They may not all be participants in the dialogue, at least not initially. As it may not be practical for every stakeholder to take part in the dialogue personally, some stakeholders may need to be represented by others.

For completeness the other four types are: 'Information seeking', 'Negotiation', 'Inquiry' and 'Eristic'. Actual dialogues may be mixtures of these various types and may shift from one type to another. Thus it is important to dissect an exchange between parties to determine what types of dialogue are being used and thereby whether what is being attempted in that dialogue is likely to succeed or whether the dialogue type if being misused.

COMPUTATIONAL MODELS OF ARGUMENTATION

The above overview of arguments and their roles provides guidelines by which computational models can be created, and thereby provide systems to support users accomplish tasks. Based on previous analyses of argumentation tasks (Brewka & Gordon, 1994; Prakken, 1995; Bench-Capon, 2003), inspired by Aristotle and other ancient Greek philosophers, it is possible to distinguish three distinct layers of tasks: the 'logical', the 'dialectical', and the 'rhetorical' (see Figure 1).

Figure 1 Argumentation Use Cases



Logical Layer: Broadly stated, the task performed in the logical layer is to construct arguments by applying argumentation schemes to some representation of evidence, facts or knowledge of the domain (Prakke, 2005; Gordon, 2008). The relevance to eParticipation is the potential of this technology to help citizens to make effective use of knowledge bases on the Semantic Web to contribute well-informed and effective arguments in deliberative proceedings. This marks the initial step along the path to providing a considered contribution to policy debate, rather than dissipating an attack by using poorly expressed objections.

Dialectical Layer: This layer is responsible for structuring, evaluating and comparing the arguments advanced in the dialogue. The idea of developing a computer model for managing support and justification relationships between propositions goes back to research on truth and reason maintenance systems in artificial intelligence. Various researchers have built on this to develop computational models of argument (Dung, 1995; Prakken, 2001; Prakken & Sartor, 2006; Gordon, Prakken & Walton, 2007; Besnard & Hunter, 2008). Here, the relevance to eParticipation lies in the comparison of conflicting points of view; by evaluating the arguments advanced in favour of and against a position it will be possible to highlight where the weaknesses lie and where the responsibility lies for providing further support for a particular viewpoint. By making the relationships between arguments and claims explicit, transparent and understandable, these tools make it easier for people to justify and explain their positions, as well as critically evaluate them.

The dialectical layer is also responsible for supporting the process of argumentation, facilitating and guiding the dialogue, including the facilitation tasks of moderators and mediators, to

help ensure that it achieves its normative goals. This includes checking that the participants observe the appropriate argumentation protocol, which in turn requires keeping track of the 'commitments' made, commitment being a fundamental concept handled by a model of dialogue. One of the first computational models of argumentation dialogues was the Pleadings Game' (Gordon 1995), an idealized model of the process of pleading in civil law cases in common law jurisdictions. Other computational models of dialogue followed shortly thereafter, see for example (Hage et al., 1994), (Lodder ,1999) (Verheij, 1996), (Bench-Capon, 1998) and (Prakken, 2001). Since eParticipation is a process, tools developed to support dialogues are clearly relevant in principle, but suitable protocols for eParticipation are an open research question. Keeping track of commitments is also important for eParticipation, to help contributors to express their views consistently and avoid attempts to change or inhibit the process by changing their positions without sufficient justification.

Rhetorical layer: This layer assists each participant to protect and further their own interests by selecting arguments to put forward, presenting them clearly and persuasively – such as through the use of argument visualisation techniques – and making sure their arguments take into consideration the standpoints, values, commitments and beliefs of the audience. Apart from the topic of argument visualisation, relatively little research has been done on computational models of this layer. For related work see for example (Gilbert et al., 2003) and (Crosswhite et al., 2003). With regard to visualisation, one of the first argument visualisation methods was developed by Wigmore, for visualising evidence in legal cases (Wigmore, 1940). The diagramming method Toulmin used in his 'Uses of Argument' (Toulmin, 1958) has been very influential, but the method developed by Beardsley (1950) and refined by Freeman (1991) has become the de facto standard in the humanities. Conklin's gIBIS system (Conklin, 1988), based on Rittel's idea of an issue-based information system (IBIS) (Rittel & Webber,1973), was perhaps the first computational model designed for visualising arguments. Gordon has recently developed a new method of diagramming arguments, in collaboration with Walton, which builds upon and integrates these prior methods (Gordon, 2007. The Carneades software tool which uses a refined version of this method is described in the next section.

This section has outlined how argumentation theory has informed the basis for constructing support systems for argumentation tasks and has pointed to where this work has a positive benefit in the process of citizen participation in policy creation, through the better appreciation and presentation of points of view. The impact on participation should be apparent; using visualisation to make clear the state of a dialogue not only focuses participants' attention on the salient points of the debate, but also allows them to see where their points belong in the overall structure of the discussion rather than being forced to work their way through volumes of text-based contributions.

ARGUMENTATION TOOLS

Douglas Engelbart, inventor in the 1960s of much of today's interactive personal computing tools, draws attention to the need for tools to tackle the "complex, urgent problems" facing society. Forty years on, he has concluded that central to meeting this challenge are argumentation systems to help clarify the nature of the problems and scaffold dialogical negotiation of

ways forward (Engelbart, 2003). A number of such argumentation tools have been developed as an educational resource, both as a means of delivering information but also as a means of teaching critical thinking skills. Since legal students are required to develop critical thinking skills and make effective use of argument, a large number of these tools have their roots in this domain, being developed as 'argumentation assistants' for the legal profession. Other tools have grown within a commercial domain in response to the demands of arriving at, and presenting, strategic decisions within a large, dispersed business community.

In this section we present examples of argumentation tools that have been used in the context of policy debate. We provide a general description of the system and, if available, the URL where either the tool can be downloaded from or where further information is available. We then briefly describe each tool by considering: the underlying argumentation model it uses, the argumentation tasks it supports, and an overview of an example eParticipation scenario it is has been used in. The tools are presented in chronological order of development.

QuestMap

QuestMap was based on the gIBIS system (Conklin & Begemann, 1988) and (Conklin, Selvin, Buckingham Shum, & Sierhuis, 2003). Originally QuestMap was developed as an organizational memory and information management tool for collaborative working within a large utilities company in California. It was the company's idea to use it to support group facilitation/deliberation. Therefore, the system supported two different types of applications, supporting asynchronous collaborative information management and supporting group deliberation in face-to-face meetings.

It was based on the IBIS model and provided hypertext and groupware functionality, allowing the user to create argument maps and lists. QuestMap used icons, or 'nodes', to represent the IBIS elements of 'Issues', 'Positions' and 'Arguments' (supporting or contesting statements relative to a position). It was powered by a hypertext engine whose functions were accessed via an interface. The chief features were as follows: the creation of hyperlinks between maps through the copying of one node into another map; a list display of all maps or lists in which a particular node features – clicking on a list element takes the user to the particular instance of that node; additional information could be added to each node by placing text in a 'contents window' – including keyword search terms; and a search engine that could produce lists of nodes containing keywords, where those lists were themselves sets of hyperlinks. A case study on its use is provided by Conklin (2003). This tool has been superseded by Compendium which is described later in this section.

Zeno, – http://zeno.berlios.de

Zeno (Gordon, Voss, Richter & Märker, 2001) provided a web-based discussion forum extended to support the evaluation, visualisation and navigation of complex networks of arguments. It also provided extensive support for moderators and mediators. A later version of Zeno was renamed "Dito" and included an argument diagramming tool called "Diaglo". Zeno's computational model of argumentation was initially based on IBIS, but later made configurable by moderators. Zeno extended the idea of threaded discussions, in which mes-

sages are organised in an outline or tree, to the collaborative construction of more general semantically labelled graphs. Both nodes and links can be labelled, with labels configured by the moderator. Appropriate labels can help participants navigate through the network and to evaluate arguments. Other extensions enabled users to describe nodes in the network with metadata and to upload file attachments. Gordon and Richter (2002) describe the latest research version of the system in more detail.

Zeno was developed and piloted in a series of research projects, beginning with GeoMed (Geographical Mediation System, IE2037), which started in 1996 and may have been the first European eParticipation projects. The goal of GeoMed was to develop and validate a web-based groupware system to engage citizens in regional and urban planning (Schmidt-Belz et al., 1999). In the GeoMed project, Zeno was integrated with a web-based geographical information system (Gordon et al., 1996; Gordon & Karacapilidis, 1997). A later version of Zeno served as the foundation, with a new graphical user interface, of the eParticipation platform developed in another European Commission funded project, DEMOS (Delphi Mediation Online System, IST-1999-20530), which ran from 2000-2004 and was successfully piloted in the cities of Hamburg and Bologna.

Zeno was used successfully as the eParticipation platform in a number of other projects as well, mostly in Germany, including projects in the cities of Esslingen (Märker, et. al., 2002) and Berlin. The project in Berlin, which engaged citizens in the planning of the renovation of the Alexanderplatz, was no longer a pilot project of Zeno, but rather a commercial project carried out by a professional eParticipation company.

Compendium – http://www.compendiuminstitute.org

Compendium is an argument mapping tool that is based on the IBIS computational model (Selvin et al., 2001). It is a collaborative argument diagramming tool for indexing, structuring and visualising argumentation dialogues. It has been used for a number of years for commercial real-time problem-solving; originally, applications were concerned with business process re-design. The Compendium tool was designed to overcome some of the known limitations of QuestMap (described above), though it has now grown substantially in scope to include integration with other tools, open source development and generally be more focussed towards use in research.

The system allows for considerable customisation of the argument maps by the users and supports outputs in multiple document formats. Elements of a discussion are represented as ‘queries’ and ‘responses’, to which qualifying remarks can be attached indicating ‘support for’, or ‘criticism of’ that contention. Using hyperlinks, users can associate relevant documents with particular nodes to back-up any references. It is also possible to partition the discussion into a series of linked maps, which has the advantage of breaking-down large amounts of data into manageable portions.

Renton and Macintosh (2005 & 2006) have been using the Compendium tool, as an example of an argumentation sense-making tool, to investigate how they can be used within a political context to support eParticipation. They have considered four possible eParticipation scenarios

and constructed the associated argument maps. These scenarios were for: provision of information; support for consultation by considering an alternative way of setting out the responses to an online consultation on a published draft policy document; support for deliberation by setting out the consultation responses in the form of an inverted tree designed to allow users to see how their convictions on one issue may conflict with other beliefs; and finally, supporting the analysis of a discussion forum where the argument map is designed to establish whether or not individual contributors had remained consistent throughout the debate, and therefore this could be used to support the analysis and evaluation of the consultation process.

Another example of the eParticipation use of Compendium is a case study of how argument mapping could support transparency and accountability in the case of a consultation on regional planning in South East Queensland (Ohl, 2008). The consultation responses were modelled using the tool and then evaluated through surveys and stakeholder interviews.

Hermes – http://www.mech.upatras.gr/~nikos/index.html

The Hermes argumentation tool was developed under the European Commission ICTE-PAN project (Karacapilidis et al., 2005). It is based on the theoretical foundations of argumentation frameworks, which led to the development of the Zeno system (Gordon & Karacapilidis, 1997). Hermes is aimed at supporting online group facilitation between government agencies. The developers argue that the majority of existing collaborative argumentation support systems have been designed to support face to face meetings with a human facilitator whereas what is needed for government to government collaboration is virtual support. The tool has a discussion forum with support for argumentation.

Hermes allows for the construction of a diagram of the discourse that is composed of the ideas so far expressed during the discussion. The basic elements are: 'issues' – corresponding to decisions to be made or targets to be met; 'alternatives' – corresponding to potential choices; 'positions' – these are assertions associated with an 'alternative', that provide grounds for following or avoiding that choice; and 'constraints' – these represent preference relations. Users can input their preferences to courses of action through a "position, relation, position" tuple, where an example of a relation is "less important than" or "more important then". Hermes records the users' arguments, checks for inconsistencies among users' preferences, and automatically updates the discourse status according to all user input.

Parmenides – http://cgi.csc.liv.ac.uk/~katie/Parmenides1.html

The Parmenides system (Atkinson, Bench-Capon & McBurney, 2004; Atkinson, 2006) is an argumentation tool which uses a computational model of an argumentation scheme for practical reasoning to guide and help focus deliberation dialogues. The system helps users to systematically address appropriate critical questions. Critical questions supported by the system reflect issues such as:

- The preconditions of actions.
- Whether these preconditions are met in the current situation.
- The effects of actions.

- The social values promoted by these effects.
- Alternative actions for achieving the same effects.

Parmenides was first piloted in an online debate about the invasion of Iraq. Users were presented with a justification of the invasion in the form of a structured argument. They then had the opportunity either to accept the argument or take part in a structured survey, in which they were given an opportunity to express their agreement or disagreement with critical questions of the kind illustrated above. The results of this survey were stored in a database and analysed to help reveal the strengths and weaknesses of the government's rationale for invading Iraq. Such a system can provide policy makers with insight into where their views need bolstering, as well as where they can rely upon public support. The system has since been extended to support further public dialogues, including a debate in the UK on the banning of fox hunting (Cartwright & Atkinson, 2008).

Parmenides demonstrates how computational models of argument can be used in a way that is not inhibiting to the layman, by operating behind a succession of screens in a friendly and familiar questionnaire format. Coherent and useful information is gained by the consultation without forcing the user (the general public) to become familiar with the rigorous reasoning standards underlying the computational model of argument – thereby aiming to ensure that no-one is left stranded on the wrong side of the digital divide.

Carneades – http://carneades.berlios.de

Carneades is an Open Source argumentation system under development in the European Estrella project (IST-2004-027655), which aims to help both citizens and government officials take part more effectively in dialogues for assessing claims, for example claims for social services such as housing or unemployment benefits. Carneades provides software components for constructing arguments from formal models of legal concepts, rules and cases (Gordon, 2008), for evaluating and comparing arguments, applying proof standards and respecting the allocation of the burden of proof (Gordon & Walton, 2006) and argument visualisation (Gordon, 2007). To our knowledge, Carneades is the only system to date to support argumentation tasks at all three layers (logic, dialectic and rhetoric) of the argumentation use-case diagram.

To conclude, in this section we have presented a number of argumentation support tools. Some of these focus on the visualisation of arguments and here the graphical notation and user interface are important features. Others focus on providing analysis of the situation but typically with a more limited graphical user interface. A number of underlying argumentation models are used. In considering their relevance to eParticipation we need to consider the features needed to support informed debate to support evidence-based policy-making. The systems we have presented here allow the users to have access to various levels of information, to be able to focus on specific information and to have the ability to organize the gathered data to construct an effective argument – all of which are required for eParticipation.

Conclusion

In eParticipation there is a clear requirement to understand better how technology can support informed, deliberation on issues (Schlosberg, Zavestoski & Shulman, 2008). Yet, there are two significant obstacles facing a potential participant in such a process. In the first place, political issues are typically complex, presenting a large number of arguments and counter arguments for consideration. These, when presented in linear text, can be confusing to the public at large. Secondly, it is not obvious that all people equally possess the necessary critical thinking skills for effectively deliberating upon such issues. Accordingly, in this paper we have explored how the application of Argumentation Systems is adding value to eParticipation methods by tackling these barriers.

Argumentation Systems are computer software applications for helping people to participate in various kinds of goal-directed dialogues in which arguments are exchanged. The authors are aware that many of the systems outlined above were developed in response to issues in legal, education and commercial domains, thus significantly distinct from the concerns of eParticipation; they acknowledge that the transition to eParticipation cannot be entirely seamless. In a research workshop on the application of Argumentation Systems to eParticipation (Gordon, Macintosh & Renton, 2006), four areas were identified where improvements should be made in order to exploit fully the benefits of Argumentation Systems. Very briefly, these are as follows. Developers need to strike a balance between imposing a formal structure upon contributions from the public, which some may find inhibiting, and providing a free text field, which imposes a considerable cost on consultation organisers in the task of extracting useful information. Research into getting AS to function efficiently has often been at the expense of refining the user interface; there is now an urgent need to address this imbalance by investigating what features are necessary for an interface if the system is to attract participants and encourage them to provide deliberated input. Associated with the previous point is the need to classify the various user groups and identify their unique requirements in order that the views of specific groups can be targeted more effectively. Finally, there is, as yet, very little work on establishing a suitable protocol for dialogue within online consultation practice by which the interaction of the system with the user can be guided.

However, the potential relevance of Argumentation Systems to eParticipation should be readily apparent, since the goal of eParticipation is to engage citizens in dialogues with government about such matters as public policy, plans, or legislation. Argumentation plays a central role in this process, as in any public consultation citizens are given an opportunity, not only to make suggestions, but also support these suggestions with arguments. We have shown that Argumentation Systems are useful both for guiding the reconstruction of arguments put forward by other parties, so as to open them up to critical analysis and evaluation, as well as supporting the construction ("invention") of new arguments to put forward in support of one's claims or to counter the arguments of others. Given that argument maps use icons and arrows to represent the structure of a series of related viewpoints, thereby clarifying the issue under consideration, they have the potential to provide a readily accessible medium in which citizens can follow, and contribute to, public debates on policy issues.

As governments seek to consult their citizens over matters of policy, it becomes increasingly important that citizens receive the relevant information in a medium that they can use, and will want to use, in forming their opinion on consultative issues. This paper presented sample uses of Argumentation Systems to support eParticipation in order to assess their potential contribution to the consultation process. They cover techniques for the presentation of complex information in a thematically arranged format, for identifying those issues that generate a significant response, for collating consultation responses and representing them within an argument structure, and for checking upon the consistency of contributions to a debate. As such, Argumentation Systems have a valuable contribution to make to both government and civil society.

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