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Extending the Contextual and Organizational Elements of Adaptive Structuration Theory in GSS Research *

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Abstract

This paper addresses the variance in findings across Group Support Systems (GSS) studies by suggesting an expanded consideration of organizational and contextual elements in Adaptive Structuration Theory (AST). We propose a model of structuring tactics at three levels of abstraction: the meeting level, activity level, and real time intervention level. We illustrate this model with three specific purposeful structuring tactics — agendas, design patterns, and micro-processes —and present related propositions. In addition to reviewing the more familiar tactics of agenda setting and group facilitation, we illustrate an approach to creating GSS value based on invoking particular social structures. We accomplish this through consideration of a design pattern language for collaboration processes drawn from the Collaboration Engineering literature. We conclude by discussing how this model of structuring tactics advances theory and practice in the GSS domain.

Keywords: Adaptive Structuration Theory, Groups Support Systems, Facilitation, Collaboration, Agenda, Collaboration Process Design

* Marshall Scott Poole and Jonathon Cummings were the accepting guest editors.

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Extending the Contextual and Organizational Elements of Adaptive Structuration Theory in GSS Research

1. Introduction

Group Support Systems (GSS) has been a major stream of MIS research for more than two decades, but has been characterized by a wide range of mixed results (See Fjermestad and Hiltz, 1999; 2001 for a compendium of GSS research). This research shows that, under some conditions, the use of GSS tools can be very helpful, indeed, while under other conditions the same GSS tools may be less useful. Therefore, it is difficult to draw systematic conclusions about the conditions that must be present for positive results to occur, particularly when extrapolating to tasks or technologies differing from those reported in the research (Munkvold and Zigurs, 2005). Thus, advice regarding best practices for adopting GSS remains tentative.

Much of the research on GSS concentrates on one-off meetings, with measures of success focused on meeting efficiency and effectiveness, idea generation and creativity, and participant satisfaction with process and outcomes (Fjermestad and Hiltz, 1999, 2001). While such a focus recognizes the importance of meetings as organizational communication mechanisms, it underestimates both the subservience of meeting effectiveness to broader organizational forces and the heavy influence of micro-processes on meeting outcomes.

Much of the GSS research published to date does not report the configuration specifics of GSS: the exact instructions given to the group, the guidelines, constraints, and ground rules by which they worked; and the step-by-step mechanics of how their work proceeded (Briggs, Vreede, and Nunamaker, 2003; Santanen, 2005). However, subtle variation in any of these factors can create substantial differences in group dynamics. Connolly, Jessup, and Valacich (1990), for example, demonstrated that GSS users who make identified contributions to a brainstorming session under ground rules that allow only positive feedback are significantly more satisfied but significantly less productive than users who make anonymous contributions under ground rules that allow for both positive and negative feedback. In like manner, Reinig et al. (1995) reported that GSS users brainstorm more ideas of higher novelty and feasibility when the facilitator's script invokes a salient social comparison than when the facilitator uses a slightly modified script that does not invoke a social comparison. Thus, a study reporting only that facilitator interventions had a positive influence on group outcomes does not provide sufficient detail to allow others to replicate such interventions effectively and methodically. There is also a need for details of the specific GSS features and configurations, the particulars of the tasks addressed, the specifics of facilitator instructions to GSS users, the ground rules and constraints under which GSS users act, and the mechanics and logistics of user actions. While there is potential value in overall assessments (e.g., contrasts of one GSS design to another) in application to organizational settings, this does not provide sufficient information for guiding groups toward finding and using best practices.

The call for this amount of detail reflects the relationship between behaviors and results that occur simultaneously at multiple levels of abstraction. We introduce the concept of "structuring tactics" to address approaches toward enacting structures at each level of abstraction. By structuring tactics, we mean consciously applied actions, decisions, and constraints that prompt a group to engage in behaviors that manifest norms, rules, embedded power arrangements, or shared meanings as they constitute "structures." The application of meeting-level structuring tactics may have a probabilistic influence on meeting outcomes, but the observation of such does not describe how to achieve such advantage given the wide variety of possible environmental and lower level contingencies. Ironically, at the same time, evaluation of lower level structuring tactics is difficult without an understanding of higher level choices and states that provide opportunities and constraints on micro-process actions and decisions. In practice, groups operate under some uncertainty and use purposeful application of tactics at all levels to move toward achieving specified and partly specified goals and objectives.

Even when groups improve the effectiveness of their meetings through skillful use of a GSS, successful meetings assessed by conventional measures may still have little organizational impact (Trauth and Jessup, 2000). It is clear that even high quality meetings do not guarantee successful organizational outcomes. It is not clear that, in the context of organizational use, managers would be

willing to invest in higher quality meetings if these did not also improve organizational performance. As pointed out by Hayne (1999), building upon work by Bostrom and colleagues (Clawson, Bostrom, and Anson, 1993; Kelly and Bostrom, 1997), facilitators generally have responsibilities before, after, and between meetings in addition to their better-known responsibilities during meetings. Such "outside of meeting" activities may be used to connect the specification of a particular meeting to larger organizational forces. Facilitators may also have responsibilities for establishing GSS facilities and programs that provide space and methods for a range of organizational activities.

In the information technology domain, and particularly with regard to GSS, it is widely held that technology alone cannot create a predictable, useful, repeatable improvement in meeting and organizational outcomes. Rather, a deliberate and skillful application of good quality tools supporting well designed work practices applied to appropriate tasks may affect these outcomes. As a result, technologies are embedded in work practices that are consciously shaped with the intention of creating desired results without necessarily specifying result content. For example, a group may take conscious actions through a detailed sequence of steps in order to create a list of action steps specifying individual responsibilities. Through structuring tactics, the group will create such a work project plan even though the content, in terms of specific actions, deadlines, and responsible parties, may not be known in advance.

To further explore the nature of structuring tactics and their effect on group behavior and emerging structures, we distinguish among three levels of abstraction. These three levels of abstraction pertain to a meeting level, an activity level, and a real-time interaction level that we call "micro-processes." Note that these levels represent three perspectives on one holistic phenomenon that we call structuring tactics in recognition of the distinction between the recipe and the banquet. The structuring tactic acts as a recipe or benchmark that guides, but does not determine, actual behaviors in which the structures are manifest and from which the nature of particular structures may be inferred. The meeting level is illustrated by agenda creation and use, the activity level by development and use of process design modules, and the interaction level by micro-processes and the rapid feedback associated with human facilitation. We present this model and related examples with the view of extending the Adaptive Structuration Model, particularly focusing on its organizational and contextual elements.

In the remainder of this paper, we present background discussion regarding the origins and some subtleties of Adaptive Structuration Theory. Then, we present the model of structuring tactics with three purposeful mechanisms — agendas, design patterns, and facilitation — proposing how they affect meeting outcomes. Following this discussion, we review our key ideas, provide suggestions regarding further study of this topic, and suggest connections between the GSS domain and other information systems research topics.

2. Background

Adaptive Structuration Theory (AST) (DeSanctis and Poole, 1994) has been used extensively as a framework for investigating and consolidating findings regarding GSS for more than a decade (Dennis and Wixom, 2002; Rao and Jarvenpaa, 1991).It has provided guidance and understanding of the GSS field. We would argue that additional focus on two of its key elements, organizational influence and context, can help us form a basis to further understand the dynamics of GSS. More specifically, we view organizational forces as generally creating an environment where group members and meeting participants are guided and directed toward desired outcomes through purposeful interventions.

The idea of an interaction between actors and social structures working inextricably toward creating social outcomes was proposed as a theory of structuration by Giddens (1979; 1993). His view of structuration was born from reconciling dual streams of sociological research: one that emphasized the actions of agents at the cost of persistent social structures and the other that emphasized the power of structures with little acknowledgement of agents' ability to influence them (Bryant and Giddens, 1991; Giddens, 1993). Giddens (1979; 1993) insisted that neither actions nor structures are

dominant, but rather that actors in social systems use and reenact structures in some circumstances and exhibit behaviors that change structures or generate new ones in other circumstances. Giddens (1993) points out that this is not solely a matter of scale. Many of us may influence structures in our families, but only a few are likely to sway a large nation. For example, Mahatma Gandhi influenced political thought and potential action structures at a global level, where most of us do not. In the context of small group work, a manager or other individuals may influence the norms and customs that persist across meetings of a particular group as well as across various groups. These social structures may be reenacted in totality or in part during each new group session. Such structures may vary with ad hoc or accidental deviation from routine, or they may be changed purposefully by conscious decision to take different actions. Behaviors intended only to address an immediate problem at hand may support or undermine previously enacted structures. It is important to note that while the social enactment of structures can be inferred from patterns of prior actual behavior, structures also have an intangible continued existence in their tendency to evoke certain patterns of behavior in the future. This can be viewed as a difference between stated and instantiated norms. For example, a norm of valuing safety may be instantiated when an individual looks both ways before crossing a street. However, one can expect a certain amount of variance between such a norm and actual behaviors over time. Observing a set of street crossings, one will find many that start with looking both ways, others with looking in only a single direction, and, perhaps some with not looking either way. It is interesting to consider structures themselves as potentially decomposable into systems and subsystems. For example, an overall norm of valuing safety may be differentiated by rural and urban street crossing norms.

It is outside the scope of this paper to consider whether such increasingly detailed norms exist as separate unique rules or are organized into a cascade of related components. However, the principle of structural levels of analysis is analogous to the levels of consideration for actions and constraints in the setting of collaborative tasks. DeSanctis and Poole (1994) elaborate on Giddens' Structuration Theory as an interaction of agents and social structures in a recursive fashion affecting social norms and constraints and, in turn, being constrained by them. It is implicit in this formulation, rather than part of Giddens' formulation of structuration, that actors are constrained by preexisting social structures that guide, but do not fully determine, their choice of actions. Evaluation, whether conscious or not, of the results of those actions strengthens or weakens these social structures, which are then reinforced or modified prior to the next action. It is important, however, to keep in mind that Giddens argued against viewing this process as a sequence of discrete action structure pairings, but rather saw these as operating in a "continuous flow of conduct" (Giddens, 1979, p55).

There is an inherent tension and simultaneity of forces in this conceptualization – forces of intentional action and forces of social constraint. DeSanctis and Poole (1994) elaborate on this concept also, describing the structuration process as one of an on-going flow of actions and structure. Additionally, they provide a set of constructs that can be examined in more detail for the purpose of studying collaboration phenomena in greater detail (see Figure 1). Key elements of this model include (1) independent variable such as the structure of the advanced information technology, other sources of structure, the group's internal system; (2) moderating variables of social interaction including both appropriation structures and decision processes that affect and are affected by emergent sources of structure; and (3) dependent variables including decision outcomes and new social structures.

Walsham (2002), in using Structuration Theory to analyze global MIS development projects, argues that "structures" can be embedded in technical systems. Considering structures to include shared meanings, power arrangements, and group norms, Walsham shows how technical assumptions such as spatial visualization in a geographic information system may be embedded in a technology developed by individuals of one culture. However such embedded structures may or may not fit well with the goals of users from another culture. The work of Watson, Ho and Raman (1994) reflects this in the GSS context showing that GSS developed in the U.S. but, used by team members in Singapore, may be applied in a manner that is faithful to the intentions of technology designers but inconsistent with local group meeting norms. In their study, this produced outcomes that largely supported expectations consistent with those observed in the U.S., but were interpreted by Singaporean participants to have quite different significance relative to the role of meetings in their environment.

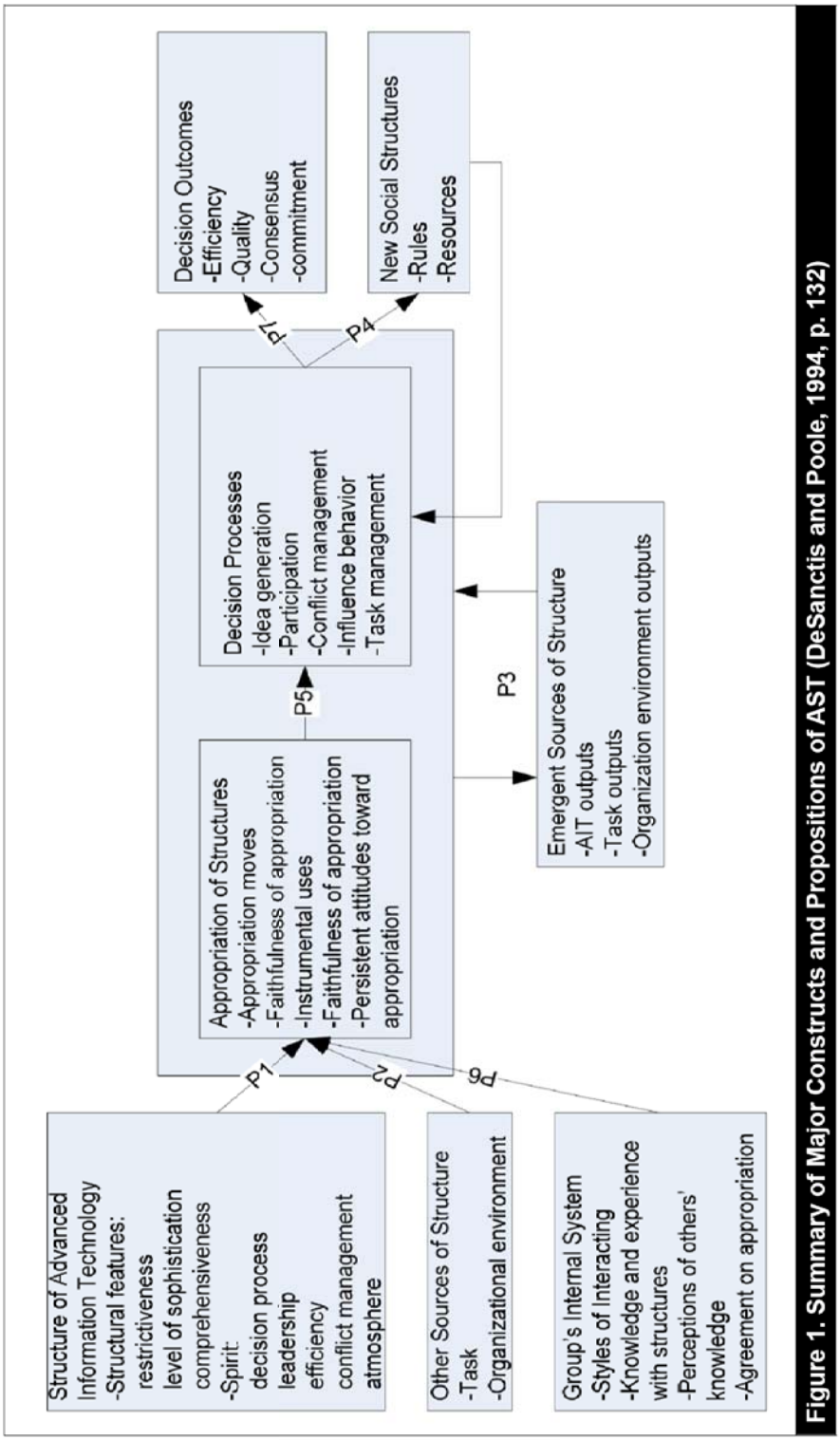

Figure 1. Summary of Major Constructs and Propositions of AST (DeSanctis and Poole, 1994, p. 132)

3. A Model of Three Levels of Structuring Tactics

Meetings and collaborative activities serve as a link between organizational objectives and operational decisions and actions. In this linking process, we can see activities simultaneously from multiple viewpoints, suggesting that interventions can address meeting processes at multiple levels of abstraction. At each level, the group may apply structuring tactics. These are recipes or guidelines that groups follow with varying degrees of rigor that are constructed with the purpose of stimulating the production of behaviors and, by inference, particular structures in terms of norms and rules. We use the term structuring tactic to emphasize their use in shaping and triggering selected behaviors, but these are not the behaviors themselves and only guide, but do not determine, the behaviors (given that individuals may vary from the recipes or guidelines). We see these structuring tactics operating at three levels: the meeting, activities within the meeting, and micro-processes of interaction between users (See Figure 2).

Figure 2. Overview of Structuring Tactics

At the highest level, we see the patterning and organizing of the meeting as a whole. In general this level addresses allocation of resources given constraints of time, participation, and information. This level provides specifications for the meeting's flow, its topics covered, and the group activities in support of these. This highest level is frequently addressed with the development and use of an agenda. We note that the agenda in this sense is viewed as the intended sequence of actions and topics, as distinct from the observed behaviors during the meeting, which may vary slightly or greatly from the meeting plan.

At an intermediate level, we see the patterning and organizing of meeting activities through the use of collaboration process design patterns. A design pattern prescribes a set of actions ordered according to conditional logic for executing a particular agenda activity. A sequenced set of design patterns could constitute all or part of a meeting agenda. As with meeting level structuring tactics, activity-level structuring tactics create a recipe for action, but are not to be mistaken for the actions themselves. The thinkLet design patterns (Vreede, Briggs, and Kolfschoten, 2006) serves as one example of such an activity-level structuring tactic and we will use it to illustrate this type of purposeful intervention.

Finally, we see a finer level of purposeful intervention requiring real-time ad hoc responses on the part of a human facilitator to react to and shape events at the micro-process level during meetings. We see these as purposeful, deliberate attempts to invoke or reshape particular social structures during execution of group activities. We illustrate this level with a discussion of facilitation. Although in

practice a facilitator generally operates at multiple levels (linking the meeting to larger organizational issues, developing and implementing an agenda, organizing and running procedural modules) (Clawson et al., 1993), the human facilitator is unique in operating at the micro-level of abstraction in adjusting group activities as they unfold. We will discuss each of the illustrative structuring tactics below.

3.1. Agenda setting and meeting level structures

Agendas can be viewed as plans, generally realized as documents, that guide the activities from which structures or sets of structures emerge among facilitators, group members, and/or group sponsors. The purpose of an agenda is to provide a target set of procedures to guide groups through one or more meetings (Niederman, Beise, and Beranek, 1996; Niederman and Volkema, 1996). Agenda setting may involve application of a standard template, such as a problem solving cycle, or may involve elaborate discussion for custom development for a unique situation. Although agenda setting is normally viewed as an activity conducted prior to meetings, agendas are subject to discussion and change during the course of meeting activity.

Nunamaker et al. (1997) indicated that agendas are of vital importance when meetings are supported by GSS. The sequence of meeting steps can play an important role in progressing through difficult issues toward particular outcomes. Subtle changes may produce sizable results. For example, discussing a topic before taking a vote may result in very different outcomes than taking a vote then discussing the results. In the latter case, assuming the vote results in a prioritized list of alternatives, lower ranked items may be dropped before discussion. This may result in meeting efficiencies, but with some probability that a best solution was inadvertently dropped, as an individual did not have the opportunity to present key arguments in its favor. Control of an agenda can shift emphasis among varied considerations and interests pertaining to a given topic. Agenda efficiency is also important, as GSS represent significant and generally expensive resources that should be allocated well.

In constructing the agenda for a particular meeting, agents shape an array of elemental activities and actions into distinct patterns for application during the meeting. The process of selecting elemental features and details of their application in a particular meeting is typically not random. Rather, these elements represent a purposefully chosen set arranged in a particular order with the aim of moving the participants toward short- and long-term goals (balanced to varying degrees with investment in team and relationship building for future task performance). The agenda embeds mutual agreements regarding expectations and meanings of both content and process issues (Miranda and Bostrom, 1999).
Groups may abandon all, part, or none of any given agenda. This potentiality for groups to act in varied ways relative to high level structuring tactics presents significant complexity for understanding and influencing collaboration outcomes. As presented by AST, the notion of “spirit” is used to represent general values — such as open participation, rationality, democracy, or efficiency — that guide design of a technology for supporting collaboration (Poole, private correspondence, 2008). The related concept of “faithfulness” is intended to characterize the degree to which such general values are mirrored by the consistency of the group’s behaviors with the spirit as intended by the designers. In principle, these notions are straightforward, but in applying them to the wide range of situations that arise in organizational settings, some additional consideration is required.

Although this discussion in AST focuses on the design of supporting technology, it is apparent that such a discussion can be extended to consider that a guiding spirit may also be invoked in agenda design. It is interesting to consider the behavioral outcome should a GSS tool set be designed for open participation, but an agenda require a focus on efficiency, encouraging open, but limited amounts of, participation. It is logical that in such a case the group will either (1) change the agenda to conform to the tools available, perhaps limiting the group’s ability to optimize its primary goal, (2) change the tool (if it has enough flexibility) to use it in ways it was not originally designed, or (3) choose not to use the tool. One approach for addressing this potential problem is to build GSS systems that resemble tool kits where the selection of components can accommodate a range of different guiding principles based on different sequencing or selection of varied component subsets

for particular agendas. As a result, the "spirit" of the GSS tool designers becomes less clearly differentiable as an attribute of the tools, per se, and more observable in the intentions and actions of the agenda designers in shaping the group's tool use.

When considering issues of spirit and faithfulness in practice, considerations of level of analysis also become complex. For example, groups may adhere closely to the agenda during some activities but not others. Two groups may deviate from the same number of activities, but in the subjective evaluation of group members, these activities may not be of equal importance, or the amount of deviation from each activity may not be of the same magnitude. Thus, different groups deviating from the same number of different activities may, in universal measures (of overall faithfulness to the meeting as a whole), display very different scores. Similarly, groups making few important deviations may be given the same subjective scores as other groups making many small deviations from a similar agenda. Observed differences in the evaluation of faithfulness could reflect differences in the designers' ability to manifest the intended spirit in the actualized details of the operations of a particular GSS.

The ideas of spirit as a general design guide and faithfulness as an evaluation tool for the degree to which group behaviors reflect or vary from these guidelines are helpful concepts. In application, however, there is room for expansion of these concepts. This is most notable when considering issues of which approach to spirit (e.g., open communication, efficiency, etc.) ought to guide agenda design, to what degree groups should remain faithful to the designed spirit, and how both spirit and faithfulness affect collaboration outcomes.

We see the best approach to the spirit of agenda design as varying with tasks and group membership. For example, tasks with urgency may demand greater efficiency as enacted in behaviors by quicker movement from discussion to consolidation and selection among alternatives, whereas longer term projects may allow for more openness (and a greater amount) of communication as enacted in behaviors by longer brainstorming and more methodical discussion of alternatives. Similarly, groups with histories of open or secretive behaviors may benefit from appropriately tailored tools and agendas that either reinforce or confront prior tendencies. We would see the "appropriate" level of faithfulness varying with the match between agenda spirit and task demand. To the extent that agenda designers have effectively bridged the gap between the group/task demands and the more effective guiding principle, we would expect that faithfulness to that spirit would result in positive meeting outcomes.

In effect, we are arguing that the quality of an agenda itself can be assessed (as distinct from meeting outcomes or group satisfaction). This can be evaluated, in principle, by analyzing the degree to which a particular agenda approach fulfills the demands of the task and other group expectations. Additionally, the quality of the agenda can be measured by internal considerations – is it clearly stated, is it easy to implement, does it lead logically step by step through sequences of actions? These criteria for a quality agenda are independent of one another. The agenda may be well aligned externally but poorly structured or stated. Or it may be misaligned externally yet very clearly structured and expressed. We would expect that an agenda is of highest quality when it addresses both external and internal considerations and that, as its quality is greater, it will have a higher probability of contributing positively to successful meeting outcomes. It is important to keep in mind, however, that in some circumstances, specifically when there are high levels of uncertainty regarding the task or irregularity in group membership, even a poor agenda (by these measures) may be the best that can be achieved and better than having no agenda at all. Ideally, groups will track the way they create and implement agendas so that these can become a source of constant improvement.

It is also interesting to consider the case, found less often (Volkema and Niederman, 1999), where groups intentionally function without a stated agenda. In some cases, the facilitator may generate an agenda creation activity and apply micro-process-level interventions as a means of building commitment to planned activities. Such an agenda may reside implicitly with the group facilitator rather than explicitly as a disclosed and collective statement. Surprising the group may be used as a technique by skilled facilitators for destabilizing fixed beliefs, practices, or attitudes.

From an organizational perspective, both the stated and observed agenda for particular meetings exist in a broader context (Trauth and Jessup, 2000). Particular activities, discussion points, or sequencing of events that may optimize a particular meeting may not necessarily be equally valuable in achieving broader organizational goals. For example, individuals within a group may address a tangential issue that does not further progress on the stated meeting goal, but which may have positive organizational consequences regarding other important opportunities or challenges. Alternatively, groups may vary from fair and equitable procedure to enact a critical but unpopular policy. Group members may have sound reasons for revising or abandoning structures and pursuing goals other than those intended by the designers. Indeed, the goals of the group may be equally valid or more valid than those of the agenda designers. However, in other cases, it might be useful to restate or re-confirm the spirit of the design and tools in order to guide the group back to more productive and more acceptable behavioral rules. To move the group back to "faithfulness to the spirit," interventions on a micro-process-level are required, and in some cases, changes in activities might be required. For instance, the group may engage members in a teambuilding exercise to reinforce a participatory atmosphere. From this reasoning, we abstract the following propositions:

Proposition 1a. High-level structuring tactics, as embodied in agendas — by engendering norms and embedding power arrangements, shared meanings, and agreements about meeting procedures and content — guide, but do not enforce group member behaviors from which particular structures emerge.

Proposition 1b. High-level structuring tactics, as embodied in agendas, can be assessed in terms of their alignment with group member and organizational goals, while group member actions can be assessed in terms of their faithfulness to the intention of the agenda designer. In the case of high quality agendas, high levels of faithfulness will lead to positive outcomes, all else being equal.

3.2. Process design and activity level structures

We illustrate a design module by considering a design pattern as one type of meeting activity. Introduced by Alexander (Alexander, 1979) design patterns are now used to guide design efforts in a number of information systems domains such as software engineering (Coplien and Harrison, 2005; Gamma, Helm, Johnson, and Vlissides, 1995), computer mediated interaction (Schümmer and Lukosch, 2007), and communication software design (Rising, 2001).. Design patterns are documented, reusable, best practices that create solutions to recurring problems (Vreede et al., 2006). They combine with design artifacts and are captured in design pattern languages that elicit their function in a boarder system.

One example of design patterns that can be used to guide and support GSS-based collaboration processes, are 'thinkLets' (Vreede et al., 2006). The thinkLet concept emerged from insights described by Briggs et al. (2003) and have been further conceptualized based on patterns and pattern theory (Kolfschoten, Briggs, Vreede, Jacobs, and Appelman, 2006; Vreede et al., 2006). ThinkLets are building blocks that can be combined into a sequence of activities. Particularly for highly and moderately structured tasks, this enables groups to create structured outcomes designed to achieve particular organizational goals.

The value of thinkLets for the structuration of collaboration processes and the increase of their predictability has been argued (Santanen, 2005; Vreede and Briggs, 2005; Vreede et al., 2006) and is increasingly supported by research findings. ThinkLets have been identified as best practices among experts (Briggs et al., 2003; Briggs, Vreede, Nunamaker, and David, 2001), and as patterns in GSS use (Kolfschoten, Appelman, Briggs, and Vreede, 2004). They have been used successfully to design and transfer collaboration processes in a number of case studies (Bragge, Merisalo-Rantanen, and Hallikainen, 2005; Fruhling and Vreede, 2005; Vreede and Briggs, 2005).

The structuring patterns that emerge during the execution of a thinkLet fall into six general categories (Briggs, Kolfschoten, Vreede, and Dean, 2006; Briggs et al., 2003; Briggs et al., 2001; Vreede and Briggs, 2005; Vreede et al., 2006):

Generate – move from having fewer to having more concepts with which the group can work.
Reduce – move from having many concepts to a focus on fewer that the group deems worthy of further attention.
Clarify – move from less to more shared understanding of the meaning of concepts.
Organize – move from having less to more understanding of relationships among concepts.
Evaluate – move from having less to more understanding of the value of concepts for group goal attainment.
Build Consensus – move from having fewer to having more group members willing to commit to a proposal.

ThinkLets are formally specified in terms of rules that describe actions that need to be executed by roles, under a set of constraints, and with the use of one or more capabilities. Capabilities to support a thinkLet may be afforded by any of a number of tools, ranging from GSS to paper and pencil, and the thinkLet will still yield similar patterns of collaboration for a group. Consider, for example, Osborn's brainstorming activity (Osborn, 1953). A codification of brainstorming as a thinkLet is specified in Figure 3.

Capability: A page viewable by all participants
Capability: An audio channel accessible by all participants that affords some means to mediate turn-taking.

Role: Participant
Action: Add <ideas consistent with group goal> to the audio channel
Constraint: Contributions must be responsive to the brainstorming question
Constraint: Contributions may not be negative toward contributions of others
Constraint: Contributions may build on contributions of others
Constraint: Contributions may be silly or unconventional
Constraint: Contribute only when granted the floor.
Constraint: Contribute only one idea per turn
Constraint: Contributions must differ from those already on the list

Role: Recorder
Action: Add to the Page
Constraint: Record all ideas suggested by participants
Constraint: Do not criticize ideas while recording them.

Figure 3. examples of ThinkLet for Brainstorming Activity Overview of Structuring Tactics

The page capability for brainstorming could be afforded by many different kinds of technology: a white-board, a flip chart, or a GSS. Notice also that the audio channel could be afforded by a face-to-face setting, by a conference phone, or by walkie-talkies. The rules offered by Osborne are intended to have a specific effect on the pattern of collaboration among participants and the recorder, and a specific effect on the output of the brainstorming task. This intended effect is not expected to change because of the tools used for recording. However, when we alter some rules, we create a new thinkLet. Consider, for example, what might happen if, instead of the constraint, "Contribute only when granted the floor" we were to state the rule "Contribute ideas as they occur to you." We would then have to replace the single oral channel, which allows only serial contribution, to a different capability that allows all participants to contribute in parallel to the page. We would also remove the role of recorder. With new rules, roles and constraints, a very different effect is likely to occur.

Having discussed spirit and faithfulness in the context of meeting-level structuring tactics, it is worth

revisiting this discussion regarding activity-level structures. Considering the GSS as a collection of tools, it is conceivable that the guiding principle for the entire collection differs from the guiding principles for the individual components. Given a desire to provide a wide range of capabilities so that GSS can be used in many circumstances, flexibility would be a likely guiding principle for the design of the GSS toolkit. However, individual components may have more focused design principles. For example, a brainstorming tool may be designed to encourage open communication, extensive divergent thinking, and creativity. In contrast, a consolidation tool may be designed to reduce cognitive load, to focus on convergent thinking, and to foster consensus. However, spirit can also come from the script and rules stated by the facilitator. For instance, a brainstorming tool can be used to edit and merge ideas, therewith supporting convergence, integration, and shared understanding. Clearly, such activities lean more heavily on the skills of the facilitator to enact the spirit of the activity. In general, these tools can fit under an umbrella focus of flexibility or multifaceted tools to address a wide range of group needs. However, we would argue that such an umbrella concept needs supplemental focus to provide sufficient guidance to designers of specific components and to researchers understanding the relationship between design principles and collaboration actualization.

Consider, again, the example of how the same tool can be deliberately appropriated in different ways for different activities, intentionally creating very different patterns of collaboration. For example, a group might use a shared outlining tool in one case to *generate* ideas; in another to *organize* ideas, and yet another to *evaluate* ideas. Therefore, it may not be useful to attempt to classify appropriation tools as having a specific guiding spirit without consideration of the specific uses to which they are put. While a designer may have intended that a group outliner be used to stimulate open discussion and creativity, this may not diminish the value a group derives from purposefully using the same tool to brainstorm narrower concepts or to break an impasse and build consensus. Given that the thinkLet is intended for reuse, it is also possible to test whether a spirit, as defined by the rules, actually invokes a particular pattern of collaboration and is, therefore, appropriate to the task at hand. Based on the results of such a test, the procedure may be revised and retested until the desired effect is secured prior to the implementation of the procedure with subsequent groups. Such testing does not necessarily determine outcomes in all future cases, but increases the probability of creating such outcomes in a significant portion of subsequent applications.

Just as the quality of an agenda can be assessed, the quality of activity-level tools and procedures can also be evaluated. Such quality measures also invoke external and internal considerations. Externally, the activity-level tool or procedure must contribute to the overall execution of the group session. From a process perspective, this means advancing meeting outcomes such as task performance or group member relationship development. From a technical perspective, it means supporting the intended activity in an effective manner such as for a consolidation activity enabling the efficient grouping of like items while minimizing false positive and negative occurrences. When selecting activities, the designer needs to consider previous and successive activities to ensure that the outcome of one step serves as input to a next step. This shows the interrelation between activities and agendas. Further, the activities should embody “non-conflicting spirits” that is, if one step of the process is very democratic, it shouldn’t be followed by an autocratic decision; it is highly unlikely that such sequence of steps would be well accepted. Therefore, the choice of activities should foster consistency in spirit. This will reduce the need to reenact these at the micro-process-level, as a consistency in spirit throughout the design is more likely to be adopted and appropriated by the group than a frequently changing spirit.

From this reasoning, we abstract the following propositions:

Proposition 2a. Activity-level structuring tactics, as embodied in design patterns — by engendering norms and embedding power arrangements, shared meanings, and agreements about meeting procedures and content — guide, but do not enforce, group member behaviors from which particular structures emerge.

Proposition 2b. Design patterns for procedural guidance at the meeting activity level, as exemplified in thinkLets, provide a means for directing collaborative efforts combining GSS tools and group

actions to increase the probability of achieving predicted meeting outcomes.

Proposition 2c. As particular combinations of design patterns for procedural guidance at the meeting activity level are constructed for particular task performance, predictable patterns of collaboration can emerge across people and organizations, particularly for more highly structured and repeated tasks.

3.3. Facilitation and micro-process level structures

The group facilitator serves as an agent who typically guides a group through planning, execution, and follow up to sessions or meetings within the larger context of accomplishing organizational goals. Such facilitation may be decomposed into content and process roles focusing on aiding the group in accomplishing its mission but also in guiding the group through various interpersonal and communication mechanisms to smooth the manner in which such goals are accomplished and to preserve or enhance relationships among group members. GSS facilitators, in addition, will aid the group in interpreting the adoption and integration of computer technologies (micro such as new modules or macro such as shifting from traditional meetings to computer-mediated ones) through training, feedback, and activity selection.

During meeting execution, the facilitator manages a vast array of complex cues. This requires the ability to perceive, balance, and weigh, the importance of each cue in combination with the whole and to select and implement statements and actions intended to lead the group to desired outcomes. Note that these outcomes will generally be in the nature of rendering a workable decision rather than affirming a particular pre-determined choice. Extensive lists of important facilitator characteristics are included in Clawson et al. (1993), Hayne (1999) and Niederman et al. (1996).

A number of studies have targeted facilitation as a key ingredient in determining outcomes of GSS meetings (Anson, Bostrom, and Wynne, 1995; Clawson and Bostrom, 1995; Dickson, Limayem, Lee Partridge, and DeSanctis, 1996; George, Dennis, and Nunamaker, 1992; Nunamaker et al., 1997; Vreede, Boonstra, and Niederman, 2002). Even when facilitation is not directly tested, as in one study of social loafing in the GSS environment (Chidambaram and Tung, 2005, p. 165), it may be recommended as a tactic for addressing group process difficulties. Following Dennis and Wixom (2002, pp. 258-259), we argue that the facilitation role is even more important in the field setting when contrasted to the laboratory.

While authors identify appropriate facilitation support, in general, as one of the key success factors, most studies cannot point out the exact interventions of facilitators and supporting features of the technology that cause the effects that support groups in achieving their goals. George et al. (1992), for example, measure facilitation in terms of whether or not process facilitation is provided, which addresses whether any facilitation is important, but does not address the variance that exists from one facilitation experience to another. It is not assumed that the effect of the facilitator is always positive or even that the facilitator always changes the group norms. Miranda and Bostrom (1999), for example, show that differentiating facilitation intervention types for a particular task may have different effects on outcomes.

The facilitator of GSS meetings, however, interacts with group and meeting structures including norms, political relationships, and understandings. As observed by Griffith, Fuller, and Northcraft (1998), the facilitator, if effective, will inevitably have an influence on the group, meeting, and outcomes. Such influence may range from urging individuals to more participation in discussion to issuing reminders regarding typing styles (e.g., use of all upper case letters) that might disrupt efforts to establish and maintain particular levels of anonymity. The facilitator, through behaviors such as these, may disrupt existing norms and establish new ones intentionally or inadvertently affecting the on-going group practices from which structures emerge. Clearly, the facilitator affects power relationships within a group to the extent that she or he serves to allocate the scarce resource of "floor time" during oral discussions and to prompt transitions from discussion to voting and other process determinations that would otherwise be performed by other group agents. Such process activities may or may not be purposefully intended to affect power relationships in particular ways, but

they will, nonetheless, shift decision making and authority. Facilitators also affect group understandings. They typically ask for repetition, clarification, and expansion of comments made by group members. This can have the generally positive micro-outcome of surfacing differences of simple understanding, if well conducted.

To the extent that a group is left on its own to appropriate GSS technology, we would expect that its pre-existing range of group-related structures would highly influence the way that it incorporates GSS into its activities. For example, a group with little verbal communication may be expected to continue having little verbal communication once GSS is introduced. However, the introduction of GSS offers the opportunity for change not only through direct use of GSS but also through reexamination of the structures themselves. In the process of incorporating the GSS into the existing group, even standard procedures may need to be adapted to the new environment. In such a process, long-time unexamined structures may become a subject of conscious consideration. To the extent that particular types of GSS appropriation are desirable, the facilitator can map a route intended to move a group to that type of appropriation. For example, if robust verbal communication is viewed as being desirable, the introduction of the GSS may also be an opportunity to introduce more occasions for verbal discussion, perhaps of posted results. The facilitator may have to take more initiative to move a group that is less verbal than one that is verbally active to the same ultimate appropriation type. In this scenario, a GSS designed with a "spirit of full participation," assuming this is proper and appropriate in the case, might not be faithfully implemented by a group with a strong "quiet" norm unless guided with extra effort by a talented group facilitator who recognizes the spirit (whether or not by that nomenclature), notices the gap between group norm and spirit, and consciously and actively intervenes to help close that gap.

The effect of the facilitator on the "spirit" of the whole package or related components of GSS will be evident. Over time, some central tendencies associated with particular facilitators will emerge and be differentiable from one facilitator to another. The facilitator serves as an interpreter of the spirit of both the technology features and the agenda. For example, should the spirit of a particular tool prove to be misaligned with a group intention during a particular meeting activity, the facilitator in real-time can adjust the method of using that tool, perhaps by changing instructions, modifying prompts, or otherwise varying from the tool's intended pattern of use. Similarly, the facilitator can vary from the details of an agenda to support an intended guiding principle or spirit, or can veer away from a guiding principle, such as efficiency, when an emergent need for relationship development suggests more detailed discussion.

It is important also to recognize that the facilitator role frequently extends beyond the planning for, execution of, and follow-up to particular meetings. Following the logic of Trauth and Jessup (2000), meetings that are successful based on meeting-level metrics may not create the intended larger organizational outcomes. The facilitator may be deeply involved in the implementation of GSS as an organizational program in which meeting support is embedded. As such, this role would include interacting with organizational sponsors for identifying appropriate projects, staffing and maintaining the GSS workspace, and interacting in a consultative role with groups and group members across projects and between meetings. It is not uncommon for facilitators to participate in the planning of a sequence of meetings within the context of a larger project. Such a series of meetings might be characterized by an initial meeting for problem definition, brainstorming of alternatives, and listing of open questions for investigation, followed by a series of meetings for progress reporting and troubleshooting, and, perhaps, completed by a meeting for reviewing project procedures. The facilitator may interact closely in the planning of the agenda and post-meeting follow-up with actions taken by the group and group members as well as interpretation of the results generated.

In the organizational setting, we often see meetings where the facilitator plays multiple roles (see e.g., Steinhauser, 2008). Sometimes a manager or individual of higher rank or status within the organization will serve a dual participant/facilitator or manager/facilitator role. In some circumstances such an arrangement works well, as the manager must ultimately approve and implement the outcomes of the meeting. In other circumstances, the dual role can interfere with process control such that quieter individuals are not stimulated to participate and group members may intuit a managerial

preference and reinforce that rather than openly present ideas and comments (leading to groupthink). From this reasoning, we abstract the following propositions:

Proposition 3a. Microprocess-level structuring tactics, as embodied in human facilitation — by engendering norms and embedding power arrangements, shared meanings, and agreements about meeting procedures and content — guide, but do not enforce, group member behaviors from which particular structures may be inferred.

Proposition 3b. Micro-processes notably invoked by human meeting facilitation appropriate particular GSS technology features and use them to support other structuring devices including those at the meeting and activity levels.

Proposition 3c. The quality of micro-processes, notably invoked by human meeting facilitation, may be deemed to be high where appropriations of meeting- and activity-level tactics and technology features maximize task- and process-oriented outcomes.

Proposition 3d. As micro-processes notably invoked by human facilitation for meetings are aligned with organizational norms, power arrangements, and understandings, meeting outcomes will more likely be successfully implemented.

3.4. Relationships among structured tactic levels

It is a main argument of this paper that in organizational settings groups may purposefully design and execute meeting, activity, and micro-process-level structures toward enacting particular outcomes or classes of outcomes (e.g., a list of actions and responsibilities as a desired outcome without necessarily pre-selecting the content of such a list). At the same time, it is important to acknowledge that actions and outcomes at each of these levels occur concurrently. We are not suggesting that meeting-level processes influence activity-level processes, but rather that structures and behaviors occur at multiple levels simultaneously and that examining levels separately provides a helpful way to examine their emerging properties. We note below a number of specific interactions among levels that are surfaced by our model.

Organization and meeting. At several points in this discussion, we have noted that sessions or meetings occur within an organizational setting. The agenda for a particular meeting or setting is largely drawn from organizational purposes. The participants are typically members of an organization, although some meetings may cross organizational boundaries. While each group member may be an employee of an organization, she or he is likely also to be part of a departmental or divisional unit, and to the extent that the membership is diverse, varied norms, values, and approaches will be manifest in terms of meeting expectations and goals. Such organizational tendencies will be combined in one way or another as an agenda for particular sessions is produced. Such combination may be the result of (1) a dominating force – whether authorized in the form of a group leader or de facto in the form of representation of a unit with overwhelming resources; (2) mixtures of tendencies on varied issues where particular issues differ in importance among participants; or (3) emergence of something new (e.g., several open and demonstrative units when operating within themselves, but acting with caution and calculation when thrust into collaboration with other units). Assuming the case where varied organizational units are in accord regarding group methods and desired outcomes, the agenda can serve as a structuring mechanism for transforming these goals into specific activity steps.

Meeting and activity. At its most fundamental, the agenda for a meeting consists of activities, and activities are not enacted outside of their use as part of a meeting. As the content of a meeting agenda changes, some activity components will be drawn into anticipated use and others will be set aside. As the meeting is executed, entire activity components may be enacted with varying degrees of conformity to the overall meeting agenda. Similarly, specific actions will conform to and vary from anticipated activities and, thereby, the overall meeting agenda. Although, these cannot be conceptually separated, focusing attention on each level can provide insights. The quality of meeting

components may form a constraint on the quality of the meeting. For example, a meeting with an important component of consolidation of ideas may be limited if only a weak consolidation tool is at hand. It is not difficult to see that a motivated group might create outstanding meetings even with weak tools, but it follows that with better tools, creating excellent meetings will be an easier task.

Facilitation, meeting, activity, and micro-process levels. Throughout this discussion we have highlighted facilitation and micro-level processes largely because we see facilitation as a unique source of affecting process at this level. However, human facilitation in many meeting situations interacts with and influences process and outcome at all levels. Human facilitation will frequently be involved with translating organizational goals into specific meeting agendas; with selecting, managing, and executing GSS rooms and programs; with guiding real-time meeting process; and with meeting follow-up, formally through meeting minutes and outcome reports as well as informally by communicating with organizational stakeholders. Evaluation of group facilitators must be multifaceted. Performance at the various levels may be independent in that a given facilitator may do an excellent job, for example, of meeting management, but tend to stray from organizational goals.

3.5. A note on the role of technology

Our discussion has focused on human interventions at three levels as structuring tactics. We would argue, though, that GSS can be used for storage of structuring tactics at each of the three levels we have been discussing. For example, a particular GSS product may provide an agenda building tool with prompts that embed various norms and patterns defining what an agenda may consist of. As a kind of recipe, the tool may not force but will perhaps induce group members to create an agenda prior to a meeting and stimulate behaviors consistent with particular norms or rules. At the activity level, the GSS can vary in restrictiveness (Dennis and Wixom, 2002) in imposing or relaxing constraints on users – who may add, edit, delete, or move the meeting to another topic in support of the rules of the design pattern for a particular activity. Another means of embedding structuring tactics in the GSS involves providing instructions to participants and scripts for facilitators supporting particular activities. If these instructions and scripts are provided at a fine enough level of detail, they may embody automated facilitation capabilities (Limayem, 2006). Finally, the system could allow for real-time configuration of many features and functions to allow for micro-process adjustments providing new extensions where groups deviate from plans. Thus, a GSS could produce embedding of structuring tactics at all three levels of abstraction.

4. Conclusion

This paper has sought to address the variance in findings across GSS studies and to extend Giddens' notion of structuration as amplified by the DeSanctis and Poole (1994) Adaptive Structuration Theory. It has addressed the diversity of findings by suggesting added consideration of organizational and contextual elements in AST, particularly in terms of how the meeting context is shaped by organizational pressures; how the facilitator frequently interacts with organizational issues and leads the group during meetings; and how organizational and contextual influences may move agendas, process design, and real-time interventions toward prescribed goals and objectives. We propose a three-level model where actors may directly and indirectly address the procedures, actions, and, ultimately, structures of the group. While examination of the natural reactions of group members to the introduction of GSS technology has the potential to provide useful insights and general behavioral knowledge, it can be enhanced in the organizational setting by directly focusing on the selective use of human intervention and technology for particular purposes. We have outlined three specific tactics through which purposeful application of GSS technology may occur. In addition to the familiar mechanisms of agenda setting and group facilitation, we have attempted to show how design patterns, illustrated by the thinkLet stream of research, exemplify an approach to creating GSS value based on the creation of particular social structures in tandem with targeted group activities.

We have also added propositions to those of DeSanctis and Poole (1994) within the context of AST applied to GSS. It has been our intention to expand the discussion of "other sources of structuration" particularly as it pertains to conscious interventions that might lead to targeted meeting outcomes, micro-processes within meetings, and the embeddedness of meetings in the organizational context.

Although we have not discussed particular methods for conducting such investigations, we have noted a number of case studies particularly targeting thinkLets. We would further suspect that action research (Baskerville, 1999) would be helpful in documenting efforts to integrate particular GSS instances in the organizational context and that design science (Hevner, March, Park, and Rahm, 2004) might be useful in consideration of the construction of particular GSS features linked to particular group structures and outcomes.

This is one of the most interesting things about AST and why it is a tantalizing theoretical research lens. The mere presence of new opportunities (or system inputs) does not necessarily generate the same result when applied in differing circumstances. Challenges include (1) interpreting actions in terms of their agency content – what potential influence on structure is embedded in the action?; (2) distinguishing when such agency influence is delivered while understanding that it may be delivered with effects or without effects; and (3) assigning particular effects (in terms of changes in structure) to specific agency content when in a dynamic environment there may be many simultaneous influences (e.g., during a face–to-face meeting, it is not clear that the stating of a comment of participant A is a more important influence than the simultaneous reading of that comment by participant B). Even when all actions of all actors are in line with the purposive structures provided to them to achieve their goals, different stakes, perspectives, knowledge or cultural backgrounds can cause conflict. Detecting and resolving such conflicts to (re-)gain mutual acceptance of the goal and the outcomes produced is critical to maintaining the relations among actors and to enabling future collaboration.

While we propose extended thinking regarding AST, pertaining to GSS in particular, we would suggest that it may similarly be applied to other related topics such as virtual teams, virtual communities, and on-line learning (Thomas, Gupta, and Bostrom, 2008). Many elements of AST including task, group, technology features, and organizational context will apply to virtual teams, even as some of the elements, by definition, such as distance relationships among members, will vary from those in face-to-face GSS situations. Virtual communities and on-line learning will present additional challenges in identifying the various stakeholders. Virtual communities will often span particular organizations or may represent an innovative grouping of participants. On-line education will have a very different configuration of concerns from the perspective of providers – particularly those providing education for compensation, whether profit making or non-profit – and those of the clients. Each of these, and probably many other social activities and groups, can be addressed through a consideration of both purposeful and natural responses to technology in context.

Applied to GSS, this stream of research emphasizes the integration of structured leadership, support for facilitation activities, real-time guidance, and the use of multiple methods in the field for furthering the utility of GSS in application. This discussion is offered as a way of extending AST so that a broader range of observable group outcomes can be understood. It would be our view that an ideal approach at the level of the MIS field to the study of GSS would include the rigorous examination of purposeful efforts aimed at engineering more predictable and successful outcomes from GSS use along with observation of natural reactions to the introduction of GSS technology and structuring tactics.

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Dr. Gwendolyn L. Kolfschoten is an Assistant Professor at Delft University of Technology in the Netherlands. She is an experienced facilitator of thinkLets-based Group Support Systems workshops having worked with numerous public and private organizations. Her research focuses on the quality of thinkLet-based collaboration process design for complex tasks. She developed the first example of Computer Supported Collaboration Engineering (CACE) technology - an integrated support suite to assist collaboration engineers in process design. Her research has been presented at conferences such as HICSS, CRIWG, AMCIS and GDN and has been published in the *International Journal of Computer Applications in Technology*, *International Journal of Human-Computer Studies*, and *Group Decision and Negotiation*.

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