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Audit Groups and Group Support Systems: A Framework and Propositions for Future Research

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ABSTRACT: Two features of auditing tasks and settings are the importance of group work and the increasing reliance on computer technology for communication. Group Support Systems (GSS) use computer technology to increase the effectiveness and efficiency of group work and communication. Prior (nonaccounting) GSS research suggests, however, that the benefits of GSS may not occur in every environment. This means that the benefits claimed for GSS need to be tested in the environment of interest, which makes GSS a promising area for systems-related auditing research. This article encourages this research. It provides a research framework and then uses this framework to review prior audit group research. The result is a series of propositions that suggest directions for GSS research in auditing.

Key words: Group systems, Group support systems, Audit groups, Group process gains and losses.

I. INTRODUCTION

Many tasks are too complex to be accomplished by a single person. Multiple knowledge bases, skills and perspectives are often necessary to complete an activity successfully. Consequently, group work is becoming more important to organizational performance. In auditing an important issue is supporting the group so that it operates effectively in more complex environments. The hierarchical nature of the audit firm and the complexity of audit information, however, inhibit group work. As they become commonplace, networked systems give auditors the opportunity to use group support systems (GSS) to support group work and auditors are recognizing this opportunity (Kirkpatrick 1993; Emerson 1994; *Computerworld* 1997).

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The purpose of this article is to provide a framework and a set of propositions that recognize the potential for GSS to make auditing more effective. Despite the potential of and publicity surrounding GSS, existing research gives mixed results in terms of performance and group member satisfaction with GSS (Bostrom et al. 1992; Dennis and Gallupe 1993; DeSanctis and Gallupe 1987). As a result, the benefits from GSS implementation cannot be automatically assumed (Watson et al. 1988; Weick and Meader 1993). Rather, recent research emphasizes the importance of evaluating potential GSS applications on a context-specific basis (Nunamaker et al. 1993). This article focuses on the auditing domain.

The article has three sections. First, it presents a framework for conducting audit GSS research that identifies the particular group setting and task activities and evaluates how a GSS affects process gains and losses associated with group work. Second, it uses this framework to review the extant multi-auditor research and suggest propositions for audit GSS research. The final section contains the conclusions and implications for audit-related GSS research.

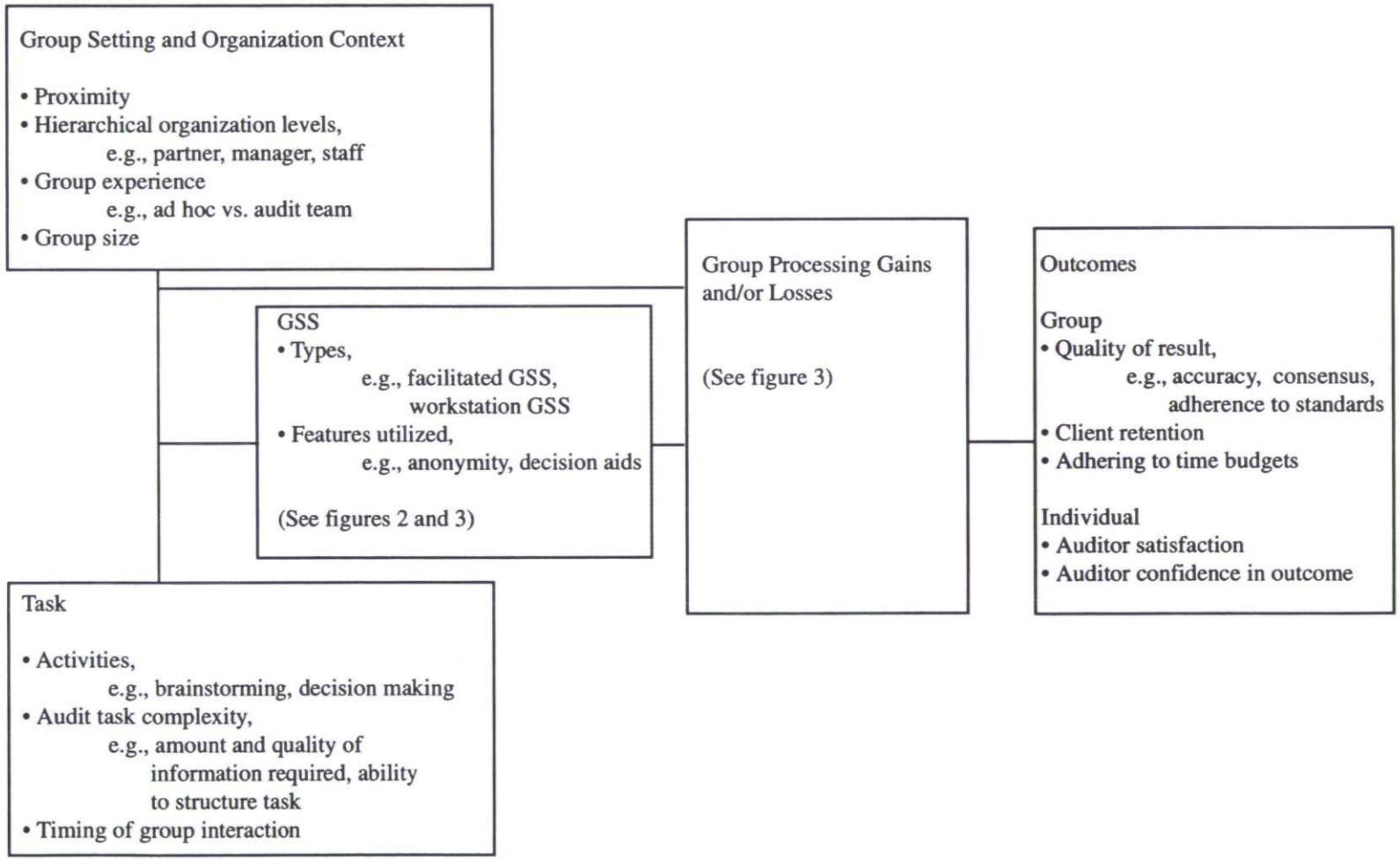
II. RESEARCH FRAMEWORK

Nunamaker et al. (1993) argue that GSS research must be qualified by the group setting, the nature of the tasks undertaken and the GSS features employed. Our framework for pursuing GSS research in the auditing domain is presented in figure 1. The framework encompasses these attributes: the group setting, the task characteristics, the expected GSS process gains and losses, and the eventual group outcome. The advantage of this framework is that it partitions group processing attributes to show when and how GSS use may facilitate more effective and efficient auditing outcomes.

Solomon (1987) distinguishes audit group *settings* as either hierarchical teams or co-acting groups and describes an audit team as personnel at various hierarchical levels working together via a hierarchical, sequential, iterative process with interaction primarily through written media and review. The nature of co-acting groups varies more than for teams, and co-acting groups tend to be formed to work on specific, more complex tasks (Bamber and Snowball 1988). Our classification of setting extends Solomon (1987) to include group member proximity and group composition issues, such as the size of the group, the history of group interactions and the relationship between group members (e.g., peer groups or hierarchical groups). Explicit identification of the setting is important because audit group work can occur in a variety of settings (Solomon 1987), while particular GSS and their features are only appropriate in certain settings. GSS can potentially support four meeting settings, based on group member proximity (i.e., same/different) and the timing of interaction (i.e., same/different). Figure 2 summarizes the types of GSS in terms of group member support and settings. There are three types of GSS currently in use: facilitated GSS, keypad GSS and workstation GSS. A facilitated GSS is a single workstation in which the group leader enters the comments and issues generated by the group, then uses modeling tools, such as flow charts or causal maps to clarify or interpret the meaning of the group's collected thoughts. A keypad GSS allows group member input to be entered and recorded using hardware similar in layout to a conventional telephone keypad. A workstation GSS is configured with a full workstation for each group member. Facilitated GSS and keypad-based systems are only appropriate for face-to-face meetings that are coincident in that they occur in the same place at the same time. However, with appropriate communication technology, workstations can support meetings that occur in all four settings, e.g., through audio or video conferencing, electronic mail. Figure 2 also classifies some examples of auditing group work according to the setting currently used in practice. For example, annual partner meetings are now limited to same-time, same-place settings, while audit teams operate in all of the four settings. Audit group settings must also be analyzed with respect to group composition because audit environments have particular group characteristics. For example, audit group membership shifts from audit client to audit client, thus the relative history of the team member interactions may vary considerably. Furthermore, a rigid hierarchy characterizes audit firms, with partners having the highest relative status (Watson 1975).

Task characteristics include the activities required to accomplish the task, the complexity of the task and the timing of group interaction. McGrath (1984) suggests that groups have four basic

FIGURE 1
A Model of Group Processing Applied in an Auditing Context[a]



[a]Adapted from Dennis et al. (1988) and Nunamaker et al. (1993)

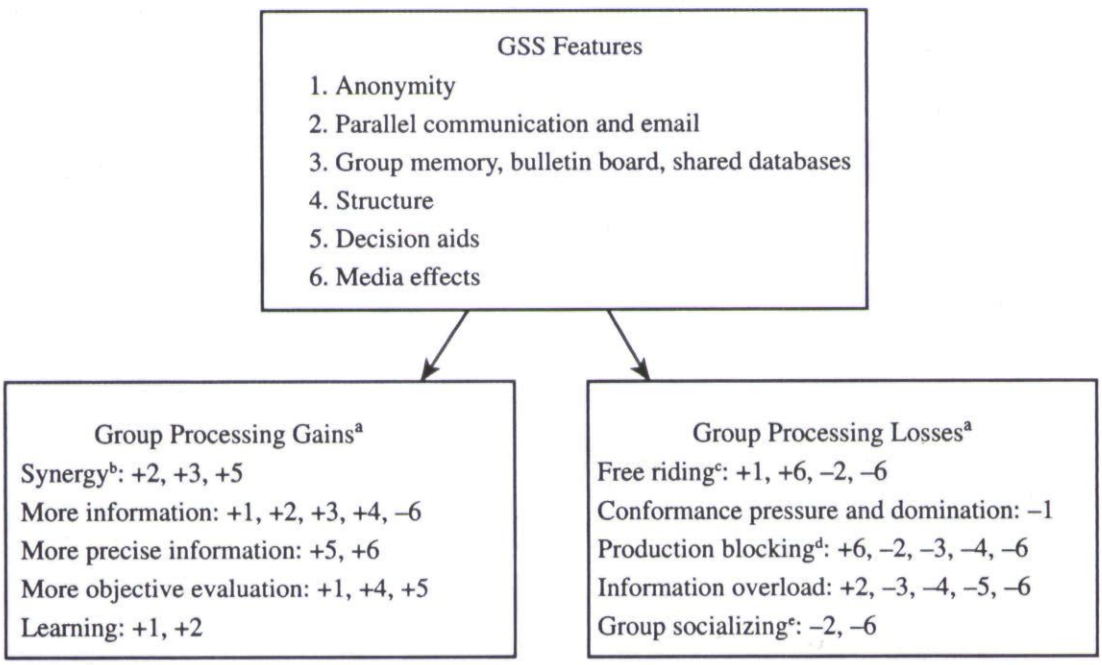
FIGURE 2
Group Settings Supported by GSS in Audit Contexts

	Same Time	**Different Time**
Same Place	Traditional Meeting 1. The audit team 2. Co-acting decision making, such as problem solving or partner meetings 3. Training classes Applicable GSS types: Facilitated GSS Keypad GSS Workstation GSS	Local Area Network or Team Room 1. The audit team 2. Review processes 3. Training classes Applicable GSS types: Workstation GSS
Different Place	Local Area Network, Audio Conferencing and Video Conferencing 1. The audit team 2. Co-acting decision making 3. Training classes Applicable GSS types: Workstation GSS	Electronic Mail and Workflow Software 1. The audit team 2. Review processes 3. Industry group specialist 4. General information sharing Applicable GSS types: Workstation GSS

performance-related task activities: generate ideas or plans, choose a correct or preferred answer, resolve conflict and execute previously developed plans. Identifying the specific activities involved in a task is important to GSS research because only certain GSS features are applicable to each activity. For example, the GSS tool of brainstorming may be applicable in idea generation tasks, but not applicable in choice tasks. In addition, large or complex tasks may involve more than one activity: an idea generation activity may precede a judgment activity. This arrangement of activities can have different implications for group interaction and, in turn, the role of GSS. Analysis of task complexity is also important in the audit environment because audit tasks can vary substantially on several dimensions of complexity, such as the amount and clarity of the information required (Bonner 1994). Furthermore, audit tasks of differing complexity require different types of tools and training (Bonner 1994). Therefore, understanding the complexity of a particular audit task is important in suggesting GSS tools to use to improve task performance. Finally, timing of group interaction refers to whether the group processes can occur simultaneously or sequentially. Some audit tasks must be performed in sequential order, e.g., audit evidence must be gathered prior to evaluation, while other audit tasks must be performed simultaneously, such as generating hypotheses for the cause of an unusual fluctuation in an account balance. The timing of required interaction will affect the selection of the GSS tool to use to improve the group processing of the task.

Once the audit setting and task characteristics are evaluated, the expected *group process gains and losses* need to be evaluated. Group work is commonplace in audit settings because process gains are perceived to result from the increased resources, such as more information, available to the group. However, there is also a potential for process losses associated with group activities. These are associated with group member interaction and group members' failure to exchange information not already known to all group members (Levine and Moreland 1990; Solomon 1987). For example, in traditional, face-to-face group meetings, information must be processed sequentially because, in most meetings, only one person speaks at a time and group members may not share information in meetings dominated by powerful or vocal participants. GSS are *proposed* to enhance group work by maximizing the gains to group processes compared to individual decision making and minimizing the process losses associated with the way the group interacts and processes information. Therefore, GSS features (identified in figure 3) change the way groups interact and process information. Ideally, examination of GSS effects should involve (1) identifying the critical processing gains and losses associated with the specific audit group and task and (2) evaluating the GSS features that can facilitate achieving process gains and minimizing process losses. The goal for GSS use is to amplify the gains and dampen the losses to improve the performance of audit work.

FIGURE 3
GSS Features and Potential Effects[f]



[a] A plus (+) [minus (–)] indicates the GSS feature is expected to increase (decrease) the effect.
[b] Synergy means that each group member contributes a different information and skill set that can enhance the group process.
[c] Free riding is when group members rely on others to accomplish goals due to cognitive loafing, the need to compete for air time, or because they perceive their input to be unneeded.
[d] Production blocking occurs when only one person can communicate at a time. This may result in forgetting ideas, or not thinking of new ideas, i.e., the production of ideas is blocked.
[e] Group socializing refers to nontask discussion which reduces task performance.
[f] Adapted from Nunamaker et al. (1993).

We focus on group process gains and losses to understand the dynamics of audit group interaction. This focus leads to evaluation of process variables such as the amount and equality of participation, the amount and types of information produced and individual group member learning (figure 3). However, of ultimate interest is the actual outcome of the GSS-aided audit group process. Because the link between outcomes and processes is not always clear (Zigurs 1993), outcome variables should be considered (in addition to process gains or losses). Some of the outcomes evaluated in prior GSS and audit group research are changes in decision accuracy, consensus, thoroughness of analysis, decision speed, satisfaction with the group process and confidence in the outcome (Zigurs 1993; also see tables 1, 2 and 3 in this paper).

III. RESEARCH PROPOSITIONS

Prior research is classified into three tables, each representing an area of audit group research: audit group research with the group aspect of the interaction exemplified by the review process (table 1); audit research comparing the performance of groups to the performance of individuals (table 2); and GSS research already conducted in the audit environment (table 3). Consistent with figure 1, studies are classified in the tables by setting and task activities. From these tables, it is apparent that not much research has addressed group behavior. Including the studies reviewed by Solomon (1987), studies published in accounting journals since 1987 and working papers, we identified only 20 audit group studies and six of these studies are recent studies using GSS technology. Thus, one encouraging finding is that the auditing potential for GSS technology is stimulating new audit group research. Incentives for further research should only increase as auditing firms integrate communication technologies into their audit processes.

The team nature of audit work and the complexity of audit tasks make group work essential to audit firms (Solomon 1987). In recognition of group work's importance, audit firms are implementing communication technologies. Extensive GSS use requires that dispersed audit team members be able to communicate electronically. Cushing and Loebbecke (1986) and Prawitt (1995) have already found differences between large accounting firms in the extent they structure and integrate technology into their audit approaches. To the extent that GSS are found to increase net processing gains without significantly increasing group processing costs, the extremely competitive environment for audit services should motivate firms to adopt GSS as they become available. Moreover, recent organizational experiences with GSS suggest that when GSS are made available, they are used by organizational members and that their use increases with employees' familiarity with them (Nunamaker et al. 1989; Poole et al. 1991). Bamber (1995) finds a similar result for familiarity with auditing decision aids. Consequently our first propositions support the recent interest in GSS-related audit research by predicting that GSS-supported group work in auditing will increase as firms implement network technologies and become aware of the various types of available GSS.

Proposition 1: Audit firms will implement GSS as they recognize the potential for the technology to improve the performance of group work.

Proposition 1a: Audit firms with well-developed information architecture and a structured audit approach are likely to be early adopters of GSS technology.

Proposition 1b: Auditor familiarity (through training and use) with GSS will accelerate the routine use of GSS provided by the auditors' firm.

Settings

Prior audit research has been conducted in three of the four settings identified in figure 2 (see tables 1, 2 and 3). Sixteen of the 20 studies we reviewed involve same time/same place settings. Only three studies (Shultz and Reckers 1981; Reckers and Shultz 1982; Arnold et al. 1996) examine the same time/different place setting. Shultz and Reckers (1981) and Reckers and Shultz (1982) implement the same

TABLE 1
Studies on the Group Aspect of the Review Process

	Settings				Task Description and Activity Type				
Article	**Same Time/ Same Place**	**Same Time/ Different Place**	**Different Time/ Same Place**	**Different Time/ Different Place**	**Idea Generation**	**Decision Making**	**Conflict Resolution**	**Execution**	**Main Findings**
Trotman (1985) Review process and the accuracy of auditor judgments	• Senior and manager interacting pairs • Senior interacting pairs		• Manager review			Judgment on likelihood of a dollar error in a transaction processed through a specific internal control system			• Manager-reviewed judgments more accurate than the individual judgments • Interacting group judgments about as accurate as the manager review judgments
Trotman and Yellon (1985) Effect of the review process on auditor judgments	• Two-person interacting groups		• Audit manager review			Judgment on internal control reliability			• Internal control evaluations less variable • Manager review of senior work approximately equal to two-person groups (either in composite form or face-to-face peer groups of seniors
Mock and Turner (1981) Internal accounting control evaluation and auditor judgments			• Audit manager review			Sample size judgment based on internal control review			• No systematic reduction in the variability of reviewed sample size judgments

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TABLE 1 (Continued)

Article	Settings				Task Description and Activity Type				
	Same Time/ Same Place	Same Time/ Different Place	Different Time/ Same Place	Different Time/ Different Place	Idea Generation	Decision Making	Conflict Resolution	Execution	Main Findings
Libby and Trotman (1993) The review process as a control for differential recall of evidence in auditor judgments			• Audit review manager			Judgment on company's status as a going concern			• More objective evaluation of evidence
Messier and Tubbs (1994) Recency effects in belief revision: The impact of audit experience and the review process			• Senior or manager review			Decision on the collectability of an accounts receivable			• Reviews displayed recency effects • Seniors' belief revisions showed signicantly greater recency effects than managers • Reviews increased number of hypotheses generated • Discussion between reviewer and reviewee increased number of hypotheses • No difference in the performance of the senior and manager reviewers, but managers completed the task in less time

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TABLE 1 (Continued)

	Setting				Task Description and Activity Type				
Article	**Same Time/ Same Place**	**Same Time/ Different Place**	**Different Time/ Same Place**	**Different Time/ Different Place**	**Idea Generation**	**Decision Making**	**Conflict Resolution**	**Execution**	**Main Findings**
Ismail and Trotman (1995) The impact of the review process in hypothesis generation tasks	• Senior and manager interacting pairs		• Senior or manager review		Generated hypotheses regarding causes for results of analytic procedures				• Reviews increased number of hypotheses generated • Discussion between reviewer and reviewee increased number of hypotheses • No difference in the performance of the senior and manager reviewers, but managers completed the task in less time
Ramsay (1994) An investigation of the hierarchical nature of audit workpaper review			• Review by by seniors and managers		Complete review and prepare review notes; use review notes to respond to questions about the case				• Managers outperformed seniors at conceptual errors while seniors found more mechanical errors • Pairs of seniors interacting face-to-face performed about equal to review

TABLE 2
Studies Comparing Groups to Individuals

	Settings				Task Description and Activity Type				
Article	Same Time/ Same Place	Same Time/ Different Place	Different Time/ Same Place	Different Time/ Different Place	Idea Generation	Decision Making	Conflict Resolution	Execution	Main Results
Schultz and Reckers (1981) The impact of group processing on selected audit disclosure decisions	• 32 partners in face-to-face goups of 4 with 8 groups in each treatment	• 32 partners in telephone conference calls of 4 with 8 groups in each treatment				Two judgments on footnote disclosures; task was performed as individuals, groups and again as individuals			• Group processing decreases judgment variability and increases subject confidence in decision • Groups use more information than individuals • Communication mode had an effect on results but may have been a failure in randomization
Reckers and Schultz (1982) Individual vs. group-assisted audit evaluations	• 64 students in face-to-face groups of 4 with 16 groups each treatment	• 64 students in telephone conference calls of 4 with 16 groups in each treatment				Two judgments on footnote disclosures; task was performed as individuals, in groups and again as individuals			• Group processing decreases judgment variability and increases subject confidence in decision • Groups used more information than individuals • Communication mode had an effect on results but may have been a failure in randomization

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TABLE 2 (Continued)

Article	Setting: Same Time/ Same Place	Setting: Same Time/ Different Place	Setting: Different Time/ Same Place	Setting: Different Time/ Different Place	Task Description and Activity Type: Idea Generation	Decision Making	Conflict Resolution	Execution	Main Results
Solomon (1982) Probability assessment by individual auditors and audit teams: An empirical investigation	• 26 hierarchical groups of 3 auditors compared to 26 individuals • Groups interacted in 2 specified formats: the first format was nominal/ interacting in which a decision was made individually and then discussed with the group, while the other was interacting/nominal which reversed the procedure					Subjects completed 6 cases asking for prior probability distributions on account balances; cases were completed as individuals as a groups			• Team judgments were more extreme and exhibited greater consensus, but also greater error levels (miscalibrations) than individual judgments • Significant difference between interacting/ nominal and individual results leads to conclusion that the interaction format affected results
Trotman et al. (1983) Individual and group judgments of internal control systems	• 2 or 3 member groups of students					Internal control reliability judgment			• Groups outperformed individuals, used more information and were more consistent

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TABLE 2 (Continued)

Article	Settings: Same Time/ Same Place	Same Time/ Different Place	Different Time/ Same Place	Different Time/ Different Place	Task Description and Activity Type: Idea Generation	Decision Making	Conflict Resolution	Execution	Main Results
Reckers and Schultz (1993) The effects of fraud signals, inventory evidence order and group-assisted counsel on independent auditor judgement	• 99 senior auditors formed into 17 3-person groups compared to 51 individuals					Subjects completed an initial evaluation of the need for inventory write down and reported the likelihood of presence of fraud, then evaluated the case with/without group assistance			• Group-assisted judgment shows remarkable adherence to the guidance present in SAS No. 53 compared to individual judgment • Group-assisted judgment shows an appreciation of market forces, which requires an efficient audit
Harry and Ruf (1994) Auditors' likelihood of assessment of initially generated hypothesis in analytical procedures: the effect of decision aids vs. group discussion	• 30 auditors worked with a decision aid that contained 5 alternative possible causes for analytic procedures result • 27 auditors worked in 9 3-person groups				Generate other possible causes for analytic procedures result	Pre- and post-treatment assessment that analytic procedures result was caused by a specified error			• Shift toward opinion of fellow group members (after a group discussion) is not supported • Auditors opinions will shift depending on whether they use a decision aid or participate in group discussion • Using a decision aid reducted post-test assessment, while group discussions shifted post-test assessments toward the group position

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TABLE 2 (Continued)

	Setting				Task Description and Activity Type				
Article	**Same Time/ Same Place**	**Same Time/ Different Place**	**Different Time/ Same Place**	**Different Time/ Different Place**	**Idea Generation**	**Decision Making**	**Conflict Resolution**	**Execution**	**Main Results**
Johnson (1994) Audit memory for audit evidence; effects of group assistance, time delay and memory task	• 133 practicing auditors at staff, senior and managers levels • Individual responses from 78 auditors who participated in groups of three are compared to individual responses					Recall or recognition of working paper evidence after review			• Group-assisted individuals have process gains of more information and more accurate information • Group-assisted individuals were more confident in evidence recognition

TABLE 3
Studies Using GSS Technology

	Settings				Task Description and Activity Type				
Article	**Same Time/ Same Place**	**Same Time/ Different Place**	**Different Time/ Same Place**	**Different Time/ Different Place**	**Idea Generation**	**Decision Making**	**Conflict Resolution**	**Execution**	**Main Findings**
Bamber et al. (1996) The effects of group support system technology on audit group decision making	• 4-person groups of senior auditors				First part of task involved generating list of relevant issues	Judgment on disclosure was performed as individuals, groups and again as individuals			• Groups outperformed individuals by having increased consensus and more complete problem analysis • GSS use maintains the advantages of group decision making • GSS use led to process gains in idea generation, with GSS groups generating more relevant issues • GSS use let to process gain of having a more thorough problem analysis • GSS groups had higher decision acceptance

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TABLE 3 (Continued)

Article	Settings				Task Description and Activity Type				
	Same Time/ Same Place	Same Time/ Different Place	Different Time/ Same Place	Different Time/ Different Place	Idea Generation	Decision Making	Conflict Resolution	Execution	Main Findings
Kerr and Murthy (1994) Group decision support systems and cooperative learning in auditing: An experimental investigation	• 54 students in a senior level auditing course were formed into 3 treatment groups: 14 subjects worked independently; 20 subjects worked in 5 GSS groups of 4 people each and 20 subjects worked in 5 face-to-face groups of 4 people each				All subjects completed one case which involved individually developing an internal control questionnaire, then participated in their assigned treatment, then reviewed their initial case answer and revised it as appropriate				• Groups using GSS had a process gain of learning; they improved their internal control questions more than groups that had interacted face-to-face and individuals who had the treatment of always working alone • No significant difference between groups that had interacted face-to-face and individuals who always worked alone • Subjects perferred face-to-face discussion to GSS use and felt face-to-face discussion was more efficient

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TABLE 3 (Continued)

Article	Setting: Same Time/ Same Place	Setting: Same Time/ Different Place	Setting: Different Time/ Same Place	Setting: Different Time/ Different Place	Task Description and Activity Type: Idea Generation	Decision Making	Conflict Resolution	Execution	Main Findings
Murthy and Kerr (1994) The effect of group decision support systems on cooperative problem solving in auditing	• 62 students in a senior level auditing course • 14 completed experiment individually • 48 students formed 12 groups of 4 members: each group worked one case using face-to-face discussion				All subjects completed two cases: Case 1— Prepare a list of recommendations to the client for the existing internal control structure over purchases Case 2 — Prepare a list of recommendations to the client for the existing internal control structure over cash				• Groups using GSS had a process gain of more information: they generated a greater number of relevant and unique recommendations to the client than groups interacting face-to-face • Groups using GSS outperformed a summation of individual responses • Subjects preferred face-to-face discussion to GSS assistance and felt face-to-face discussion was more efficient
Karan et al. (1996) Information technology support for collaborative decision making in auditing: An experimental investigation	• Stage 1: 80 students divided into 20 groups of 4 • Stage 2: 40 students divided into 10 groups of 4					Subjects assess level of audit risk for hypothetical client. Initial individual assessments required from all subjects Stage 1: Subjects performed the task interacting face-to-face or using GSS (anonymously) Stage 2: Subjects performed the task using GSS (not anonymously)			• GSS-mediated communication was more efficient than face-to-face • No significant difference in degree of satisfaction between GSS and face-to-face • Difference in choice shift due to automated decision aid and not anonymity

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TABLE 3 (Continued)

Article	Settings				Task Description and Activity Type				
	Same Time/ Same Place	Same Time/ Different Place	Different Time/ Same Place	Different Time/ Different Place	Idea Generation	Decision Making	Conflict Resolution	Execution	Main Findings
Ho (1994) Technology and group decision process in going-concern judgments	• 42 partners, managers and supervising seniors from 4 public accounting firms were formed into 14 hierarchical groups of 3 members each who were randomly assigned to GSS or face-to-face settings					Groups asked to analyze a company's ability to continue as a going-concern. Using a 7-point Likert scale to make judgments on going-concern status, loan repayment ability, profitability, and liquidity			• Both GSS and face-to-face groups experienced a process gain of more thorough decision analysis, but this analysis did not reduce variance in decisions • No significant difference in going-concern decision between groups using GSS and face-to-face groups • Levels of perceived agreement and confidence in group decision significantly higher for GSS than face-to-face setting
Arnold et al. (1996) Audit group decision making: the impact of time pressure and group support systems	• 62 students in 12 practiced groups of 4–6 participants that made 48 materiality decisions	• 31 students in 6 groups of 4–6 that made 23 materiality decisions				Materiality judgment using 6 information cues for 4 cases. Two cases were completed with time pressure, two cases were completed without time pressure			• GSS and face-to-face had similar approaches to processing under time pressure • GSS use led to slower processing of information cues and a corresponding increase in time required to reach a group decision

time/different place setting as a conference call between experimental participants, while Arnold et al. (1996) use a GSS. Different time/same place settings are presumed in the manager review studies (see table 2).[1] None of the studies examine different time/different place group work. The research has only examined small groups of two to four group members. Of the studies conducted, only four implement an interacting hierarchical group (Solomon 1982; Johnson 1994; Ismail and Trotman 1995; Ho 1994); the other studies examine groups of peers.

Even this limited amount of research indicates that the audit group's setting matters. The communication channel (e.g., face-to-face, telephone, or computer network) can affect attributes of the decision process (e.g., coverage of issues, satisfaction) in addition to the actual decision (Schultz and Reckers 1981; Bamber et al. 1996; Arnold et al. 1996). For example, Bamber et al. (1996) found GSS groups covered more issues, while Shultz and Reckers (1981) found that telephone communication led to a more conservative shift in opinion than face-to-face discussion. With respect to the hierarchical level, review process studies find that hierarchical review improves the overall group process by, for example, increasing the number of hypotheses generated (Ismail and Trotman 1995) and improving the overall accuracy of the outcome (Trotman 1985). Furthermore, this research suggests that the hierarchical level of the auditor performing the review can also affect overall group performance because reviewers at different levels are relatively more effective at identifying different types of errors (Ramsay 1994). Finally, for activities outside the review process, Gibbins and Emby (1984) find that group consultation is important to professional judgment in auditing, but that the value of the consultation is perceived to vary directly with the hierarchical level of the auditor consulted.

Other than manager/partner review, which is described as taking place in different time/same place settings, audit groups have typically met in the traditional same time/same place setting. GSS are expected to increase the use of same time/different place settings (Bamber et al. 1996). Figure 2 shows that such meetings can occur with the aid of local area networks, audio and video conferencing. Moreover, just as GSS facilitate the engagement partner and consulting partners, for example, being involved in the field auditors' deliberations through a same time/different place meeting setting, GSS also permit others, including industry specialists and technical partners from the national office, to be temporarily added to the group. This larger and more diverse group helps to ensure that the relevant experience and expertise is available to the group on a timely basis. The addition of outsiders, however, changes the familiarity and experience that the group has working together and may decrease group cohesiveness (Thomas and Fink 1963). Furthermore, the addition of *ad hoc* group members may change GSS use patterns, because GSS use increases with familiarity (Nunamaker et al. 1989; Poole et al. 1991). Finally, because GSS facilitate meeting structuring and the communication within large groups (Dennis et al. 1990; DeSanctis et al. 1991), the additional coordination cost associated with larger groups may also be less with GSS use, further increasing the likelihood of a larger working group. These results and the findings from the audit group research discussed above provide the basis for propositions regarding GSS use and audit group settings.

Proposition 2: GSS lead to the use of more nontraditional audit group settings, e.g., same time/different place settings.

Proposition 2a: Use of same time/different place GSS leads to a decrease in senior and manager hours spent at client sites and therefore may change the level of personal interaction between the auditor and client.

Proposition 2b: Use of same time/different place GSS leads to an increase in the number of concurrent clients to which seniors and managers can be assigned.

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[1] The review process could also be conducted in different time/different place settings if workpapers were taken off-site for review. However, none of the prior review-process research explicitly stated that different place settings were used.

Proposition 2c: Use of same time/different place GSS leads to increased timeliness of review (because review can be done off-site) and this more timely review will lead to more effective audits.

Proposition 3: GSS lead to an increase in audit group size and the diversity of group members.

Proposition 3a: The increase in consultation via GSS use will lead to more effective audits because technical expertise will be more readily available. (Group membership will be driven more by expertise than location of personnel.)

Proposition 3b: Practiced audit groups will use GSS more than *ad hoc* audit groups and will employ different GSS features than *ad hoc* groups. For example, *ad hoc* and geographically dispersed groups will focus on GSS communication features, while practiced groups will integrate GSS structuring features into their day-to-day work.

Proposition 3c: Larger audit groups will perceive GSS as more effective and will exhibit greater satisfaction with GSS use.

Task

Tables 1, 2 and 3 indicate that audit group studies examine a variety of audit tasks, including internal control evaluation, disclosure decisions, assessment of the value of accounting populations, going concern judgments, likelihood of fraud judgments and risk assessment. However, in terms of McGrath's (1984) taxonomy of task activities, the range is more limited. Twelve of the 20 studies involve decision-making tasks and the other eight involve idea generation tasks. Idea generation has been studied in research on the review process (Ramsay 1994; Ismail and Trotman 1995), group vs. individual research (Harry and Ruff 1994; Johnson 1994) and in audit GSS research (Karan et al. 1996; Kerr and Murthy 1994; Murthy and Kerr 1994; Bamber et al. 1996). None of the prior audit group research examines conflict resolution tasks or execution tasks.[2] Only two studies examine different levels of responsibility within the decision-making task: Shultz and Reckers (1981) and Reckers and Shultz (1982) examine the responsibility of the decision makers with respect to advisory decision making vs. binding decision making and find that auditors evaluating a problem in an advisory capacity tend to be more conservative than auditors evaluating the problem in a binding capacity.

Overall, tables 1, 2 and 3 suggest that within the decision-making and idea generation task activities, group processing has a positive effect and that, especially in terms of idea generation, GSS are also associated with positive outcomes. This is a potentially important finding for auditing GSS given the role of hypothesis generation in auditing and because failure to identify the right explanation can have significant audit consequences (Koonce 1993). While execution and conflict resolution tasks have not been examined, GSS may positively affect these activities. GSS use can increase commitment to and satisfaction with the group decision, which facilitates conflict resolution and execution (Bamber et al. 1996). However, these findings should be interpreted with care given the limited amount of research.

This early auditing GSS research tends to select a typical audit task performed by groups and examine the consequences of providing GSS to the groups. Task characteristics such as time and budget pressures, materiality and audit risk are not explicitly studied, although Arnold et al.'s (1996) examination of the interaction of time pressure and GSS use is an exception. Given the limited knowledge of audit groups, this approach is understandable and, given the variety of audit tasks and task activities, there is room for further research examining the generalizability of GSS effects across different audit tasks. However, research also needs to move in the direction of examining the interaction between task activities and GSS use and also the effects of specific audit task characteristics. We propose the following propositions relating GSS use to audit task activities:

[2]However, a recent nonaudit accounting group study looks at negotiation with a GSS in a conflict resolution task (Arunachalam and Dilla 1995).

Proposition 4: Positive outcomes found for GSS in idea generation and decision-making audit task activities will extend to conflict resolution and execution audit task activities.

Proposition 4a: For audit tasks where the focus is conflict resolution (e.g., determining level of audit disclosure), GSS will engender group process gains including more objective evaluation of information, greater equality of participation and greater commitment to the group decision.

Proposition 4b: For audit tasks where the focus is execution (e.g., evidence gathering), GSS will engender process gains including the ability to gather and evaluate more information in less time and less susceptibility to pressures such as premature sign-off.

Proposition 4c: Structuring audit tasks into definable task activities (e.g., hypothesis generation and hypothesis evaluation in preliminary analytical review) will facilitate matching GSS tools to the task activities and result in more effective GSS applications.

Proposition 4d: Task characteristics such as materiality, client importance, audit risk, and time and budget pressure will affect the development and use of GSS applications.

Next, our research framework suggests that task complexity be evaluated prior to recommending GSS use. Task complexity increases with the amount and clarity of information present during each phase of the task: input, processing and output (Bonner 1994). For example, task input complexity increases with the number of information cues available for the task, while task output complexity increases with the number of possible outcomes and the clarity of evaluation criteria for selecting the best outcome (Bonner 1994). Bonner (1994) also suggests that task complexity decreases with the ability to structure processing of the information input. In addition to the amount, clarity and processing structure of the information available for the task, the richness of the information also affects task complexity. Information richness refers to "how much the information contains 'surplus' emotional, attitudinal, normative and other meanings, beyond the literal cognitive denotations of the symbols used to express it" (McGrath and Hollingshead 1993, 92). GSS use can change the amount and clarity of information input (through the GSS tool of group memory and shared databases), the methods of processing the information (through the GSS tools of parallel communication and structure) and the methods for evaluating the information (through the GSS tool of decision aids). Further, GSS use can change the information richness available in the task due to the media effects associated with using GSS. The effects of each of these GSS tools on audit tasks will be discussed below. However, at this point we propose several general propositions on task complexity and GSS use:

Proposition 5: GSS use will engender greater group process gains, such as more comprehensive and detailed analysis, for complex audit tasks than for simpler audit tasks.

Proposition 5a: GSS use will encourage consultation with experts for complex and technical audit tasks involving, for example, audit scope, statistical and computer auditing and financial disclosure.

Proposition 5b: GSS use will improve audit outcomes, including better developed justifications and increased auditor confidence in complex audit tasks, such as audit planing and the evaluation of the clients' internal control environment.

Proposition 5c: GSS use will be more effective for complex audit tasks, such as audit planning and opinion formulation, which can be structured to take advantage of specific GSS tools.

McGrath's (1984) task activities may be performed individually as separate tasks or sequentially as part of a larger task. The audit itself is a sequential process made up of a multitude of audit tasks (each consisting of one or more of McGrath's (1984) task activities) with many of these tasks depending on the outcome of earlier tasks (Ashton and Ashton 1988). As discussed earlier, GSS make it efficient for more individuals (e.g., specialists and superiors) to be included in the group as needed. So, for example, the number of levels required to authorize an action is reduced because one or more of these levels is co-opted, if only temporally, into the group. Alternatively, through problem structuring and increasing the information available to group members (i.e., providing background knowledge and specialized information), the GSS may avoid the need for the original level of authorization or the need to seek a specialist such as a technical partner from the national office (Huber et al. 1993). In the case of working paper review, GSS use combined with electronic working papers permit almost instantaneous review. Thus, the sequence of tasks may be completed on a timelier basis with GSS use.[3] This suggests the following propositions:

Proposition 6: GSS use increases the timeliness of audit group work that must be performed in sequential order.

Proposition 6a: GSS use can change the need to perform certain audit tasks in sequential order (e.g., review can occur after each audit step rather than at the end of the audit plan) by increasing access to information.

Proposition 6b: GSS use can empower the group through problem structuring and embedded knowledge, reducing the group's need for external authorization and feedback.

Process Gains and Losses

Group process gains and losses pertain to the group working in a nonsupported environment and the group as it works with a GSS. Understanding how specific process gains and losses operate in the audit group is important if we are to move beyond viewing audit group processes and related GSS effects as a black box and provide directions for audit group use of GSS. Recent studies on the review process have responded to Solomon's (1987) call for research into specific process gains and losses associated with multi-auditor judgment. For example, Ismail and Trotman (1995) find that both review and subsequent discussion results in the process gain of generating more plausible hypotheses (i.e., more information) and Libby and Trotman (1993) find that because the reviewer considers information inconsistent with the preparer's stated opinion, review provides a process gain of a more objective outcome. Kerr and Murthy (1994) find a process gain of more learning for GSS-supported groups (see tables 1 and 2).

While (nonaccounting) GSS research into the gains and losses associated with specific GSS features is well established, this research is just beginning in auditing. One example is Karan et al. (1996), who examine the GSS feature of anonymity. However, they do not find a difference due to anonymity in the choice-shift observed between GSS and face-to-face groups in an audit risk assessment task (i.e., both the anonymous and nonanonymous GSS users had a similar choice shift, which was different from the choice shift in face-to-face groups). Instead they attribute the difference to the presence of the GSS's decision aids that were not present in the face-to-face discussions (table 3). However, more research will be needed to understand how GSS features affect processing gains and losses in various audit group setting/task combinations. The (nonaccounting) GSS research makes clear that a GSS cannot simply be assumed to increase a specific process gain or reduce a specific process loss (e.g.,

[3] This effect is separate from the GSS effect on the time to complete an individual task activity. Existing auditing research (Arnold et al. 1996) suggests that GSS may result in groups taking longer to complete some individual tasks. Although Bamber et al. (1996) provide evidence suggesting that one reason for this is that the group is processing more information and that, in terms of information per unit of time, the GSS is no less efficient.

Watson et al. 1988). The overall mixed results in table 3 for auditing GSS indicate that researchers have to match the GSS features employed to the group setting, the task and the expected group process effects. The primary GSS features and their potential effects (i.e., process gains and losses) are summarized in figure 3. Propositions about the role of these GSS features in auditing follow.[4]

The first feature identified in figure 3 is *anonymity*. Anonymity means that the identity of the communicator is concealed. This GSS feature may be especially relevant in auditing settings because of an audit firm's hierarchy. This feature operates to mitigate conformance pressure and group domination by more prestigious group members. The (nonaccounting) GSS research tends to find that anonymity does not necessarily affect decision performance, but that anonymous groups tend to generate more information and be more critical and probing in their analysis (Jessup et al. 1990; Valacich et al. 1992). These are important decision attributes in auditing that promote auditors' professional skepticism. While Karan et al. (1996) did not find a significant difference in choice-shift attributable to anonymity, their study used groups of peers (students). Based on a review of GSS research on the feature of anonymity, Dennis and Gallupe (1993) conclude that groups of peers perceive anonymity to be less important than groups with hierarchical structures whose members had different power and status. Anecdotal comments by staff auditors indicate that they are reluctant to speak critically in front of superiors. Rather auditors are more likely to be influenced by their superiors to whom they are accountable (Peecher 1996). This leads to the following propositions:

Proposition 7: Anonymity mitigates conformation pressure in audit settings so that more information is generated that is evaluated more objectively.

Proposition 7a: Process gains from anonymity are larger when audit groups are composed of auditors at various hierarchical levels and with different backgrounds and specialties.

Proposition 7b: Process gains from anonymity will increase as the disparity in level of auditor increases (e.g., more process gains will result when partners meet with staff members than when partners meet with managers).

Proposition 7c: Auditor satisfaction with the group outcome will increase when the GSS feature of anonymity is used in groups composed of auditors of various hierarchical levels.

Proposition 7d: Anonymity will increase group process gains during audit tasks that are subjective and require the expression of an opinion (e.g., contingent liability disclosure and sufficiency of audit evidence).

Another GSS feature that can change the way audit groups interact is *parallel communication*. Parallel communication (also called simultaneous input) allows all group members to input ideas simultaneously and, therefore, is especially effective at reducing production blocking and facilitating the generation and communication of information (Gallupe et al. 1991; Nunamaker et al. 1993). Parallel communication will be more useful for audit tasks where the completeness of information generated and evaluated is more of a concern than information overload (Watson 1993). For example, in going-concern evaluation and opinion formulation, it is more important to have all the relevant information than to have too much information. Parallel communication is also important because the hierarchical nature of the audit firm can affect who speaks at meetings and the order of speaking. Therefore, parallel communication should also help minimize the domination effects inherent in hierarchy (Tan et al. 1995). Finally, in same time meetings, parallel communication permits more information to

[4] These propositions reflect our evaluation of the strongest nonaccounting GSS research results and the more important audit group issues. They do not cover all possible GSS process gains and losses for audit group work.

be considered in less time, because group members' input of information can take place at once. Given the time pressure inherent in audit environments (McDaniel 1990), parallel communication may facilitate more effective meetings. This discussion suggests the following propositions:

Proposition 8: Parallel communication will result in improved audit outcomes by broadening auditors' participation in the group process, thereby increasing the information generated.

Proposition 8a: Process gains from parallel communication are larger for audit tasks requiring brainstorming (e.g., hypothesis generation in preliminary analytical review) or the efficient consideration of large amounts of information (e.g., a going-concern decision).

Proposition 8b: Process gains from parallel communication can result in more communication throughout the audit firm and increase auditor learning and satisfaction.

Typically, GSS provide a *group memory* feature by recording information entered by group members and presenting this information or summaries of this information to group members on demand. Group memory documents the group discussion, reducing group members' cognitive effort to remember topics previous discussed (thereby reducing information overload) and improves the efficiency of meetings because the group memory avoids groups redundantly discussing meeting topics. Group memory also permits group members to temporarily uncouple themselves from the group to, for example, individually pursue a train of thought, for example, without missing the intervening communication (Nunamaker et al. 1993). In addition to increasing the availability of information currently generated by the group, GSS can include technologies for accessing databases. Thus, GSS can also increase access to external information available to the group. This is a potentially important feature in auditing as accounting firms are currently developing data bases capturing information such as industry practices and typical error rates, while online workpapers capture audit specific data. GSS provide the means for delivering this information to audit groups in real time. Furthermore group memory and access to databases are potentially important to auditors performing evidence evaluation tasks. Audit evidence decisions are affected by a variety of factors including comprehension and recall of evidence (Cushing and Ahlawat 1996). For example, Moeckel and Plumlee (1989) find that auditors are likely to rely on their faulty memories rather than consult actual working papers. Because prior research has found that auditors are biased by recently recalled information (Ashton and Ashton 1988; Messier and Tubbs 1994), the use of GSS group memory and databases potentially could alleviate these evidence evaluation biases, improve the accuracy of the evaluation and reduce overconfidence in faulty memories. This discussion of group memory (and databases) leads to the following propositions:

Proposition 9: Group memory increases the information available to the audit group from both inside and outside the group.

Proposition 9a: Group memory facilitates the group's use of information by reducing production blocking and information overload.

Proposition 9b: Auditors using GSS will be more apt to research issues back to automated working papers and therefore avoid potential evidence biases.

Proposition 9c: Group memory reduces the time spent in audit meetings by documenting the group's discussion as it takes place.

Proposition 9d: Real-time documentation will increase group members' commitment to the group decision and facilitate execution of decisions made by the group.

Structure can apply to the group process (i.e., process structure) or to the audit task (i.e., task structure). GSS research has focused on process structuring, while auditing research has tended to focus on the use of decision aids to provide task structure to individual auditors. Because GSS can be used in a variety of audit tasks, we focus on *process structure*. Process structure tools include the use of an agenda or a fixed communication process. The value of process structure is that it keeps a group on task, establishes goals for the group and provides a framework for thinking about the group task. All types of GSS have some process structure features and typically there is considerable flexibility in determining the degree of structure. Furthermore, the decision to use a GSS implicitly requires a group to design its meeting, because it has to select which process structure tools to use and how to sequence them. These attributes of process structure should lead to increased generation of information and more objective evaluation of the information generated. The expected reduction of process losses occurs in the area of information overload with structure assisting in the digestion of more information.

The structure tools addressed by GSS research include the use of an agenda and a fixed communication process. For example, George et al. (1991) examined the effect of an overall meeting agenda and found no difference in a generate-and-choose task with or without an agenda; Easton et al. (1990) examined a process in which the group communication was divided into separate and distinct subconversations and found a difference in the number of ideas generated. The results found in GSS research on process structure are mixed, leading Dennis and Gallupe (1993) to suggest that the use of process structure may be case specific and only engender process gains where the process structure fits the task structure, with greater process structure being appropriate for more complex tasks. In the audit environment, Solomon (1982) examines two interacting formats: nominal/interacting (in which a decision was made individually and then discussed with the group) and interacting/nominal (which reversed the interaction). While Solomon (1982) did not find a significant difference between nominal/interacting and interacting/nominal groups, there was a significant difference between interacting/nominal and individual results, leading him to conclude that the interaction format (process structure) affected results. Given that many auditing task are complex (Bonner 1994) and that group processing is generally reserved for the most complex of these tasks, process structure should be an important attribute of auditing GSS use. Accordingly, we propose the following propositions:

Proposition 10: Process structure engenders process gains (e.g., reducing production blocking and discouraging socializing) by helping audit groups stay focused and work through the audit task in a logical manner.

Proposition 10a: Audit groups are more likely to apply GSS-based agendas and other structuring tools than they are manual (non-GSS) agendas and manual process structuring tools.

Proposition 10b: Group process gains resulting from the use of GSS process structuring tools will increase as audit task complexity and group size increase.

Another feature of GSS as shown in figure 3 is the ability to provide *decision aids,* such as vote tabulation and statistics. In auditing, there is already a long tradition of supporting auditors in their performance of complex audit tasks. Audit tasks are complex in part because auditors are required to perform tasks that involve weighing and combining (sometimes-unrelated) pieces of information and using this information to make probabilistic judgments. Because these tasks are generally difficult (Hogarth 1987), the audit profession has implemented many types of decision aids. In general, research on decision aid use finds that decision aids affect individual decision making (Messier 1995). The decision aids that have been implemented range from simple checklists of factors to be considered, for example, in assessing the client as a going concern, to expert systems that work the auditor step-by-step through assessing the client as a going concern. A concern with such decision aids is

auditors' tendency to work backwards from a desired outcome (Kachelmeir and Messier 1990). Expert systems are another approach to knowledge sharing that permit the individual auditor to deal with complex tasks and, perhaps, provide an alternative to group decision making and GSS use. An auditing issue that has grown with the use of these aids is the extent to which audit firms should adopt a structured approach to a task. A primary concern with decision aid use is that there are limits to which they can be designed to address task differences derived from complexities in individual audit environments (Cushing and Loebbecke 1986; Sullivan 1984; Prawitt 1995). In contrast, groups may possess the expertise, but also retain the flexibility to accommodate these complexities. Moreover, because the GSS can focus on structuring the group's *approach* to the task rather than the audit task itself (i.e., process structure vs. task structure), the GSS can support the group's expertise without necessarily limiting its flexibility (Nunamaker et al. 1993). For example, rather that providing a standardized checklist of issues relevant to a going-concern decision (task structure), a GSS decision aid may allow a group of auditors to brainstorm a list of all relevant factors for the particular client, rank them based on their relative importance and then vote on whether the particular client is a going-concern (using GSS process structuring and decision aids). This leads to the following propositions on GSS decision aid use:

Proposition 11: Using GSS decision aids and GSS process structuring will result in group process gains such as more precise information, which is analyzed more thoroughly and leads to more effective outcomes.

Proposition 11a: Audit groups using the GSS features of voting and tabulation will have better calibration of probabilities and other quantitative scales.

Proposition 11b: Audit groups using GSS decision aids will be better able to manage ambiguity and uncertainty in assessing business and audit risks and in making probabilistic estimates.

Proposition 11c: GSS decision aids are less subject to the working backwards phenomenon and superficial use compared to decision aids designed for use by individual auditors.

Proposition 12: GSS decision aids are an alternative to expert systems and are especially relevant for tasks such as audit planning for which the requisite knowledge is incomplete or must be continuously updated.

As soon as audio and video production become low-cost personal computing options, *media* choices are likely to become routine GSS features to be turned on and off as the context requires. Media can influence how much information outside the literal context is communicated with the message because facial expressions and body language often help in the interpretation of a message (McGrath and Hollingshead 1993). The additional information communicated along with the literal message is called "information richness." Media influence varies by GSS type and can affect the richness of the information communicated. For example, video conferencing maintains the ability to interpret body language and facial expressions, while using a distributed workstation system usually eliminates these cues (see figure 2). Furthermore, the four different task types discussed above will interact differently with media. To illustrate, idea generation involves consideration of the largest amount of information (and associated ideas) as possible so that the evaluative and emotional connotations conveyed through facial expressions may be detrimental in an idea generation task. On the other hand, conflict resolution tasks may require the transmission of not only factual information, but also transmission of attitudes toward the information, which are often conveyed with facial expressions and body language. Media effects can also affect the group members' interaction with the technology and with each other. For example, typing comments is typically slower than talking but generally adds to the clarity of the

communication and reduces production blocking (because reading is faster than listening). Furthermore, the media effects in some GSS can reduce free riding by forcing group members to make an input prior to the group moving forward. However, if the GSS does not offer this type of input checking, then group members can hide behind the technology and not enter into the group process. Little is known about the media influences on group processes and performance (Nunamaker et al. 1993). While video and audio conferencing are likely to be not as media rich as face-to-face communication but richer than electronic communication, it is difficult to generalize specific effects. For example, Lee (1994) finds evidence that electronic mail can be rich when group members are familiar with each other. Given that GSS research has not yet sorted out these competing media influences, we recognize that the media has implications for audit group processes with the following proposition:

Proposition 13: For audit groups to experience process gains from GSS use, the appropriate type of GSS media must be matched to the audit task.

IV. CONCLUSIONS AND IMPLICATIONS

There has been a recent increase in audit group research, in part stimulated by the interest in GSS applications. This is not surprising given that network technology is changing the way audits are performed. Indeed, an important message of this article is that the scope and implications of this technology both warrant and provide opportunities for research. Our review of GSS and audit group research provides a number of implications for GSS research in auditing. The first is that the somewhat mixed GSS findings to date combined with the complexity inherent in audit environments, audit group work and GSS use suggest that audit GSS applications represent a rich area for research. The limited settings examined in existing (nonaccounting) GSS research suggest a need for research documenting GSS effects in auditing domains and investigating the particular GSS features relevant to auditing. We propose a framework based on existing GSS findings for undertaking this research.

The proposed research framework analyzes the audit group setting and task activities and then uses these to evaluate the process gains and losses affected by the application of a GSS. The propositions provide direction for this research. Our review of the (nonaccounting) GSS literature suggests that, at this point in the development of GSS research, parallel communication and anonymity are two of the more powerful GSS features. Parallel communication should be readily applied to audit groups. The need in auditing to assign accountability makes anonymity a more difficult feature to apply in auditing. Nevertheless, the potential for anonymity to encourage more critical analysis (and, thus, support professional skepticism) warrants careful consideration. Group memory and databases may also be a particularly important feature in auditing, given accounting firms' recent and continuing efforts to formalize organizational memory and make it available to auditors.

The proposed GSS research will also contribute to our understanding of basic group processes in auditing. A limiting factor for GSS research in auditing is the lack of published research setting forth the most prevalent and pressing issues in audit group work. Accordingly, field studies of, for example, working audit groups and more generalizable survey research on the nature of audit group work are desirable to provide an understanding of audit groups and their tasks and problems.

Solomon (1987) suggests that the cost involved in conducting group research is one reason there is so little of it. Group research is costly because of the number of subjects required to be able to compare changes in group processing. For example, 80 subjects would be required to form 20 four-person groups, leaving only ten observations in each of two treatments. Furthermore, an inherent dilemma in conducting group research exists with respect to the use of *ad hoc* vs. practiced groups. Using *ad hoc* groups does not capture the length of time that auditors normally work together on audit projects; however, using practiced groups, presents an experimental control problem because the groups are no longer homogeneous subjects: practiced groups are dissimilar in length of relationship and prior personal encounters. These two issues have made students the preferred subjects in group research. Students are plentiful and accessible to researchers and can be formed into homogeneous *ad hoc* groups,

which can become practiced groups over the course of an academic time period. Further, because GSS research is in its infancy, the use of students to examine basic GSS-related issues in auditing seems a reasonable first step. However, the use of student subjects as surrogates for auditors creates a dilemma for audit researchers because GSS are most applicable for complex auditing tasks for which students may not be appropriate subjects. Consequently, the use of student subjects requires perhaps even more careful experimental designs than using practicing auditors. Researchers must carefully evaluate the appropriateness of using students to examine the GSS process/feature of interest, remembering that forming students into *ad hoc* peer groups does not capture normal hierarchical audit team settings, nor are students generally capable of handling complex audit tasks.

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