Chapter 1
DSS-CMM:
A Capability Maturity Model for DSS Development Processes

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ABSTRACT

While DSS development methodologies and implementation research are abound in the DSS literature, a gap still exists in terms of the ability to provide a holistic conceptual structure for improving the management and development of decision support systems, the ability to capture and share understanding of key DSS development processes, and most notably, the ability to provide guidance for DSS development and process improvements. This paper proposes a Decision Support System Capability Maturity Model (DSS-CMM). The model leverages related DSS literature and input from DSS researchers and practitioners to identify pertinent DSS development processes and capability levels. From a theoretical perspective, DSS-CMM provides a meta-model for DSS development processes and represents the first maturity model specifically targeting DSS development. From a practical perspective, the model provides a framework for organizations to assess the capability level of their DSS development processes and devise process improvement initiatives to address any limitations with existing practices.

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INTRODUCTION

Decision Support Systems (DSS) (Eom, 1999; Gerrity, 1970; Keen & Scott Morton, 1978; Power, 2002) enable decision makers to utilize knowledge and data to support and meet their demands for decision-making. Over time, these systems have been associated with a variety of names varied mainly by the type and approach for decision support. Examples include model-based, knowledge-based, communication-based, and data-based decision support systems. Collectively, these systems are also referred to as Decision Making Support Systems (DMSS) (Mora Forgionne, Cervantes-Perez, & Gelman, 2010).

Similar to other types of information systems, the development of DSS represents a recurrent discussion in the field (Gachet & Haettenschwiler, 2006). Saxena (1991) argues that the development of DSS, while innovative, seems primarily ad hoc, i.e., lacks process maturity. Reasonably, one could argue that these missing links fall on the complex as well as uncertain context and decision situations that these systems attempt to address. However, as information technology continues to advance, so do the studies of DSS development. The result is a variety of DSS development methodologies that capture varies facets of DSS development (Mora et al., 2006, 2010. Whether focusing upon decision support processes or emphasizing a software/systems engineering perspectives, all such studies aim to address the need to expand knowledge on DSS development. Recently, Gachet and Haettenschwiler (2006) proposed a "tripatriate" approach to integrate the varied focuses of DSS development methodologies. In a parallel theme, research continues to focus upon finding key factors necessary for successful implementation of DSS systems outside of the theoretical emphasis on the system itself (Alavi & Joachimsthaler, 1992; Clark, Jones, & Armstrong, 2007).

Yet, regardless of the advances in DSS development methodologies or the recommendations from implementation research, a gap still exists in terms of the ability to provide a holistic conceptual structure for improving the management and development of decision support systems, the ability to capture and share understanding of key DSS development processes, and most notably, the ability to provide guidance for DSS development and process improvements. In order to address the gap, DSS development methodologies must be described at a meta-level. In that regard, maturity models (MM) can provide the necessary framework and benchmarks needed to assess DSS development methodologies. Further, they allow for meta-level descriptions of DSS development processes as a whole, which in turn enables organizations to both identify problems or improvements, but also the ability to assess the overall needs of the process as it evolves.

Accordingly, we propose herein a capability maturity model able to address DSS development processes, regardless of the specific development methodology. Comparable to the Software Engineering Institute's (SEI) continuous representation of the Capability Maturity Model (CMM) (Paulk, Weber, Curtis, & Chrissis, 1995), we use six maturity levels within the DSS capability maturity model (Shrum, 1999). Further, we draw on extant literature related to DSS development methodologies, practices and processes, existing maturity models, and input from DSS researchers and practitioners to identify critical DSS development practices and articulate capability levels for these practices. Theoretically, the research presents the first capability maturity model specifically targeting DSS development methodologies and provides a practical framework for organizations to assess capability levels of their DSS processes to address limitations and to devise improvement initiatives. Further, the proposed capability maturity model incorporates social and organizational issues relevant to DSS development including needs assessments, cost/benefits analysis, user involvement, and training.

The rest of the paper follows Peffers et al. (2008) and is organized as follows: We define