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Generic Arguments: a framework for supporting online deliberative discourse

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Abstract

In this paper we propose a framework based on argumentation that can be used to support deliberative discourse on line. Online communities have several distinct advantages as very open forums but they also have some deep disadvantages. We argue that the proposed framework and web application GAAMtalk permits and encourages the positive elements of online deliberation that will enhance discussions.

Keywords

Argumentation, deliberative discourse, online discourse, virtual communities, decision support

INTRODUCTION

The World Wide Web as a communication medium and forum for a liberal exchange of information and personal expression has considerable potential for supporting group decision-making. A large range of possible scenarios can be imagined, from a small panel of jurists considering a current case to a virtual community discussing a particular issue with an aim of reaching agreement. In envisioning the utility key structural considerations need to be addressed to move towards implementations of systems to provide effective support. Some of the important questions are:

- What rules and tools would an online community need in order for it to engage in effective, meaningful debate so that decisions are generally accepted by its members?
- Can online communities produce a better-informed and more responsible constituency?
- Can online, and increasingly off-line as well – communities govern themselves online?

Our sense of how traditional communities operate is well developed as their existence has been documented over thousands of years. In contrast, online communities are only a few decades old, and the large difference evident between the two leaves us without the full benefit of the lessons of experience. For example, members of self-organizing online communities come to one another and communicate as equals, stripped of many of the social cues present in physical encounters. Much of the effective “social glue” that binds physical communities is lacking in their online counterparts. As well as this, various physical constraints that keep traditional geo-communities together in times of significant disagreement and conflict are also missing.

Although open communities on the web are usually formed by those who share like values and a desire to use their shared online spaces for communication, virtual communities rarely achieve long-term peaceful existence, the ability to adequately inform themselves as a group or discuss and decide important issues. Greater anonymity online encourages both valuable conversations among those who would not normally interact off-line and the recognition and respect of views that would otherwise never be heard. It also fosters an irresponsibility that deeply undermines online discussions. Off-topic comments, disagreements about process,

and much pointless discussion without decision-making are common. As a consequence, many online groups have resorted to moderators and filtering.

Governance of online communities requires the consent of the participants to a greater degree than physical communities. However, unlike off-line jurisdictions, online groups have no significant means by which to force their members to remain involved. This is a difference from ordinary communities in that, not even the presence of members of self-organizing online communities is assured. At any time, without reason a member can simply leave the community, sacrificing their social and intellectual investment usually without penalty.

The central claim advanced in this article is that on-line discussions can be regulated for the benefit of all participants with the use of a normative reasoning structure. The structure captures important elements of reasoning within the field of discourse of concern to the community and, by and large, is acceptable to the community. The structure can be created and maintained by the community itself or it may be created and maintained by a social institution. The structure represents a shared understanding of the field of discourse and acts as a way of enhancing community identity.

Participants express their claims and beliefs with the use of the normative structure. The structure provides a mechanism for organizing the claims made by potentially thousands of participants. Supporting evidence for claims advanced by participants, typically expressed using links to documents, can be coherently organized by linking the evidence into the appropriate node within the structure. In this way, documents are efficiently collected and collated within the reasoning context of their use.

In moving between communities, documents play an important role, bringing people from different groups together to negotiate and coordinate common practices. Such negotiations are particularly significant in institutions, bureaucracies and corporations that comprise many different communities. The direction of the institution as a whole may depend on the successful outcome of negotiations among its constituent groups. Both the means and a willingness to come to a shared understanding are vital to the effectiveness of such institutions. Within online communities the views, thoughts and arguments are put forward as documents albeit possibly less structured (as comments on a news group). It becomes a key requirement within the online community to collectively develop the broad terms of reference of the discourse or in fact the key elements and agreed structure of the discourse.

The normative structure that we propose is based on a particular model of the “shared understanding” of the domain of discourse. This model is a graph of *generic arguments* that can be used to represent any argument in the domain. In the next section, argumentation concepts are introduced as background for the description of the model called the generic actual argument model (GAAM) in section 3. The application of the model for on-line communities is described in section 4.

ARGUMENTATION

A number of researchers in recent years have assumed that knowledge is often used in arguing for or against an assertion and have therefore used argumentation theories to model reasoning. The philosopher Toulmin (1958) concluded that all arguments, regardless of the domain, have a structure that consists of six basic invariants: claim, data, modality, rebuttal, warrant and backing. Every argument makes an assertion based on some data. The assertion of an argument stands as the claim of the argument. Knowing the data and the claim does not necessarily convince us that the claim follows from the data. This is achieved by the warrant. The backing supports the warrant and in a legal argument is typically a reference to a statute or a precedent case. The rebuttal component specifies an exception or condition that obviates the claim.

Stranieri *et al.* (2001) draw a distinction between dialectical and non-dialectical applications of argumentation concepts. Dialectical approaches are those that deploy argumentation concepts to represent the process of exchanging messages between participants to a discourse. Dialectical approaches typically adopt a non-monotonic logic and often use operators that derive from discourse analysis such as *assert* or *rebut*. Recent examples of dialectical approaches can be found in Farley and Freeman (1995), Prakken (1993a), Poole (1988), Gordon (1995), Cohen (1985), and Fox (1986), Vreeswijk (1993) and Dung (1995).

In contrast to the dialectical approach, argumentation has also been used to structure or organize knowledge. For example, Marshall (1989) and Ball (1994) developed hypertext based systems that structured knowledge using the Toulmin structure. Dick (1991) indexed cases using the Toulmin structure to improve information retrieval and Clark (1991) represented the views of individual geologists using the structure.

Drawing the dialectical/ non-dialectical distinction enables the specification of a framework called the Generic Actual Argument Model (GAAM) that is expressly non-dialectical. Our aim is to advance a framework that a discursive community agrees is sufficiently general to enable every participant to express their own claims and beliefs no matter how divergent the claims are yet provides a framework for the organization of claims into a coherent body. The framework does not provide a norm for reasoning but instead advances a normative structure for reasoning.

The use of a normative structure for reasoning enables the integration of information systems into discursive communities. Specifically, the framework enables the development of knowledge based systems that integrate a variety of inference procedures, combine information retrieval with reasoning and facilitate automated document drafting. Furthermore, the non-dialectical GAAM provides the foundation for simple dialectical models. Systems based on our approach have been developed in family law, refugee law, determining eligibility for government legal aid, copyright law and eTourism.

THE GENERIC/ ACTUAL ARGUMENT MODEL

As Stranieri *et al.* (2001) illustrate the majority of applications of Toulmin's structure actually vary the structure in one way or another. The variations can be understood as attempts to add dialectical features into a structure that is essentially non-dialectical. In the generic actual argument model, we vary the Toulmin structure in order to arrive at a frame that is expressly non-dialectical.

An important aspect of our modification is the principle that most arguments, reasoning or justifications within a field of discourse can be represented as a set of *generic arguments* which link together to form a tree or graph structure. Each generic argument represents a class of actual arguments that may be made and structurally embodies the components that go towards shaping well considered decision making in uncertain domains.

Generic arguments

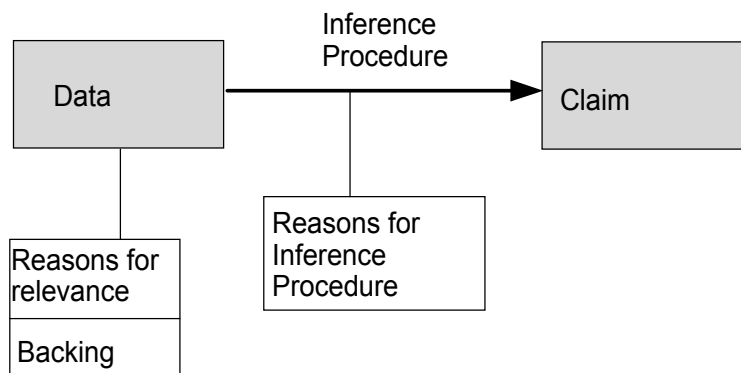


Figure 1: A basic outline of our version of a Toulmin argument

Figure 1 represents the basic template for the knowledge representation we call a *generic argument*. A generic argument is an instantiation of the template that models a group of *actual arguments*. The generic argument includes:

- A variable-value representation of the claim with a certainty slot
- A variable-value representation of the data items (with certainty slots) as the grounds on which such claims are made
- Reasons for relevance of the data items

- Inference procedures that may be used to infer a claim value from data values
- Reasons for the appropriateness of the inference procedure.

The idea is that the generic argument sets up a template for arguments that allows the representation of the claim and the grounds for the claim. The claim of a generic argument is a predicate with an unspecified value (which can be chosen from a set when an actual argument is being made). A claim takes the form <PREFIX>{VALUES}<SUFFIX> as seen later in Figure 4. Each data item is also a predicate with an unspecified value that can be taken from a specified set of values. The connection between the data variables and the claim variable is called an inference mechanism. An inference mechanism is a relation between the data space and the claim space.

It is important to appreciate that the notion of a generic argument can be used to capture a shared understanding about what a core set of arguments in a domain are. In some respects there is some similarity to 'topic theory' (see Aristotle 1928, Alexy, 1989) in that an important aspect in constructing each generic argument is a search for the premises or grounds for that argument. The generic argument represents the results of this search as the data items articulated and their reasons for relevance. These are considered to be 'nearly' complete knowledge about the possible grounds for that argument. As such they would include general exclusionary reasons as described by Raz (1990) which are often the basis for rebuttals.

Establishing the generic arguments in a domain provides considerable structure for developing arguments. Engisch (1960) observes that 'reaching a conclusion as such gives rise to a minimum of effort; the main difficulty lies in finding premises for it'. We argue that establishing the generic arguments in a domain is an effective part of acquiring, representing, reasoning and providing justification and transparency for decision making.

In our generic argument the Toulmin warrant has been translated to the inference mechanism, the reasons for relevance of the data items and the reasons for the inference mechanism. The Toulmin rebuttal is not explicitly represented but would be captured within this structure as a different instance argument possibly using a different inference mechanism that produces different claim values.

Explicitly representing the inference method enables the use of a variety of inference mechanisms. For example, the method used to infer an assertion in the family law application, Split Up described by Stranieri *et al.* (1999) is a rule for some arguments and a neural network for others. Branting (1994) provides a framework that captures legal reasoning using both rules and exemplars. In his framework, rules and exemplars differ primarily in that exemplars are much less abstract than rules and can be used to provide a bridge between the abstract rule descriptions and the specific case descriptions. A knowledge representation framework that separates the inference method from other components is very flexible. We argue that our argument based approach captures the granularity of reasoning necessary in the most appropriate way by:

- Collectively deciding on a set of generic arguments
- Collectively agreeing on the choice of inference mechanisms
- Allowing actual arguments to be built by instantiating generic arguments. In fact agreeing on the set of values that claims and data items may be drawn from
- Allowing actual arguments to be built that extend the generic set.

Each generic argument has a claim, data items, reasons for why each data item is relevant, the names of the associated inference mechanisms and reasons for their appropriateness. Figure 2 shows a generic argument in greater detail. It consists of: a conjunction of data items or slots each with a reason for its relevance and the backing for this; a choice of inference mechanisms and the reasons for each one of these mechanisms and of course, the claim slot. All data slots act as input to the inference mechanisms. Each inference mechanism in the inference mechanism slot provides a means of reaching a claim value from the input data values. Inference mechanisms may include rule sets, trained neural networks, case-based reasoners or human reasoning. The choice of a particular inference mechanism (other than human inferencing) and the reasons for that inference mechanism provide a reason for arriving at a particular claim value. In the case of human inferencing

there will still be a need to provide a justification for the claim. At the generic argument level this explanation cannot be given.

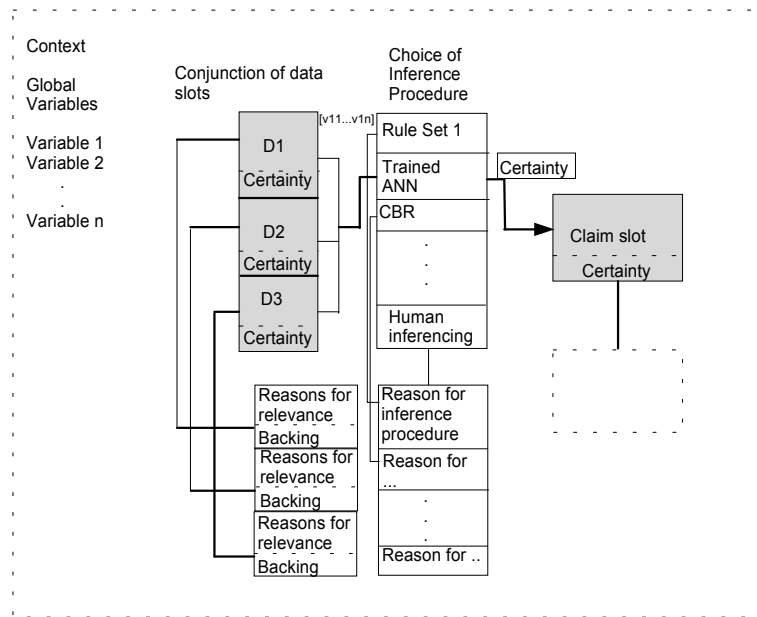


Figure 2: Full representation of a generic argument

Figure 2 also includes *certainty* slots for each data item, claim and inference mechanism. These recognise that there is uncertainty in the processes of developing actual arguments. The certainty values are assigned when values are assigned in the process of constructing an actual argument. A generic argument is an agreed approximation to a world but still may only be partial knowledge. We do not explicitly put a certainty or confidence value on a generic argument although we permit generic arguments to change over time. The structure of generic arguments that describe a domain will not be static. As knowledge within the domain evolves new versions of the generic argument structure will be required. New factors emerge as being relevant to some arguments and new inference mechanisms may be needed as new legal rules emerge or new cases become precedents. Most actual arguments in a domain are then underpinned by a particular version of the generic argument structure.

The knowledge in a domain of discourse can be represented as a tree of these generic arguments with a data item of an argument being the claim of another argument. The generic arguments within a domain can be established by engaging participants in the discussion in the development of the generic argument structure (GAS). The intention is to have participants agree on a structure for reasoning developed from their shared understanding. The open textured nature of many areas of reasoning mitigates against the representation of all arguments in a domain as generic arguments but a large proportion of arguments in many domains can be represented in this way. It is also useful to know when particular actual arguments diverge from instantiations of generic arguments and to detect whether or not they are accepted.

Actual arguments

Actual arguments made are instances of a generic argument where each data slot has a value, an inference mechanism can be chosen and executed to deliver a value for the claim slot. Figure 3 illustrates an actual argument with data values set and the particular inference mechanism selected is human inferencing. With human inferencing there is no reason for the inference mechanism given at the generic level and there is therefore a need to justify the claim value produced by the human inference. This is represented in the diagram as the *claim value reason* slot.

Figure 4 is an instantiated generic argument from Refugee Law where the claim is “The applicant *may have* a chance of harassment due to political opinion”, based on the data items and values given in the diagram¹. The claim value asserted in the Figure “*may have*” needs to be justified and this justification is the claim value reason that is provided at the stage of making an actual argument rather than at the generic argument stage.

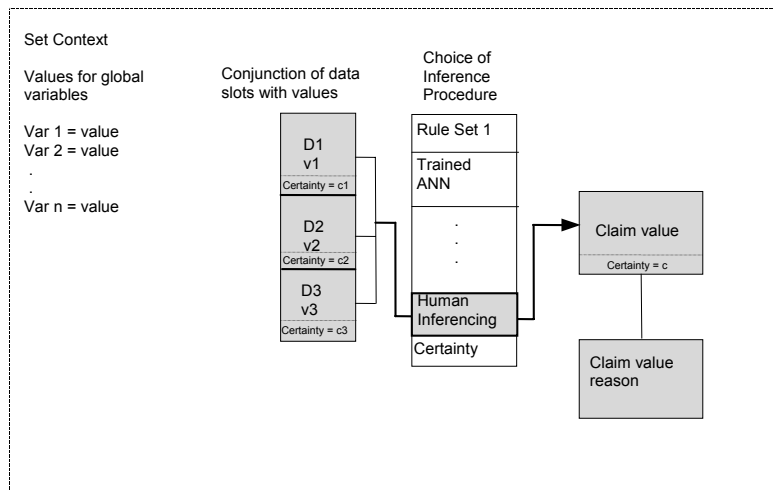


Figure 3: An instance of a generic argument

Situations will arise where an argument needs to be made for which no generic argument exists. In these cases, a new argument specific to that situation is created. Ultimately, the series of actual arguments made in a case is built and represents the full argument in that situation. Some of the arguments are instances of generic arguments, others are newly created.

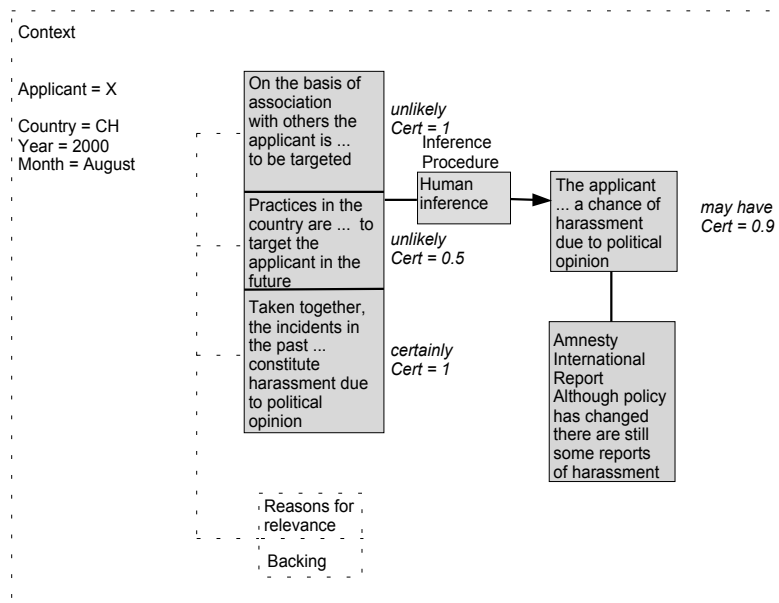


Figure 4: Reasoning from text in an instance argument in Refugee Law

¹The decision maker may have chosen as an inference mechanism, a rule set which contained a rule “If harassment on the basis of association is *unlikely* and practices and policies in the country are *unlikely* to target the applicant then the applicant *may have* a chance of harassment due to political opinion”. The justification for this claim would come from the reasons for the rules in this rule set and its appropriateness for reasoning with this data about this claim. This is what would be called *deductive justification* by MacCormick (1978)

THE DEVELOPMENT OF GENERIC ARGUMENT STRUCTURE IN ONLINE DELIBERATIVE DISCOURSE

How do we move on from the collection of heterogeneously structured documents and comments that make up the discourse provided by electronic media such as news groups or bulletin boards? Many online publications enable readers to respond directly to an article and to have that feedback appear directly below the article in a kind of “threaded discussion” format. A perfect example of this is ZDNet’s Anchordesk. Publications can implement this process as a stand alone feature or they can integrate it with existing discussion boards. CoNote is a computer supported cooperative work system designed to facilitate communication within a group via the use of shared annotations on a set of documents reported by Davis (1995). The central idea underlying CoNote is that shared annotations provide an effective forum for groups whose work involves frequent reference to some set of documents. The key difference is that the documents being annotated provide a context for the group discussions. This context enables people to find relevant discussions more easily. The shared annotations model also provides a more structured forum than tools for shared authoring, because the documents play the role of a (relatively) fixed context for discussions.

Seen this way, shared documents within communities are in many ways the grounds for disagreement or agreement. Documents are the beginning rather than the end of the process of negotiation, providing a shared context for constructing meaning. Huizinga (1972) was particularly critical of the teaching of writing in the United States. Writing was presented to students as the outcome of deliberation whereas, Huizinga maintained, it was really just another part of the deliberative process. This view of the document as a medium or resource for negotiation suggests that one avenue for technological development lies in improving the means for negotiation.

The Generic Argument Structure provides a means for improving negotiation and deliberation. Within the community a GAS provides a constant reminder of the agreed upon, shared understanding and interpretative assumptions. Between communities it provides a public face to the elaboration and explanation as well as the possibility to encourage participation.

The GAS can be developed in two ways. Participants to a dialogue can collectively deliberate on a structure that will suit as the desired normative structure. Alternatively, a social institution can be charged with the advancement and on-going maintenance of a GAS. Once a GAS is developed for the community then discourse using the structure can proceed.

An example of the latter approach can be imagined in a futuristic legal setting. The social institution charged with the maintenance of the GAS would be the Court that has jurisdiction over the subject matter of the discourse. For example, a future Family Court may advance a GAS. All concepts that are relevant for a Family Court judgment and precisely how each relates to others is explicitly represented in the GAS. Claims made by all parties to a dispute are made as actual arguments instantiated from the GAS. In this way, points of divergence can more readily be identified and information systems can more easily be integrated to support reasoning. Ultimately, a Court judgment is also represented as an instantiation of the GAS ensuring a transparency of reasoning that is well beyond current practice.

Discursive communities that have no social institution that can be appropriately charged with the maintenance of a GAS can develop their own GAS. The construction of the generic argument structure can be carried out through structured dialogue between GAAMtalk (a web version of our argumentation tool) and participants. The basis of this structured dialogue is the repeated use of a meta generic argument structure. The final GAS developed will be the one that has the strongest arguments in its favour. It sets the structure of reasoning and debate for the community on the particular matter for deliberation. A step toward Afshar *et al.* (2002) describes Consult, a system that enables a community to engage in a Delphi-like communication and a Borda preferendum vote in order to agree on a generic argument structure.

The meta generic arguments are:

1. The top level generic argument claim is: <PREFIX><VALUE><SUFFIX> {is/ is not} the top level claim. At this stage <VALUE> is left unspecified.
2. <VALUE SET> {is/ is not} the agreed set of values for the top level claim.
3. <PREFIX><VALUE><SUFFIX> {is/ is not} a data item for the claim.
4. <REASON FOR RELEVANCE> {is/ is not} a reason for the relevance of the data item.
5. <BACKING> {is/ is not} is the backing for the <REASON FOR RELEVANCE>.

These can be organised into a tree with the top level claim that the GAS that emerges is the currently agreed GAS for the discourse. Each of the above meta generic arguments then acts as grounds for this top level claim. The subject of Argument 1 is moved, seconded and voted upon. Once the generic form of the top level claim is established the grounds on which such a claim will be made are adduced. “<PREFIX><VALUE><SUFFIX> {is/ is not} a data item for the claim”, has to be moved and seconded. The support for the data item is then measured. In the case that the support is judged to be sufficient then the reasons supporting the claim (a document) are stored as <REASON FOR RELEVANCE>. <BACKING> is then dealt with in a similar fashion and then the discourse will move onto the next grounds or data item in turn. The appropriate meta generic arguments are iteratively applied until there is agreement not to go any further.

The collaborative development of the generic structure provides a framework for the development of actual arguments. It involved the contribution of reasons (these are attached as documents) as to why data items are relevant and participants are now in a position to construct their actual arguments. The structure can be displayed as a tree in one of the Windows of GAAMtalk and the contents of each node displayed as each node is traversed.

Once a generic argument structure has been established, participants can start to use the structure to develop their actual arguments. For a participant to develop their own argument, they can build an actual argument tree in another window of GAAMtalk by selecting nodes from the generic tree and selecting a value to complete the claim from the set of values in that generic argument. Reasons for the particular claim value need to be given at this stage². These are attached as documents supporting the particular claim value used. GAAMtalk allows one participant's argument tree to be compared with another. It also uses an algorithm developed by Yearwood *et al.* (1999) to draft a document for each participant from their argument tree that sets out their argument as a structured document in XML. There is a tight coupling between the XML and the argument tree so that text in the document can be identified with the corresponding argument component. Participants' arguments for their particular points of view can be compared either in a document view or in an argument tree view.

Points of diversion identified between participants' arguments can be discussed by focusing on the particular issue (whether it be a claim value reason or a new data item)³. Once these points of disagreement are identified the strength of each argument can be gauged. As with the generic argument tree the strength of an argument is established by a simple voting system. Fox and Krause (1992) argue that a simple function for computing the merit of an argument simply determines the proportion of supporting arguments in the total set of arguments (see Fox, 1991) and although we think of arguments as having different degrees of force this is still an effective means of capturing the merit of an argument.

CONCLUSION

We have presented a conceptual system for the support of deliberative reasoning within on-line communities that has been partially implemented. The system separates the reasoning into two parts by first involving participants in the development and agreement on the basic structure of reasoning that will be used and then allows the development of individual points

²GAAMtalk does not invoke inferences as the construction of the generic tree did not involve the development of inference mechanisms.

³Reasons for relevance and backings would, of course lead back to discussion of the generic tree and would require strong support for returning to those structure considerations.

of view within this framework. It permits both a visual annotated structure for the representation of views as well as a document representation.

The quality of the discussions developed whilst using such a web-based application needs to be investigated but we conclude by proposing that:

- The argumentation frame is a practical way to represent arguments
- Establishing the generic arguments in a domain can be done by dialogue with participants
- Establishing the generic arguments in a domain engages the participants in structuring and setting the terms of deliberation
- Participant actual arguments are either instance of the generic or new arguments
- The ability to add and delete data items and select inference mechanisms allows the exercise of discretion
- The choice of viewing a participant's argument either as a graph or an XML document helps focus on common points and recognize points of departure
- The dialogue needed to impartially run a discussion can be automated by control structures that iteratively implement the meta generic arguments outlined above.

Returning to the questions raised in the introduction. The framework and web application presented need to be tested in order to assess whether they are effective in supporting meaningful debate and produce better governed online communities. A detailed evaluation program is being formulated that will focus on validity and verifiability, usability and social benefit and impact.

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