Summary of Paul and Nazareth (2010)

In their article titled, in part, "Input Information Complexity, Perceived Time Pressure, and Information Processing in GSS-Based Work Groups," Paul and Nazareth (2010) studied the relationship between information processing, input complexity, time pressures, decision schema, and information overload in groups supported by group support systems (GSS). They began by noting little research had "specifically focused on the information characteristics of collaboration technology supported work groups" (p. 31), arguing that questions revolving around the volume and diversity of the information these groups take in need to be studied, with particular emphasis on what happens during the processing of this information. Their study was intended to contribute towards exploring and answering these questions.

Next, Paul and Nazareth (2010) presented previous research in information processing, focusing on research from the perspective of cognitive psychology. Such research has focused on factors of information load and diversity, proposing an inverted-U relationship between information complexity "and the level of information processing" (p. 32). In this proposed relationship, information processing levels increase up until a tipping point, when information overload occurs. For different individuals and/or groups the tipping point is thought to be at a different point, based on the capability for processing of an individual or group. Time pressures also appear to play a role, and Paul and Nazareth briefly discussed the literature on that topic; inverted-U relationships have also been proposed between information overload and time pressures. Specific to GSS-based groups, Paul and Nazareth reviewed a few studies which had found information overload and information processing to be important factors. Suggested techniques from these studies to reduce information overload included (but were not limited to) the Delphi method, quantitative models, and regulation of the flow of ideas.

Paul and Nazareth (2010) focused their study on "how information complexity and time pressure relate to the level of information processing in" GSS-based groups, as well as on whether a schema to aid the decision would alleviate information overload caused by these factors (p. 33). They proposed and hypothesized, based on the literature, that in GSS-based work groups

- information complexity for group members has an inverted-U, nonlinear relationship with the level of information processing;
- "time pressure is positively related to the level of information processing" (p. 34); and
- decision schema increase the complexity that can be handled before the tipping point of information overload is reached.

To test these hypotheses, the authors conducted an experiment where 54 groups, each composed of five randomly assigned undergraduate business students, used a group decision support system (GDSS) and an intranet to evaluate MBA programs in the form of a ranked list based on weighting criteria. The authors chose this decision task both in order to appeal to the business students and due to the diversity and volume of information available on each program. The GDSS provided communication and process structuring support, while the intranet provided information on each of the criteria for each MBA program under evaluation. Face-to-face communication was strongly discouraged during the main phases of activity. After each student weighted the criteria individually, groups would see the resulting rankings as averaged across group members. Group weightings could then be adjusted as many times as necessary in order to reach consensus amongst at least four of the five members, echoing the Delphi method. Measures of the results of each group included decision time (length of group session); information flow (number of intranet pages accessed per time unit); information diversity

(number of unique pages accessed); information volume (number of information bits accessed, one bit per attribute); and time pressure (a two-item, five-point Likert scale). The time pressure scale was found to be reliable and valid via expert review and factor analysis.

Paul and Nazareth's (2010) analyzed their results using polynomial regression. They found support for the inverted-U relationship between information complexity and information processing, especially in the case of information flow; findings for information volume were also significant, but only at a higher probability level of Type I errors. Time pressure was also found to significantly and positively correlate with the level of information processing, proving the authors' second prediction to be true. Their third hypothesis, that decision schema would increase the capability to handle complex information, was found to be true through careful analysis of the treatment and control groups. The former did not feature an inverted-U relationship, which—per the researchers—implied they had not reached the tipping point for information overload yet because of the support of decision schema.

Paul and Nazareth (2010) argued their findings showed that groups face information overload just like individuals do, and that decision schema and other information that can simplify decision making help to reduce information processing and thus increase the amount and complexity of information groups can use. Their findings could and cannot be easily generalized to other tasks or configurations of groups or to other populations. They suggested future research should extend the study to include real decision makers; asynchronous and virtual teams; different types of decision schema; and better operational measures of variables.

Analysis: Evolution of GSS Research

Paul and Nazareth's (2010) article shows that many things have changed over the years in GSS research, yet there are still a few constants which have remained in any GSS study. The

defining factor of much GSS research, especially early research, has been examining how groups make decisions; this is perhaps expected given the area's emergence out of decision support systems research (see DeSanctis & Gallupe, 1987). Much early literature focused on "decision rooms," featuring workstations; display facilities; and technologies for interaction, polling, and the like. Groups of managers then used these rooms for meetings where they made decisions, supported by the GSS and its technology. This approach was present in the work of Stefik et al. (1987) on the Colab system and how it could be used within a decision room, with nary a mention of how Colab could be applied to distributed work. Such a focus is also in evidence in DeSanctis and Gallupe's (1987) seminal article on GSS.

It did not take long for the use of GSS outside of decision rooms to be considered, however. Dennis and his colleagues (Dennis, George, Jessup, Nunamaker, & Vogel, 1988; Nunamaker, Dennis, Valacich, Vogel, & George, 1991) broadened the study of GSS to include their potential use by distributed groups, drawing upon the study of collaborative groups in computer-supported cooperative work (CSCW) research. The taxonomy they developed of GSS environments (Dennis et al., 1988, p. 609)—based on DeSanctis and Gallupe's (1987, p. 591) contingency perspective model—featured twelve possible types of GSS, of which only four were non-distributed. Nevertheless, their focus was still primarily on meetings—hence their conception of electronic *meeting* systems (EMS)—and entirely on group decision making, rather than group collaboration as was (and is) more typical of CSCW research.

Speaking of the latter, Ellis, Gibbs, and Rein (1991) presented such a CSCW perspective—albeit one also emerging and evolving—on supporting groups and group collaboration. Their GROVE system was still restricted to task support, rather than providing support for group interactions as a whole, but did not require a focus on decision-making or for

all group members to be co-located. The system tested by Connolly, Jessup, and Valacich (1990) in their study of the effects of anonymity and tone was also task-restrictive, but unlike some of the other GSS literature the emphasis on decisions was downplayed. Instead, the ideas generated in the group's meeting were forwarded to experts for evaluation, rather than the groups themselves making any final decisions. Of course, groups may still have not passed on ideas that they judged to be of poor quality; thus there was still an element of a decision being made in these groups, placing Connolly et al.'s study in line with GSS research—albeit in a forward-thinking fashion—rather than CSCW research.

Paul and Nazareth's (2010) study presented an interesting combination of the above. Given its laboratory experiment methodology and need for control, use of the GSS was unavoidably set in a non-distributed environment which served as a meeting. The "decision room" aspect, however, was not present; instead group results were displayed on participants' individual screens. A decision of sorts was being made: which criteria for assessing MBA schools are most important, and thus (by extension) which MBA schools are the best? As such, the study itself would not be foreign to a time-traveling DeSanctis or Gallupe from 1987.

The article taken as a whole, however, shows how GSS research has evolved since earlier studies. Paul and Nazareth (2010) made frequent mention of virtual and distributed teams, collaboration, and asynchronous, non-meeting based tasks in their introduction, literature review, and discussion. They also drew significantly from cognitive psychology, showing the influence of alternative perspectives as raised by Ellis, Gibbs, and Rein (1991). The focus on support of a given task was still present, however, rather than an exploration of more general support for collaborative activities. One can conclude this is one of the remaining dividing lines between GSS and CSCW research, and a factor that is especially constant throughout the GSS literature.

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