ISSA Proceedings 1998 – Reconstruction Games: Assessing The Resources For Managing Collective Argumentation In Groupware Technology

Advances in new information technology has brought computerization to bear on practices of argumentation in organizations thus providing a range of new alternatives for improved handling of disputes and decisions (Aakhus, 1997; Baecker, Grudin, Buxton, and Greenburg, 1995; Ngyemyama and Lyytinen, 1997; Nunamaker, Dennis, Valacich, Vogel, and George, 1991; Poole and DeSanctis, 1992). Many of these technologies, called "groupware," are systems explicitly designed to intervene on discourse and manage it by supplying resources that help communicators overcome obstacles to resolving or managing their disputes and decisions. In designing and deploying groupware, members of the industry practice "normative pragmatics" (van Eemeren, Grootendorst, Jackson, and Jacobs, 1993) since they grapple with the problem of reconciling normative and descriptive insights about disputing and decision- making in order to effectively manage it. In particular, they must deal with a critical puzzle for argumentation theory and practice (and for groupware design). That is, how to develop procedures that further the resolution of a dispute while remaining acceptable to the discussants and that apply to all speech acts performed in order resolve the dispute (van Eemeren & Grootendorst, 1984, p. 17).

The purpose here is to show how practical solutions to this analytic puzzle found in groupware reveal implicit theories of argument reconstruction. Implicit theories yet to receive descriptive or critical attention. This is accomplished by conceptualizing groupware products as models of "reconstruction games" that when implemented constitute particular forms of talk through which parties address a dispute or decision.

1. Groupware

Groupware products are designed for a wide range of human activity that involves argument relevant activities such as scheduling, strategic planning, design, group-writing, and negotiation. Groupware is defined by Peter and Trudy Johnson-Lenz as "intentional group processes and procedures to achieve specific purposes plus software tools designed to support and facilitate the group's work" (Hiltz and Turoff, 1992, p. 69). The enduring novelty of groupware lies in (1) the capacity of the tools to allow large groups of people to come together across time and geographic location and in (2) how the nature of the medium might solve standard problems of collaborative decision-making such as information sharing, cooperative action, authority, and errors of collective judgement (Johansen, 1988; Sproull & Keisler, 1991; Turoff & Hiltz, 1978).

Advances in networked computing are leading to a proliferation of groupware products that are increasingly difficult for users, designers, and researchers to classify, assess, and choose. Indeed, what are groupware products supposed to do? It is generally understood that groupware aids decision relevant communication (DeSanctis & Gallupe, 1987). Yet, existing approaches for classifying and assessing groupware do not adequately address the communicative purposes of groupware design. For instance, the most common way proposed to understand groupware is in terms of how the tool supports interaction across time and geographic location (Johansen, 1988). The trade literature, moreover, focuses on the technical compatibility of groupware products within existing technological infrastructures (Price Waterhouse, 1997).

An alternative way to understand groupware proposed here is to conceptualize it as a tool for constructing particular contexts of argumentative discourse. To develop this perspective, groupware products will be distinguished in terms of their model for reconstructing a dispute or decision into argumentative discourse. It is first necessary, however, to outline the complexities of common circumstances for which groupware products are designed and implemented and then to conceptualize groupware in terms of resources for constructing forums of argumentation.

2. Managing Disagreement

The decision-making circumstances for which groupware products are designed and implemented involve small to large groups of participants engaging in activities such as strategic planning, design, negotiation, and policy-making. Deliberation is a key purpose of these activities since the activity involves determining a prudent course of action more than, say, establishing the truth or

falsity of any particular claim (Walton, 1992). Deliberation is a socially and intellectually complex activities for at least three reasons.

First, the complexity of deliberative activities occur because collective choices must be made under conditions where it is difficult to know what the consequences of any particular choice will be or whether current preferences for what counts as a good choice will hold in the future (March, 1979; March, 1994). Indeed, arguing about consequences as a way of determining what-to-do is a feature of deliberative discourse (Walton, 1992).

Second, deliberation becomes "wicked" when there are numerous participants who variably leave and enter the decision-making and when there is no definitive statement of the problem itself (Conklin & Weil, 1998; March and Olsen, 1979; Meader & Weick, 1993; Shum, MacLean, Bellotti, & Hammond, 1997). A great deal of argumentation in deliberative circumstances is over what is and is not arguable and who can and can not make arguments.

Third, deliberation depends on plausible reasoning where participants make and grant assumptions for the sake of moving the discussion forward (Kyburg, 1991; Walton, 1992). This means that conclusions and chains of arguments are based on defeasible reasons that change when better knowledge becomes available, thus shifting the grounds for accepted conclusions and lines of argument. How it is possible for decision-making to successfully go forward, despite the uncertainty of claims, incomplete knowledge, goal ambiguity, and instability in preferences, depends on the capacity of the participants to manage the "disagreement space" around a dispute or decision and to construct viable standpoints to pursue in developing a prudent course of collective action.

A disagreement space is the "structured set of opportunities for argument" defined by the "indefinitely large and complex set of beliefs, wants, and intentions" that interactional partners can reconstruct from what has been said or project in saying something (van Eemeren et al., 1993, p. 95). How "disagreement space" is reconstructed is critical to how a dispute or decision is collectively pursued. A dispute or decision, for instance, can escalate beyond the control of the participants or de-escalate to the point of no interaction depending on how the participants reconstruct opportunities for argument from the pragmatic circumstances of the dispute or decision (van Eemeren et al., 1993; Jacobs and Jackson, 1992; Jacobs, Jackson, Stearns, & Hall, 1991). What a resolution to a dispute or decision is, what is learned by the participants, and what is established as grounds for future action, depends on how disagreements relative to a dispute

or decision are handled. It is quite useful then to see groupware in terms of what argumentative resources it supplies for participants to reconstruct a dispute or decision into a manageable disagreement space on which collective argumentation proceeds.

3. Reconstruction Games

Attention has only recently turned to understanding how groupware is constitutive of communicative activity like argumentation (Meader & Weick, 1993; Ngyemyama and Lyytinen, 1997; Orlikowsiki, 1992; Poole and DeSanctis, 1992).

In particular, how groupware helps parties to a dispute or decision understand and shape the decision or dispute in which they are engaged is only beginning to be understood (Aakhus, 1997).

Groupware products can be usefully conceptualized as special instances of rules of argumentative conduct for reconstructing disputes and decisions into particular forms of argumentative dialogue. Groupware products are "designs for discourse" because they reconcile normative and descriptive assumptions about argumentative discourse (Aakhus, Madison, & Jackson, 1996). Groupware represents a set of design choices made about how participant expressions, beliefs, sentiments, and habits ought to be transformed into a particular type of disagreement space and thus opportunities to pursue the resolution or management of a dispute or decision. The affordances of a groupware product design invites parties to treat disputes and decisions as particular kinds of argumentative activity by supplying means to distribute turns and allocate types of turns and means to elaborate and extinguish lines of collective reasoning.

Moreover, the tools set up preferences for the type of argumentative roles available to the participants relative to what is said and what is projected and inferred from what is said. The activity which participants orchestrate via the groupware produces the grounds for further activity and outlines a framework of participation for that provides a "working consensus" for engaging in the dispute or decision (Goffman, 1959; Goffman, 1981). A framework from which the reasonableness of individual and collective activity is judged and sanctioned (Heritage, 1984). Groupware is not a dialogue game in Walton's (1992) sense but the materials and practical theory for reconstructing the context of a dispute or decision into various forms of argumentative activity.

The design features of groupware products idealize particular forms of

argumentative activity that make some moves for solving a dispute or decision more reasonable than others. Reasonableness depends not only on the content of a contribution but on the form and timing of the move relative to the activity. How a decision is made or dispute resolved is as important as what is concluded. What counts as rational is located in the procedures for formulating contributions, taking-turns, and assessing contributions. The complexity of the deliberative circumstances where groupware is implemented makes the form of the activity taken to handle a dispute or decision a special warrant for the rationality of collective action and conclusions generated through the activity. How does groupware contribute to the resolution and management of disputes and decisions?

First, groupware supplies categories and procedures that, for instance, enable parties to organize standpoints, elaborate and extinguish lines of argument over a standpoint, and manage impasse to foster progress. The groupware product provides answers and routines for organizing talk. Second, groupware products have a systemic rationality (March, 1988) that explains how to organize interaction as well as justify the reasonableness of the outcomes of activity based on the groupware design. Groupware products not only supply material resources for shaping a disagreement space but a rationale for shaping it in particular ways. This will be illustrated by describing classes of reconstruction games modeled in groupware products.

Table 1 Reconstruction Games

Reconstruction Game	Purpose	Orchestration	Systemic Rationality
Issue Networking	Form a web of issues and relevant positions on issues	Clash of claims	Self-correction of claims and lines of argument
Funneling	Consensus Formation	Flow of argumentation toward an acceptable conclusion	Activity establishes commitment to put proposals into action
Repertoire	Create a knowledge base for action	Pooling and refining expertise	The best available expertise computes to answer questions posed by those who need an answer

Three classes of reconstruction games have been identified thus far in groupware products. These are summarized in *Table 1* relative to the purpose of the game, its basic model for orchestrating interaction, and its systemic rationality. Purpose refers to the aim of reconstructing a dispute or decision. Orchestration refers to how relevant argumentative activity is structured. Systemic rationality refers to how argumentative activity warrants the outcome of the activity.

4. Issue Networking

"Issue-Networking" is one type of reconstruction modeled in groupware that is closely aligned with the critical discussion model of pragma-dialectics. This model idealizes participation in argumentation as a series of moves by participants to identify and connect issues while developing pro and con standpoints relative to any issue.

Progress towards a resolution is a matter of optimizing disagreement through the clash of claims. The groupware tools help participants orchestrate their interaction by providing structures intended to optimize the clash of claims so that lines of argumentation unfold to reveal areas of agreement and disagreement, unarticulated issues, and relevant relationships among issues. These groupware products supply means for participants to label their turns as a particular type of contribution to a decision or dispute and to indicate whether a participant is making a new contribution or responding to previous turns. By participating in the mode prescribed by the groupware tool, the groupware product can create a representation of the interaction as argumentation. Through the groupware tool the participants can see how their interaction unfolds as lines of argumentation, how particular turns contribute to a line of argument, and how a context of issues and claims forms around conclusions from the unfolding clash of claims in a discussion.

Groupware products that reflect the issue-networking model are found in web-based conferencing systems such as HyperNews and OpenMeeting. These systems supply basic turn types for participants to take up in dealing with a decision or dispute.

HyperNews, produced at the National Center for Supercomputing Applications, allows participants to indicate whether their contribution to the discussion is a new idea, an agreement, a disagreement, a clarification, or relevant documentation (HyperNews, 1998; LaLiberte & Woolley, 1997; LaLiberte, 1997).

OpenMeeting, produced at Massachusetts Institute of Technology and used in U.S. government's National Performance Review, provides additional labels for actions taken and alternative proposals (Hurwitz & Mallery, 1998). The participants can identify the type of action they take in contributing to the decision or dispute while the groupware creates a record of the argument as a network of issues. The labeling and outlining provide means for coordinating lines of disagreement and keeping the line of argument taken up relevant.

Questmap is part of a commercially available groupware product made by the Softbicycle Company that is a good example of a tool for orchestrating discourse as an issue-networking game (QuestMap, 1998). It is similar, in principle, to OpenMeeting and HyperNews but is tailored to both synchronous and asynchronous meetings. QuestMap, in addition, uses a graphical representation of discourse as argument and it is based on the IBIS model of capturing design rationales (Conklin, 1998; Conklin & Weil, 1997; Yankemovic & Conklin, 1990).

The materials for orchestrating talk into argumentation are as follows. The primary screen that each user views produces a graphical representation of the dispute or decision that provides the fundamental turn types in QuestMap. Turn are identified with icons that mark issues as question marks, arguments as lightbulbs, and reasons as a plus or minus sign indicating pro or con.

Through the screen, the participants can “click” on any icon representing part of the developing argumentation in order for the participant to add or extend issues, arguments, or reasons. The fundamental turn types that are made available to participants through QuestMap include posing a question, posing an idea that is an answer to the question, and posing pro or con positions to ideas offered by others. It is expected that a question, or issue, must be stated as a real question, not one that presupposes its own answer, and that an idea is an assertion that can be argued (Conklin, 1998).

There can be an unlimited number of ideas in response to a question. For each idea, participants can present a pro or con argument. These basic turn-types built into the software increase participant opportunities to expand the argumentation around a choice. QuestMap also allows participants to signal that a decision has been made on an issue and allows participants to signal that they accept an assertion without contributing further to the discussion.

Groupware products that enable participants to reconstruct their decision or dispute as a network of issues reflect commitments to critical discussion, such as outlined by pragma-dialectics, since participation is not limited in terms of raising doubts and new issues. Issue-networking style groupware focus participation on the development of discussion threads for the benefit of the group and the individuals. The tools emphasize opening up lines of argumentation as opposed to closing or limiting lines of argumentation. The tools maximize opportunities for participants to develop issues and scrutinize the claims of others. Exploration of the disagreement space is not limited since all claims can be challenged, the clash of claims is open to the scrutiny of the participants, and any participant can contribute to the development of a line of argument.

Moreover, the resolution of any issue is a product of exhausting lines of argument around the issue. The rationality of issue-networking style groupware is vested in two levels of scrutiny. First, all participants can contribute to and examine the micro-exchange of assertions in response to an issue because these types of tools attempt to focus clash and the development of lines of argumentation. The pursuit of issues and claims, however, is left to the control of the participants developing

issues and scrutinizing what others have said. Second, the macro development of the issue network is open to correction as new facts, knowledge, interpretations, and circumstances emerge because these tools allow participants to examine the rationale behind an existing conclusion when that conclusion becomes part of another decision. The product of the micro exchange is an emergent collective representation of the dispute or decision space that forms improved grounds for current and future individual and collective action.

These tools treat disputes and decisions as contexts for individual and collective learning since the tools emphasize the capacity of individuals to explore and develop better positions on issues more than settling an issue by closing discussion on it. Issue-networking tools warrant conclusions reached and actions taken because issue-networking, in principle, aims to reconstruct argumentative activity that exhausts the production and critique of claims made to resolve issues in a dispute or decision.

The general design of issue-networking tools emphasizes the exploration of issues and the capacity to adjust lines of argument before and after decisions. These strengths reveal two areas for developing and implementing the models of reconstruction in these types of tools. These two weaknesses stem from the fact that scrutiny over argumentation and the development of an issue network is left to the common sense and tastes of the participants. First, the argumentative interaction in these settings is subject to drift (March & Olsen, 1976).

This means, for instance, that argumentative attention and activity may develop lines of argument that draw attention to features of the dispute or decision that are later found to be irrelevant or irresolvable. It also means that the mode of decision-making misses the point of what people are trying to argue such as when argument over face and identity is treated as a digression rather than material to the multiple goals involved in resolution of a choice (see van Eemeren et al., 1994 and Jacobs et al., 1991).

Issue-networking tools provide categories and procedures for treating discussion as a clash of claims but no categories and procedures to draw participant attention to sources of micro-level digression and macro-level drift in the development of the issue network. Certainly, some sort of fallacy recognition would be useful. How to do this is a complex matter since the design of the groupware must remain elegant. The OpenMeeting system, for instance, provides for a moderator role where particular people screen the quality and relevance of a

contribution before it is made available to the rest of the participants. There is also the possibility that participants could be assigned particular roles such as critic or evaluator to help foster discussion (Sillance, 1994). Another approach is to focus on the types of turns people take rather than assigning particular roles. This leads to the other area for development of issue-networking tools.

Second, labeling how a turn contributes to an argumentative discussion is roblematic. Assuming that labeling a speech act is a valid means to signal argumentative intent and to create interactional coherence, then the types of labels offered matter a great deal. The issue, claim, and pro/con labels are obviously just one avenue for construing argumentative interaction. There could be other arrays of choices for labeling that indicate, for instance, whether a participant is attacking grounds or warrants. Moreover, participant might be allowed to tag other comments as a type of fallacy to check and to build repertoires of practical reasoning problems. Offering more labels for turn taking, however, seems to overcomplicate the technology and may be an inadequate assumption about how communicators interpret messages. An alternative is available in POLIS which is a groupware tool to support on-line learning (POLIS, 1996). Some POLIS tools require participants to formulate a stance relative to an expert opinion or popularly held opinion. Thus, the procedures for turn-taking presuppose clash and provide the grounds against which to argue. Such an approach makes it possible for participants to engage taken for granted assumptions developing in the issue network without taking on the burden of appropriately labeling their action.

"Funneling" is another type of reconstruction modeled in groupware. These groupware tools help parties to a decision or dispute orchestrate their interaction by providing structures that solve problems collectives encounter in making progress toward a conclusion, such as participant willingness to disclose new ideas or to evaluate the ideas of others (Nunamaker et al., 1991). Groupware that models a funneling reconstruction game provides means for participants to orchestrate their interaction so their joint activity manufactures a consensus that settles their decision or dispute. Decisions and disputes are reconstructed through the tools as a sequence of collective activities that successively narrow a dispute or decision toward the most acceptable conclusion. Argumentation is idealized as a means for formulating a proposal that the collective is willing to back. The funneling game departs from the critical discussion ideal modeled in pragma-dialectics due to its emphasis on settlement but shares a commitment to

viewing argumentation as a preferred sequence of activities that in turn prefer particular speech acts.

The groupware products that most typically reflect a funneling model are group decision support systems (GDSS). GDSS are traditionally deployed in meeting room settings but more recently GDSS style groupware products have debuted as web-based tools. GDSS tools provide an interface that outlines how parties should exchange messages when handling their dispute or decision (Aakhus, 1997a). Screens generally function as a means to capture messages, to access and retrieve stored messages, or to manufacture new messages. Each GDSS varies in how these functions are performed but typically each GDSS has at least one tool enabling participants to orchestrate their interaction into activities focused on gathering intelligence, design alternative courses of action, and evaluate and choose a course of action. Because GDSS design treats argumentation as a sequence of activities that encourage collective opinion to converge on a conclusion, the specific tools offered in GDSS systems are usefully arrayed along the phases of sequential decision-making models. Table 1 uses Simon's (1960) decision processing model to display the tools available in some GDSS groupware products. The rows show tools from GDSS products relative to phases in the sequential model. GDSS tools can obviously be used for a variety of functions but are entered into this table in terms of the tools primary purpose.

Each category in Table 2 displays various GDSS tools for orchestrating a dispute or decision. Reconstruction modeled in GDSS differs from issue-networking in that the GDSS does not highlight the micro-clash of claims. Instead, GDSS focus on managing the flow and transition of argumentation from one phase to the next, channeling interaction towards settlement. GDSS tools orient toward collecting and managing expressions of opinions and then manufacturing individual comments into a collective statement (Aakhus, 1997b). The clash of individual claims becomes important when it draws out more opinions for the group to collectively sort and evaluate.

First, tools for gathering intelligence, such as "brainstorming" tools, focus on capturing participant comments by encouraging participants to say whatever is on their mind so that no possible idea is left out. Intelligence gathering tools collect all ideas participants have about a topic or issue into a massive pool of messages. These messages provide the materials on which the group will construct its decision. After using these tools, the dispute or decision is, in a

sense, contained in the pool of messages the participants generate, as is the solution. The relevant next activity is to search and order the pool of messages to find the solution.
Second, tools for designing and creating alternatives, such as, “organizer” or “categorizer” allow participants to breakdown the pool of messages into representative, mutually exclusive categories.
These categorizing tools enable participants to reduce the mass of messages and thus organize a collective search for an answer to the decision or dispute. Once the pool of messages is categorized, the participants can organize and assess the categories or create categories of categories to aid their search for an answer. Categorizing is a form of critique of what is said since categorizing puts a particular order to contributed messages.
Third, tools for evaluating alternatives, such as “prioritize” and “rank,” provide means for participants to jointly critique and foster progress toward a conclusion. The tools typically allow participants to compare and assess across categories of messages in order to determine which categories are better or worse. The voting tools are means to represent the underlying attitudes of the group. Some voting tools, such as in GroupSystems, report levels of consensus among the individual rankings or ratings of the participants. Vote results and consensus measures enable participants to formulate the collective will and point to more and less obvious lines of action. The voting tools might be used; for example, to identify which categories participants will give more attention in a discussion or to choose an alternative.

The rationality of groupware products that enable participants to reconstruct their decision or dispute as a funneling game is found in how the tools enable the manufacturing of both collective opinion and collective will. GDSS tools enable parties to orchestrate their interaction in a way to find the most acceptable proposal or solution for a decision or dispute. The funneling game enables participants to balance demands for efficiency, wide-spread participation, and collective reflection. Participation proceeds by jointly constructing a pool of messages, jointly organizing and reducing the pool of messages, and finally jointly developing criteria and evaluating messages and categories using those criteria.

Table 2 GDSS by Sequential Decision-Making Phase

The emphasis on formulating consensus is quite visible in how the style of the tools orients the argumentative work of the participants on constructing the boundaries for argument in their dispute or decision. The clash of claims is not part of the structure of the tools. Instead, the boundaries constructed through joint construction of a message pool, categories, and criteria outline a set of commitments for explaining and justifying future action, especially in the face of doubts or threats. Voting, for instance, is a means for displaying collective sentiment toward an action. Measurements of consensus do not justify the merits of a claim or proposal as much as allow a group to scrutinize its collective will to do or believe something.

The strength of groupware modeling a funneling game is its capacity to manage the flow of argumentative activity and foster movement toward a collective conclusion. This capacity rests in important ways on how the tools separate individual arguers from the claims and critiques they offer and a focus on producing meta-information to represent decision-making.

First, the tools separate the arguer from claim so that the claim stands as an idea of its own for the examination of others. Treating messages as units of information that can be stripped from sequences of activity and transferred to other categories or activities compounds this separation.

While separating arguments from arguers relieves interaction from some causes of conflict escalation, a potential consequence is that reconstruction through these tools orchestrates practical argument as a search for the truth of assertions while missing other relevant modes of organization around rights, obligations, and interests. Furthermore, the principle of separation may appear to contribute to the search for true assertions, while the methods of reconstruction actually treat argument as an ironic form of information management where decision-making progress is based solely on the perceived value of gathering and organizing information (Aakhus, 1997).

Second, argumentation progress is based on creating meta-representations of what the group has said. Reducing a mass of messages entails a loss of

information value so what is gained and lost in reduction is critical. Categorizing allows for easier management and navigation through the mass of messages but those gains do not mean that issues in the decision or dispute are resolved or clarified. Voting summarizes opinions but it is not a means of creating a clash of competing claims. It is a means for representing the willingness to believe or act on some claim. GDSS tools carry the capacity to create more abstract, high level views of a dispute or decision while glossing over the details.

6. Reputation

Experts-exchange (1998) is a novel form of groupware that points to a potentially new category of reconstruction game that allows participants to orchestrate their interaction as a form of expert inquiry. Experts-exchange allows participants to create a space where users can pose and answer questions and sort out the best questions and best answers. This particular groupware product idealizes argumentation as advice giving through questions and answers while giving the non-expert leverage to hold candidate experts accountable.

The groupware product provides the following structures for interaction. People seeking advice can pose questions to candidate experts but in order to participate the question-asker must be willing to award points for the best answer. It costs to ask questions, so there is incentive for the question asker to ask good questions. Candidate respondents can earn the points offered by the asker if they supply the best answer as judged by the question-asker. It is through the continued participation in this activity, participants can collectively, though individually figure out how to take action to solve problems. The model of argumentation links knowledge and action at two levels. At the micro level the asker gets answers to questions. The answers are formulated by knowledgeable people and tailored to the specific question. At the global level, a number of collective benefits accrue from the micro exchange of questions and answers. First, a pool of experts develops based on their ability to successfully answer questions. Second, pool of assessed and rated answers to questions develops. Third, there is a general selectivity of question asking since there is cost to asking questions.

The reputation game modeled in experts-exchange is novel because it does not rest scrutiny over argumentation in pro-con exchange nor as a series of activities leading to a collective conclusion. Instead, it treats argumentation as the growth of knowledge relevant to taking action. The economy of interaction on which it is based connects the micro exchange of question and answers with the growth of

collective knowledge about problems and issues. By putting reputations at stake, action in argumentative activity is focused on determining who provides the best answers to the questions people have about what action to take. The rationality of the system is vested in keeping individuals tied to their contributions so that people do not become separated from their ideas. Scrutiny over argumentation is based in the way an expert's answer must be accountable to the question asker. The ability to build a reputation as an expert depends on how well a candidate expert formulates an answer that solves the posed problem and that can be understood by the question asker. The structure of activity transfers the burden of translating expertise for non-experts to the expert since the competition lies in providing answers not in questioners forming a queue behind the most notorious expert.

7. Conclusion

This paper prepares the ground for further investigation of how models of argumentation and rationality are institutionalized in procedures, practices, and practical theories of technology, organization, and professional practice. What we see in groupware products are "reconstruction games" for orchestrating disputes and decisions into particular forms of argumentative activity. As such, groupware products are instantiations of practical theories about how argumentation can be used to manage disputes and decisions. These theories reconcile descriptions about how argument works and how it ought to work in practical circumstances. Choosing among groupware products or designing a groupware product, then, is a choice about what counts as good argumentative activity to handle decision or disputes as much as it is a choice about the technical feasibility of a product. We are only beginning to understand how to assess argumentative practice when the assumptions behind theoretical ideals do not hold (Aakhus, 1995a; 1995b; van Eemeren et al., 1993).

The need to assess groupware, and other means for constructing communication forums, points to the further need to refine argumentation theory to cope with orchestration practices and the systemic rationality of communication forums. There is a need to theorize the role of "procedural heuristics." That is, how models of argumentation are selected and put into play by individuals and organizations, how those models transform ordinary modes of disputing and decision-making into new modes, and how the models have consequences for collective action and knowledge.

The preceding description of groupware as models for reconstructing argumentative discourse, for instance, suggests the existence of a significant population of argumentation models that lie somewhere between theoretical and naïve models of argumentation. We see in the design of groupware products how the product focuses on making deliberative discourse possible while leaving the substance of critique and resolution of claims to the common sense of the participants. Certainly, this helps keep the procedures usable and less invasive for users but generally neglects how computing tools might enhance collective reasoning beyond simply breaking down the barriers of expression. For instance, there is little in the way of procedures that allow for specialized roles or the tagging and collecting of decision biases and fallacies in collective reasoning (see Sillance, 1994). Whether and how to include such procedures, however, points to the multiple levels of assessment required in developing argumentative procedures and constructing forums for managing argument. The next steps should consider how argumentative models articulate with social contexts and how types of argumentative activity are forms of collective identity. The validity of a set of procedures depends on whether it works and whether people use it as intended.

REFERENCES

Aakhus, M. (1995a). The rational consequences of argumentation management. In F. van Eemeren, R. Grootendorst, J. A. Blair, C. A. Willard (eds.), *Proceedings of the Third ISSA Conference on Argumentation* (pp. 593-605). Amsterdam: International Centre for the Study of Argumentation.

Aakhus, M. (1995b). When old social technologies meet modern problems: Science Court as a model for managing expert disagreement. In S. Jackson (Ed.), *Argument and Values: Proceedings of the Ninth SCA/AFA Conference on Argumentation.* Annandale, VA: Speech Communication Association.

Aakhus, M. (1997a). *The communication logics of computer-supported facilitative inerventions: A study of the community of practice and social technologies surrounding the use of group decision support systems in process facilitation.* Unpublished doctoral dissertation, University of Arizona, Tucson.

Aakhus, M. (August, 1997b). *Settlement on the electronic frontier: The use of group decision support systems in argumentation management*. Presented at the 10th annual NCA/AFA conference on argumentation, Alta, UT.

Aakhus, M., Madison, C., and Jackson, S. (1996, May). *Discourse design and the design of discourse. Presented at the International Communication Association*

annual convention, Chicago, IL.
Baecker, R., Grudin, J., Buxton, W., & Greenberg, S. (1995). Groupware and computer supported cooperative work. In R. Baecker, J. Grudin, W. Buxton, and S. Greenberg (Eds.), *Readings in Human Computer Interaction: Towards the year 2000* (pp. 741-754). San Francisco: Morgan Kaufman Publishers, Inc.
Conklin, J. *The IBIS manual: A short course in IBIS methodology*. [Online], 18 pages. www.gdss.com/IBIS.htm [April, 1998].
Conklin, J. & Weil, W. *Wicked problems: Naming the pain in organizations*. [Online] 10 pages. www.3m.com/mee...etwork/readingroom/gdss_wicked.html [March, 1998].
Council [Computer Software]. (1998). San Francisco, CA: CoVision, Inc.
DeSanctis, G. & Gallupe, B. (1987). A foundation for the study of group decision support systems. *Management Science*, 33(5), 589-609.
Eemeren, F. H. van, Grootendorst, R., Jackson, S. & Jacobs, S. (1993). *Reconstructing argumentative discourse*. Tuscaloosa, AL: University of Alabama Press.
Eemeren, F. H. van & Grootendorst, R. (1984). *Speech acts in argumentative discussions: A theoretical model for the analysis of discussion directed towards solving conflicts of opinion.* Dordecht, Cinnaminson: Foris/Berlin: Mouton de Gruyter. PDA1.
Experts-Exchange. About experts exchange. [Online], 1 page. www.experts-exchange.com/info/geninfo.htm [May, 1998].
Goffman, E. (1959). *Presentation of self in everyday life*. New York: Anchor Books.
Goffman, E. (1981). *Forms of talk*. Philadelphia: University of Pennsylvania Press.
GroupSystems [Computer Software]. (1998). Tucson, AZ: Ventana Corporation. Available: http://www.ventana.com
Heritage, J. (1984). *Garfinkel and Ethnomethdology*. Cambridge: Polity.
Hiltz, S. R. & Turoff, M. (1992). Virtual meetings. In R. Bostrom, R. Watson, & S. Kinney (Eds.), *Computer augmented teamwork: A guided tour* (pp. 67-84). New York: Van Nostrand Rheinhold.
Hurwitz, R. & Mallery, J. *The open meeting: A web-based system for conferencing and collaboration.* [Online], 22 pages.
www.w3.org/Conferences/WWW4/Papers2/349 [May, 1998].
HyperNews [Computer Software]. (1998). Urbana, IL: National Center for Supercomputing Applications.
Jacobs, S., Jackson, S., Stearns, S. & Hall, B. (1991). Digressions in argumentative discourse: Multiple goals, standing concerns, and implicatures. In K. Tracy (Ed.),

Understanding face-to-face interaction (pp. 43-62). Hillsdale, NJ: Lawrence Erlbaum Associates.
Jacobs, S. & Jackson, S. (1992). Relevance and digressions in argumentative discussion: A pragmatic approach. *Argumentation*, 6, 161-176.
Johansen, R. (1989). *Groupware: Computer support for business teams*. New York: Free Press.
k.net [Computer Software]. (1998). Austin, TX: Milagro, Inc. Available: http://milagro.austin.tx.us/k.net/building.html
Kyburg, H. (1991). Normative and descriptive ideals. In R. Cummins & J. Pollock (eds.), *Philosophy and AI: Essays at the interface* (pp. 129-139).
LaLiberte, D. *What is HyperNews?* [Online], 5 pages.
www.hypernews.org/HyperNews/get/hypernews/about.html [May, 1998].
LaLiberte, D. & Woolley, D. (1997, May). *Presentation features of text-based conferencing systems on the WWW*. CMC Magazine [Online], 11 pages. www.december.com/cmc/mag/1997/may/lalib.html [September, 1997].
March, J. & Olsen, J. (1979). *Ambiguity and choice in organizations.* Bergen: Universitetsforlaget.
March, J. (1988). *Decisions and Organizations*. Oxford: Basil Blackwell.
March, J. (1994). A primer on decision-making: How decisions happen. New York: Free Press.
Meader, D. & Weick, K. (1993). Sensemaking and group support systems. In L. Jessup & J. Valacich (eds.), *Group support systems: New perspectives.* New York: MacMillan.
MeetingWorks [Computer Software]. (1998). Enterprise Solutions: Authors. Available: http://www.bbentsol/comprod/at_work/index. html
Ngwenyama, O. & Lyytinen, K. (1997). Groupware environments as action constitutive resources: A social framework for analyzing groupware technologies. Computer Supported Cooperative Work: The Journal of Collaborative Computing, 6, 71-93.
Nunamaker, J., Dennis, A., Valacich, J., Vogel, D. & George, J. (1991). Electronic meetings to support group work. *Communications of the ACM*, 34(7), 40-61.
Orlikowski, W. (1992). The duality of technology: Rethinking the concept of technology in organizations. *Organizations*, 3(3), 398-427.
POLIS [Computer Software]. (1996). Tucson: University of Arizona. Available: http://www.u.arizona.edu/ic/polis/
Poole, M. & DeSanctis, G. (1992). Microlevel structuration in computer supported group decision-making. *Human Communication Research*, 19, 5-49.

Price Waterhouse (1997). *Technology Forecast: 1997*. Menlo Park, CA: Price Waterhouse World Technology Centre.
QuestMap [Computer Software]. (1998). The SoftBicycle Company. Available: http://www.softbicycle.com/QMfeat.html
Shum, S., MacLean, A., Bellotti, V. & Hammond, N. (1997). Graphical argumentation and design cognition. Human-Computer Interaction, 12, 267-300.
Sillance, J. (1994). Organizational and behavioural issues raised by intelligent argumentation systems. *Behaviour and Information Technology*, 13(4), 285-298.
Simon, H. (1960). *The New Science of Management Decision*. New York: Harper & Brothers Publishers.
Walton, D. (1992). *Plausible argument in everyday conversation*. Albany, NY: State University of New York Press.
Yakemovic, K. C. & Conklin, E. J. (1990). Report on a development project use of an issue-based information system. In F. Halasz (Ed.), *CSCW 90: Proceedings of the conference on computer-supported cooperative work* (pp. 105-118). Association for Computing Machinery.