Chapter XVII

Quality Factors for DMSS Assessment: An Application of Research Frameworks

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ABSTRACT

The objective of this chapter is to demonstrate the use of a decision support systems research (DSSR) framework to improve decision making support systems (DMSS) quality. The DSSR Framework, which was developed to integrate theoretical constructs from various information systems areas into a coherent theme, can serve as a tool for DMSS developers. Developed to provide a unified reference to theoretical constructs used in theory building and testing, the DSSR framework can also be used as the basis for the identification and selection of a hierarchy of factors potentially affecting the quality of DMSS development. The chapter proposes that a unified set of quality factors derived from the DSSR framework be used in tandem with the generic software quality metrics framework specified in IEEE Standard 1061-1992. The integration of these two frameworks has the potential to improve the process of developing high-quality decision making support systems and system components. The usage of these frameworks to identify system quality factors is demonstrated in the context of a military research and development project.

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INTRODUCTION

As information technology advances, organizations, individuals, and supporting information systems become increasingly interrelated. Within this environment exists the need for high quality systems or system components that support decision making. Evolving from stand-alone systems used primarily by staff specialists, decision making support systems can be found embedded as components of larger integrated systems and range from personal financial planning aids to complex decision-making components integrated into advanced military systems. Underpinning this need is a body of research applicable to decision-making support systems (DMSS) that describes, to various degrees, factors relevant to the development of high quality systems.

Factors affecting the development, use, and operation of DMSS can be identified in over three decades of theoretical and empirical research from the fields of decision support systems (DSS), management information systems (MIS), and their referent disciplines. Included in this body of research are several proposed frameworks influencing both DMSS research as well as systems development. Some of these frameworks offer breadth without specification of well-defined research constructs while other frameworks are much narrower, focusing on a subset of a field. This set of frameworks has been useful in establishing the credibility of these research fields; however, most lack depth and do not represent a cumulation of theoretical knowledge. Their usefulness for theory building and the identification of quality factors needed by systems developers has been limited.

Most MIS and DSS frameworks have been developed from a particular viewpoint that highlights a set of concepts as well as a particular level of analysis. Several early DSS-specific frameworks have guided research in the field of DSS. Alter (1977) developed an early taxonomy of DSS organized into seven DSS types lying along a single dimension ranging from extremely data-oriented to extremely model-oriented. Bonczek, Holsapple, and Whinston (1981) present a number of conceptual and operational frameworks, strategies, and techniques primarily focused on system construction. Sprague (1980) developed a research framework focusing on a developmental approach for creating a DSS and the roles of key players. While the impact of emerging information technologies on DSS remains an issue, the specific technologies of interest have changed from office automation systems (Blanning, 1983) to data warehousing (Gray & Watson, 1998), Web technologies, and integration of legacy systems.

Beyond the early DSS-specific frameworks, there are a number of more general frameworks for MIS research. The Mason and Mitroff (1973) model is one of the first comprehensive MIS research frameworks. This model views an information system as consisting of the following key variables: an individual’s psychological type, the class of problem, the method of evidence, the organizational context, and the mode of presentation. The Ives, Hamilton, and Davis (1980) model of an information system, the most comprehensive of these early frameworks,
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