DSS and Multiple Perspectives of Complex Problems

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INTRODUCTION

Decision support systems have always had a goal of supporting decision-makers. Over time, DSS have taken many forms, or many forms of computer-based support have been considered in the context of DSS, depending on one's particular perspective. Regardless, there have been decision support systems (DSS), expert systems, executive information systems, group DSS (GDSS), group support systems (GSS), collaborative systems (or computer-supported collaborative work (CSCW) environments), knowledge-based systems, and inquiring systems, all of which are described elsewhere in this encyclopedia.

The progression of decision support system types that have emerged follows to some degree the increasing complexity of the problems being addressed. Some of the early DSS involved single decision-makers utilizing spreadsheet models to solve problems. Such an approach would be inadequate in addressing complex problems because one aspect of problem complexity is that multiple stakeholders typically exist.

Baldwin (1993) examined the need for supporting multiple views and provides the only attempt found in the information systems literature to operationalize the concept of a perspective. In his work, a view is defined as a set of beliefs that partially describe a general subject of discourse. He identified three major components of a view: the belief or notion to convey, a language to represent the notion, and a subject of discourse. He further described notions as comprising aspects and a vantage point. Aspects are the characteristics or attributes of a subject or situation that a particular notion emphasizes. A vantage point is described by the level of detail (i.e., overview or detailed analysis). Assuming the subject of discourse can be identified with the notion, Baldwin described how differences in views may occur via differences in the notion, the language, or both.

We agree with Baldwin's insights, but we take a different approach regarding the identification of DSS capabilities needed to accommodate different views. When multiple stakeholders confront a complex decision-making situation, each stakeholder may view the problem differently. We prefer to say the decision makers approach the problem from different perspectives. A decision maker's *perspective* is the cognitive sense-making structure the decision maker uses to construct an understanding of a problem. It is based on experiences, assumptions, and biases, among other things. What often makes resolution of complex problems so difficult is that difference stakeholders have different perspectives of complex problems. As such, the stakeholders bring to the problem different sets of experiences and different assumptions. They are guided by different biases and they often have different goals. These differences may not be distinct or mutually exclusive. Indeed, what makes resolution of complex problems possible is the overlap or commonality that exists in various perspectives. Simultaneously, the differences in the perspectives, when recognized as reasonable, contribute to better understanding of the problem situation by those that do not initially share those aspects of a perspective.

This article examines the nature of perspectives in greater detail and outlines issues that must be addressed for DSS to incorporate support for multiple perspectives into a decision maker's decision making process.

BACKGROUND

Janssen and Sage (2000) noted the existence of multiple perspectives and the need to support them in the

area of policy making. They observe that complex decision-making environments are often attacked by drawing on the expertise of multiple experts. Often, the inputs of these experts are in summary form and without background information that would allow a policy-maker to assess the context in which the expert's perspective was developed. They developed a system that policy makers could use so that experts and decision makers with differing views could better understand each other's thought processes in complex situations. Their approach makes no effort to identify similarities or differences in individual perspectives.

Salipante and Bouwen (1995) see multiple perspectives as a way of understanding organizational conflict. They analyzed grievances filed in organizations and determined that grievances rarely fit into a single category (e.g., wages or discipline). Parties in a grievance form differing perspectives of the situation and hold to their perspective with great conviction for its veracity. Further, mediators tend to introduce their own perspectives when settling grievance disputes according to their preferred way for resolving disputes. Salipante and Bouwen's analysis points to the social construction of organizational reality, emphasizing that organizational reality is not a single objective thing but rather a negotiated reality based on the multiple perspectives of its stakeholders. While recognizing their existence, this work also does not attempt to explicitly model perspectives.

Why Perspectives Are Lost in GSS

Group support systems (GSS) emerged in recognition of the group-oriented decision making processes in organizations. GSS expanded DSS to include tools consistent with the role and function of groups in decision-making processes. These efforts were driven by acknowledgement that groups are often employed to solve problems, especially in situations exhibiting greater complexity. This research came to focus on group behaviors, and a shift of emphasis from group *decision* support to simply group support emerged. Often, the function of these group support systems is to synthesize whatever perspectives exist of a problem into a single perspective so that DSS approaches to problem solving can be used. For example, brainstorming capabilities are used to surface multiple perspectives of a problem, but group support system rating and voting functions effectively elevate the aspect(s) *most widely held* in the group to the status of being the aspect(s) *most important* in the decision-making behavior of the group. Typically, a voting process is employed to identify these aspects of a problem as the ones that will be adopted by the group to represent the problem at hand.

Users of group support systems often benefited from the surfacing of assumptions and beliefs that emerged during brainstorming sessions. However, these systems were not designed to maintain the integrity of the various perspectives of a problem being considered. We believe that a process that loses a perspective of a problem situation probably loses information valuable in constructing an approach to dealing with the problem in a sustainable, long-run fashion.

Philosophical Bases for Perspective Support in DSS

More recently, thought has been given to working with problem perspectives through the design of systems capable of inquiry (Courtney, 2001). These efforts trace their designs to Churchman's seminal book *The Design of Inquiring Systems* (1971) and the work of Mason and Mitroff (1973). Notably, the more sophisticated inquiring systems incorporate the notion of perspectives.

The first approach to inquiry described by Churchman that recognizes multiple perspectives is the Kantian inquirer. Though not expressed explicitly as "perspectives," the Kantian inquirer recognizes the value of multiple models of a situation, in that there is synergism in the multiple models (Linstone, 1999). Paradice and Courtney (1986, 1987) designed a system based on Churchman's description of the Kantian inquirer that performed as well as human subjects in identifying the underlying structure of a complex business simulation. In a few cases, it correctly identified relationships that human subjects had misidentified.

A different way of dealing with perspectives exists in Hegel's dialectic. Dialectic processes implicitly embody two perspectives, the thesis and the antithesis. Where the Kantian inquirer sees synergy in multiple perspectives, the Hegelian inquirer seeks to synthesize multiple perspectives into one. Hodges (1991) developed an information system based on dialectic analysis and demonstrated its effectiveness in supporting complex decision-making situations.

The final inquirer presented by Churchman is based on the philosophy of E.A. Singer. The essence of the