

THE MAJOR CONSTITUENCIES IN DECISION SUPPORT SYSTEM DEVELOPMENT, USE AND EVALUATION

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ABSTRACT

Research into the evaluation of decision support systems (DSS) is usually based on a single reference group. This may not be appropriate where there are always more than one group involved in the development and use of the DSS. An alternative approach, common in organisational behaviour, is to involve each group, or constituency, who has a stake in the system. This allows the views of each constituency to be identified and considered within the evaluation process. Improvement to the system could then be made based on each constituency's requirements. This paper identifies and discusses the constituencies that are relevant to consider during an ongoing DSS evaluation process. This discussion forms the foundation for further research into DSS evaluation.

INTRODUCTION

Decision support system (DSS) evaluation has been suggested by many as an important research area (Raghavan and Chand 1988, Keen 1987, Akoka 1981). In a recent review it was found that most research focuses on a single reference group, often the users of the system (Maynard and Arnott 1995). Few studies identify several groups and evaluate the DSS in respect to these groups.

The use of a single reference group within the evaluation of DSS is questionable. Focusing on the users of the system is understandable given that they initiate, fund and use the system. However, if other groups that have a significant stake in the system have no say in the evaluation process they may become dissatisfied with the project. This is the converse of excluding the users from the development process. In developing and evaluating systems as critical as DSS, it makes good sense to be as inclusive of people and interest groups as possible.

This paper introduces an approach that includes a variety of groups within a DSS evaluation process - the multiple-constituency approach. The next section identifies DSS evaluation research that has included multiple groups and determines the groups that are most appropriate to include in the DSS evaluation process. Once identified, these constituencies are examined to determine their importance to the development, use and evaluation of DSS.

THE MULTIPLE-CONSTITUENCY APPROACH

A widely used method of examining the effectiveness of organisations is the multiple-constituency evaluation approach (Connolly *et al.* 1980, Cameron 1980, Cameron and Whetten 1983b). This approach, rather than selecting a single group on which to base the evaluation of the organisation, aims to identify all groups that are involved in the organisation so that the evaluation is more balanced and all relevant viewpoints are taken into consideration. A constituency within the organisational behaviour discipline is defined as any group with similar beliefs, or an individual that has some stake in the organisation (Cameron and Whetten 1983b). Transferring this approach to the decision support system discipline, a constituency can be defined as any individual or group that has a stake in the DSS. According to this approach, all constituencies that are significantly influenced by the development, use and evaluation of the DSS should be included in the evaluation process.

The multiple-constituency approach treats the DSS as a system generating differential opinions of effectiveness for different constituencies. So, unlike many other evaluation approaches in the DSS field, multiple evaluation measures should be generated for each constituency. This will provide the opportunity for a detailed analysis of how a DSS development project is progressing from one evaluation to the next. For instance, rather than simply being aware that the users are not satisfied with the system, each of the other relevant constituencies could also be represented and results for each constituency could be compared with those from previous evaluations. It could be that the developers are dissatisfied with a central information systems department procedure and cannot deliver the required DSS. The managerial users may be able to bring political pressure to change the ruling.

The important aspects of the multiple-constituency approach include its use of all relevant constituencies in the evaluation process, the development of measures for each constituency and the opportunity for the evaluation process to yield a minimum level of satisfaction per constituency. These issues are discussed further in Maynard and Arnott (1994).

USE OF CONSTITUENCIES IN DSS RESEARCH

Within DSS research, several studies have identified multiple-groups, or as we define them, constituencies, that should be involved in the development, use and evaluation of DSS. Gorry and Scott-Morton (1971) discuss the interaction between managers and analysts in development and the skills required of each for differing types of systems. In his adaptive design model, Keen (1980) identifies the users and builders of the DSS as key roles and elaborates on how each interacts in the development of the system. Sprague (1980) and Sprague and Carlson (1982) identified tool-smiths, technical supporters, DSS builders, users, and intermediaries within their Tools-Generator-Systems paradigm as important groups within the development process.

Most research into DSS evaluation focuses on a single constituency group, usually the decision-makers or users. (Carlson 1983, Sanders 1984, Amoako-Gyampah and White 1993, Hough and Duffy 1987, Barki and Huff 1990). This research has been complimented by a few studies that take into account multiple-constituency groups. These studies have identified management, users, decision-makers, intermediaries and DSS builders (Hamilton and Chervany 1981, Watson *et al.* 1987 and Mahmood and Sniezek 1989). However, where a number of groups have been identified, the evaluation results are typically combined to produce a single measure. This aggregation may be sub-optimal as the system can only be improved in relation to the aggregate measure, rather than specifically for each constituency. The result may be that all constituencies are unhappy.

Table 1 is a catalogue of studies that investigate the development, use or evaluation of DSS where multiple constituencies are used. Each study is listed with its author and the constituencies that were used. Some of these constituencies are specific to a particular type of system, for instance Rainer (1989) specifically refers to executive information systems (EIS). Most can be generalised for any DSS.

Five constituencies have been consistently identified: the DSS developer, the user, the decision-maker, the chauffeured decision-maker, and management. Researchers have used a variety of terms to refer to each constituency. These are identified in *Table 2*. The DSS developer constituency refers to those who are actively involved in the technical development

and implementation of the DSS. A user refers to a person who uses the system directly in

Study	Constituencies Identified
Ahituv and Getz (1986)	tool builder, DSS builder, intermediary and decision-maker
Gorry and Scott Morton (1971)	manager and analyst
Hamilton and Chervany (1981)	user, manager and builder
Keen (1980)	user and builder
Mahmood and Sniezek (1989)	management, indirect users and direct users
Rainer (1989)	executives, providers and vendors
Ramamurthy <i>et al.</i> (1992)	users and the organisation
Sanders and Courtney (1985)	managers, financial planners and 'others'
Udo (1992)	users and managers
Watson <i>et al.</i> (1987)	management, users and the DSS group
Sprague (1980) and Sprague and Carlson (1982)	tool-smiths, technical supporters, builders, intermediaries and users

Table 1: A catalogue of constituencies.

support of the decision maker. The chauffeured decision-maker and decision-maker have the responsibility for making the decision. Where they differ is that the chauffeured decision-maker does not physically use the system, this is done by a user who acts as an intermediary between the system and the chauffeured decision-maker. The management constituency sets the policies of the organisation and thus, will support and constrain the development of the DSS. A further constituency that may also be appropriate for inclusion in an evaluation process is the decision-consumer. The decision consumer constituency comprises those people who are directly and significantly influenced by a decision that has been made through the use of the system.

Constituency	Synonyms
DSS Developer	analyst, builder, DSS builder, the DSS group, tool builder, tool-smiths, DSS developer, technical supporters
User	intermediaries, users, direct users, indirect users, management
Chauffeured Decision-Maker	indirect users, users, decision-maker, management
Decision-maker	direct users, users, decision-maker, management
Management	executives, financial planners, the organisation, management
Decision Consumer	<i>None</i>

Table 2: Constituency Synonyms

From a logical point of view, each of the constituencies identified represents a distinct subset of people involved in the development and evaluation of DSS. When operationalised, however, an individual may play roles in more than one constituency. For example, the user,

decision maker, and DSS developer roles could be performed by one individual. The interaction between constituencies, even when an individual takes on more than one role, is shown in *Figure 1*. These interactions may be important to the evaluation process.

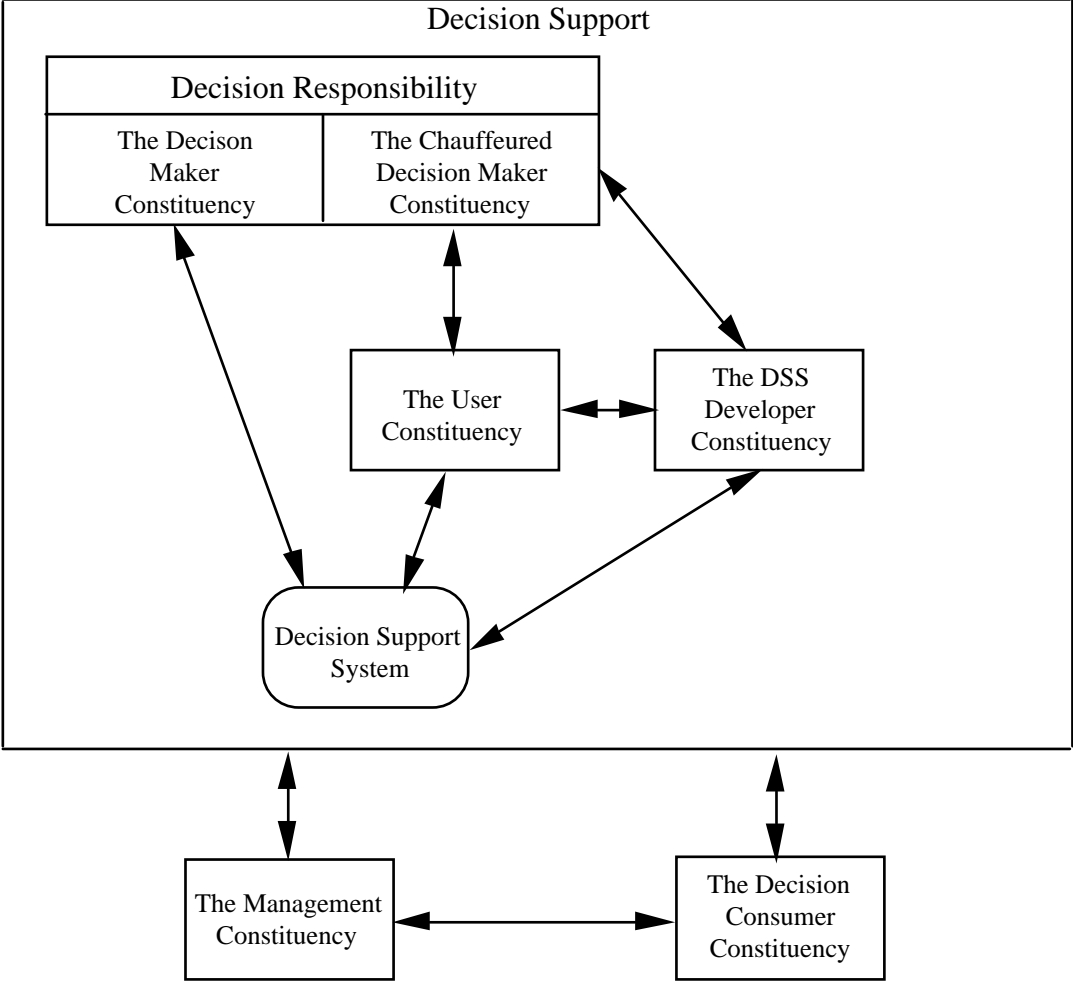


Figure 1: Constituency interaction

In the following sections each constituency will be investigated to determine whether it is appropriate to include it in an evaluation process that takes place during the life time of the DSS, ie. throughout its development, use, and continuing evolution.

THE DECISION-MAKER AND USER CONSTITUENCIES

In many DSS evaluation studies the terms decision-maker and user are often used interchangeably, while other studies differentiate between direct and indirect users

(Mahmood and Sniezek 1989, Hamilton and Chervany 1981). Ambiguity exists as to when a user is a decision-maker, when a decision-maker is a user, and how these roles differ. These constituencies have strong interrelationships.

As argued above the decision-maker and the chauffeured decision-maker are responsible for the decision being made. Where they differ is in the nature of system use. Decision-makers and chauffeured decision-makers share concerns from a decision making perspective during the development, use and evaluation of the DSS. However, the decision-maker will have an additional set of requirements relating to the physical use of the system. This second set of requirements will be similar to the users or chauffeurs. The decision maker and the user roles could be undertaken by a single person.

The role of the decision-maker in development is to help the DSS developer to determine how best to design a system to support the decision process. The DSS developer in turn needs to interact with the user of the system to ensure that the system is useable. If the user perceives that the system is difficult to use then it is unlikely that use of the system will continue. As most DSS users are managers they have the discretion not to use the system or to stop development altogether.

For example, a decision-maker may be responsible for the production in a small manufacturing plant and may need to determine the next months production schedule and raw material requirements. To make this decision there are a number of sub-tasks that must be completed. The decision-maker may need to know the production forecast for the next production run and current stock levels. To estimate production, the decision-maker may need some forecasting based on past production figures with a seasonal variation. The decision support system may require the user to enter the expected seasonal variation, and a number of forecasted production figures may be displayed (perhaps a pessimistic, optimistic, and average figure). The user may then pass this information to the decision-maker who will then select the production figure that is felt to be applicable. The user can then provide the decision-maker with further information (such as stock on hand and reliability of suppliers) and then proceed to use the system to produce some alternatives on ordering raw materials.

Throughout the development of the system, it is useful for the decision-makers and users to provide feedback to the DSS developer to determine how well the system is operating from their perspective. This process, is essentially a form of informal evaluation. A more formalised method of evaluation may be useful for these constituencies to express how the system meets, or does not meet their requirements. The role of the users of the system in the

evaluation process is to provide indications of how well the system is suited to their requirements. The decision-maker perspective, including that of the chauffeured decision-maker, tends to focus on the attributes of the system that are directly related to how they work, in particular to the decision process. Thus, the appropriateness of the DSS to the decision and to the decision process would be important aspects to the decision-maker.

THE DSS DEVELOPER CONSTITUENCY

Developers have rarely been identified as important in the evaluation of decision support systems. This may be indicative of many current evaluation procedures where DSS are only evaluated after a significant system has been delivered. The developer will have some views on how they think the DSS is progressing that are different from the other constituencies. The interaction between the developer and other constituencies is shown in *Figure 1*. The role of the DSS developer is to build and support the DSS throughout its life-cycle. They interact with the decision maker and user constituencies to determine system requirements. The DSS developer constituency is also responsible for the production of all relevant documentation, conducting training for the system and ensuring that the system meets the needs of its users (Watson *et al.* 1987, Rouse 1986, Arinze 1989). In essence, the developer constituency aims to design a system that is compatible with the user and decision-maker constituencies requirements.

The use of the DSS developer constituency in the evaluation of the DSS is as important as including it in development. Some factors that may be important to the continued development of the system may only be provided by the developer, as the other constituencies could be unaware of development problems that may be present. For example, the DSS developer may identify organisational and technological limitations that may otherwise be overlooked. They may also identify emerging technologies that could be used to enhance the system but may be unwilling to discuss these without the use of an evaluation process as they could be seen as technology driven by other constituencies. The absence of the DSS developer constituency in the evaluation process may cause many of these factors to be overlooked.

THE MANAGEMENT CONSTITUENCY

The involvement of management, other than manager users and decision makers, in the development and use of a decision support project may be an important factor in its success (Barki and Huff 1990, Meador *et al.* 1984). The nature of this involvement is both supportive and constraining. *Figure 1* shows the interaction between the decision support project and the management constituency.

In a DSS project the management constituency may be involved in a supportive capacity in many ways. They control the provision of resources for the project, the promotion of the use of the DSS and the progress of the DSS development process (Watson *et al.* 1987, Hogue and Watson 1983). Keen and Wagner (1979) suggest that management involvement and review of DSS projects is important due to the frequent change and restructuring of the DSS project that often takes place.

The organisation will have several constraining intricacies that may restrict the development of the DSS. For instance, Keen (1980) states that the DSS will be confined by the technology available, the organisation's charter and location, and the organisation's procedures and systems. If the system is seen as being supported by management, there is a political impetus for people to use the system. The importance of management support in the development and use of the DSS is further observed in evaluation studies where the amount of management support has often been found to influence the success of a DSS (Sanders and Courtney 1985).

The strategies, policies and procedures developed by management need to be adhered to within the development and use of the DSS. In addition, the DSS will need to be justified to management to gain their initial support. This can be considered the first phase of evaluation and may be the initial contact that the management constituency has with the decision support project.

The involvement of the management constituency in the evaluation process can provide further advantage to the DSS project. Management may have a different perspective, possibly at a more strategic level, about how they think the system is progressing. Factors of interest to management may include the cost of the system, the timeliness of development and how the system supports the organisation. Further, the evaluation process may be beneficial for the management constituency as it may identify problems that other constituencies are experiencing in the development and use of the DSS. Evaluation process outcomes may also be used by management to plan the general development of DSS within the organisation, to identify problems in resource allocation and identify where the organisation can improve its technological capability.

THE DECISION-CONSUMER CONSTITUENCY

The decision-consumers are those who are directly influenced by the decision (see *Figure 1*). This constituency is not usually involved in the development process and will only be of use after an initial decision has been made. The focus of the decision-consumer constituency is generally more operational based than that of the other constituencies. The decision-consumer constituency, however, is usually concerned with the applicability of the decision solution to the problem situation.

The interaction of the decision-consumer with the decision support project and their input into the evaluation of the DSS may be valuable in many cases. After a decision has been made and implemented the decision-consumers may be able to identify problems with the result.

For example, a DSS designed to help forecast the sales of a particular product may forecast a decrease of 10% for the next quarter. The decision-maker, after judging this to be reasonable, provides this information to the production staff and planning commences for a 10% decrease on production. But nearing the end of the quarter, the production staff note that there was a 5% increase in the market rather than a 10% decrease, and that they had no goods left for sale. It is then realised that a major event had occurred during the quarter - a national government advertising campaign has affected sales. The decision-consumers (in this case being the production staff), relay this information to the decision-makers. The developers then incorporate it into the DSS. Thus, including the decision-consumer in the evaluation process has helped in the further development of the DSS.

CONCLUSION

This paper has identified several constituencies that should be involved in the development, use, and evaluation of the DSS. These constituencies include the decision-maker, the chauffeured decision-maker, the user, management, the DSS developer and the decision consumer. The inclusion (or exclusion) of constituencies may radically alter the outcome of the system evaluation. Their views will each enhance the system and should be considered

during an evaluation process. If a single reference group is used in the evaluation process and the subsequent evolution of the system, then the DSS will obviously be based on the needs of that single constituency. It follows that by using a multiple-constituency evaluation approach a better evaluation of the system and, thus, a better DSS should be produced as a result of incorporating the requirements of each constituency. It is acknowledged that the level of importance of each constituency may differ depending on the DSS being evaluated.

This paper represents initial research into the use of multiple-constituencies in the evaluation of DSS. Substantial work needs to be completed before the ideas presented here can be operationalised. This work is currently being undertaken in three major areas.

- 1) We are currently identifying the generic evaluation requirements for each constituency. This will form the basis of requirements within an evaluation process that can be added to by each constituency as they see fit.
- 2) We are identifying appropriate evaluation techniques that could be used in a multiple-constituency based evaluation process.
- 3) We are investigating an approach to deliver the evaluation outcomes to constituencies. These delivery mechanisms will essentially be used to inform constituencies where the system is failing for their constituency.

Finally, we are investigating the applicability of applying this research through the use of a computer based evaluation tool.

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