Chapter 5.13
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
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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 facili-
tating 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 for-
dward description of impacts, perils, and benefits
in layman terms.

The only possible method to adequately re-
spond 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 develop-
ment 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 ac-
cess 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 com-
menced sessions. In the case of DSS implemented
via the Internet, the situation is significantly dif-
ferent; 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 inno-

ative 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
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