Chapter XVI
Web-Based Decision Support System: Concept and Issues

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ABSTRACT

This chapter elaborates the basic concepts underlying the development of Web-based decision support systems (DSS) with a discussion on the key concepts and technical issues. The utility of Web-based decision support system in enhancing communication and decision-making capability in a distributed environment or a multiple stakeholder process (MSP) has been explained through examples with diverse application from the real world. Further, the chapter introduces a Web-based decision support system developed by the authors for water resources management on basin scale and also some evolving concepts like mobile agent technology to meet the challenges and problems associated with traditional Web-based DSS. The authors hope that better understanding of the key issues and concepts can bring together analysts, modelers, and the end users to build Web-based DSS that are understandable, accessible and acceptable to all, be it corporate or business houses, environmental agencies or government organizations.

INTRODUCTION

A decision support system (DSS) can be defined as a computer-based tool used to support complex decision making and problem solving. Although this definition applies very well to decision making in many purely technical areas, it falls short of reflecting one extremely important aspect of the decision-making process, that is, the role of human factor.

One of the biggest challenges for DSS in facilitating access to information by a broad spectrum of stakeholders is that available information must directly address their concerns and information needs. Therefore, it is important to know how the information is obtained from and presented to nonspecialists; what information is or should be presented, and how the access to the information is managed. Another challenge is associated with enabling nontechnical professionals (decision makers may not be technical people, they may be politicians or bureaucrats) to obtain answers to their questions, especially in cases where both questions and responses need not be expressed in technical terms. The information presented to nonspecialists cannot substitute or hide the facts. This information must contain the same value as far as real consequences of options, but the form of this information should allow for straight forward description of impacts, perils, and benefits in layman terms.

The only possible method to adequately respond to these challenges has been the balanced and targeted usage of DSS technologies combined with organizational adjustments to the decision-making process, for example, where nontechnical professionals and interest groups also have the right to participate in the evaluation of options and their impacts. Web-based DSS can be used effectively to overcome this problem. Web-based DSS can help retrieve, analyze, and display structured data from large multidimensional or relational database, provide access to multimedia documents and unstructured data, and facilitate communication and decision making in distributed teams or multiple stakeholder processes (MSP) (Power & Kaparthi, 2002).

Unlike traditional DSS implemented on a single computer or on a network, where a user (decision maker or stakeholder) has an account, the development and usage of Web-based DSS faces many conceptual and technical challenges. In the case of DSS implemented on a single machine or in a network, the user has DSS available either through the software installed on the operating system or through a user interface to a remote application server. In the latter case, the capabilities of the user interface also rely strongly on the operating system. The access to resources extends beyond physical resources of the computer, such as disk space, memory, and printers. The user working with DSS in an interactive mode may also access and manipulate models built into the DSS and their parameters. The user may "activate" or "deactivate" certain components of the system model, change preferences, select display, or print alternatives. Data used by a DSS can be accessed and modified to allow users to explore various situations and scenarios. Results obtained by the user can be stored for further use; working sessions can be suspended and then started again without loosing information and data created during commenced sessions. In the case of DSS implemented via the Internet, the situation is significantly different; the user is accessing the Internet through a Web browser, which does not offer the same level of capabilities as an operating system. In order to offer users of Internet based DSS the same control and operational capabilities as those available to a user in traditional IT environment, the owner of a particular Web server has to make additional technical and developmental efforts. Technical difficulties and costs associated with providing the Internet users with advanced control mechanisms over DSS cause implementation of a Web-based DSS to proceed at a slower pace.

From the above discussion it is clear that WWW technologies have created new opportunities for DSS research and also for developing new innovative DSS. The field of Web-based DSS is a new one and more research is needed to design methodologies for implementing DSS using Web technology, to investigate linking of models and database technologies in Web environment, and to define role and effects of user's involvement in design and development of Web-based DSS.