RESEARCH AGENDA

ANALYTICS: DECISION SUPPORT SYSTEMS-REVISITED

BACKGROUND

Decision Support Systems (DSS) has been an area of significant interest to information systems (IS) researchers for more than four decades. The primary impetus was and continues to be on leveraging information systems to support individual as well as organizational decision-making. Despite the wealth of contributions, DSS research has been criticized repeatedly for limited relevance to professional practice. Ironically, such practice has been a driver and motivation for such research (Vizecky & El-Gayar, 2011).

Over the last decade, there has been a significant development in information technology. Specifically, we have witnessed an unprecedented increase in computing power and storage coupled with a reduction in acquisition cost, a robust, reliable, and universal networking infrastructure, a prevalence of standardized communication protocols, and a plethora of analytical techniques and supporting tools. Collectively, such technologies enable organizations to systematically collect large amounts of data pertaining to virtually any and all aspects of its operation as well as provide the tools to potentially analyze their information assets for improved decision support and enhanced performance. On the demand side, an increasing reliance on data-driven decision by information savvy managers further fueling the need for decision support also referred to in contemporary literature as 'Analytics'. In essence, 'analytics' pertains to moving from 'data' to 'decisions' or as Lavalle et al. (2011) put it "embedding analytics to transform information into insight and then action" (Lavalle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011). Companies are increasingly recognizing analytics as a mechanism to develop and sustain competitive advantage (Davenport & Harris, 2007; Davenport, Harris, & Shapiro, 2010; Davenport, 2006; Harris, Morison, & Davenport, 2010)

RESEARCH AGENDA

The overarching theme of my research agenda centers on analytics and decision support. In essence, *how can organizations and individuals leverage the vast quantities of data for improved decisions and ultimately for the betterment of their organizations, societal, and individual well-being?* I am particularly interested in a holistic and a systems view of decision support and analytics, i.e., not only the underlying technological aspects but also the human (people) and contextual aspects that will need to be taken into account and with an end-goal of improved decision-making for stakeholders.

In that regard, I have organized my agenda around four major research themes as shown in figure 1. These themes are development, delivery, application, and evaluation. The following sub-sections briefly describe each of these themes.

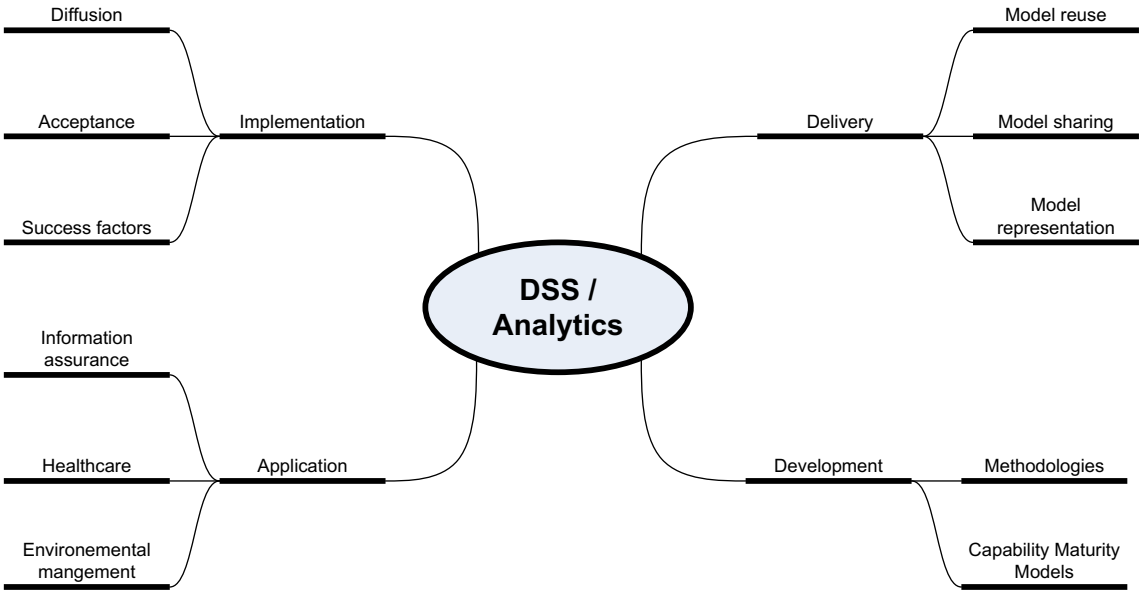

Figure 1. Major research themes

DEVELOPMENT

Despite recent advance in software engineering and systems analysis and design, there is a need for continued attention to system development practices, and decision support systems are no exception (El-Gayar, Deokar, & Tao, 2011). The development of decision support systems is further complicated with the co-mingling of the decision support aspect and the software development aspects. The decision support is further complicated with the need to not only understand the requirements of the underlying decision task/problem, but also the decision styles of the user and the overall context of the decision situation.

Along this theme, my research agenda centers around the DSS development methodologies, and capability maturity models. With respect to methodologies, I am interested in the development improvement, and evaluation of DSS development methodologies. Examples of such topics in the context of evolutionary DSS development include: what systems development methods and tools are most appropriate to evolutionary development? What aspects or characteristics of an information technology make it suitable for evolutionary DSS development? And what skills and knowledge does a systems analyst need for an evolutionary DSS development project? (Arnott, 2004). Other questions include: can software engineering process be utilized in DSS development? How can such processes be improved/adapted for DSS development? And, considering decision support systems as socio-technical systems, what development methodologies are most appropriate? And can we develop better analysis and design approaches for the design of socio-technical systems?

Related to methodologies is the maturity of such methodologies. Analogous to software engineering, is it possible to develop a capability model for DSS development processes similar to the Software Engineering Institute's (SEI) Capability Maturity Model (CMM) (Paulk, Curtis, Chrissis, & Weber, 1993)? What would such a maturity model look like? How to improve the acceptance of such model within the DSS development community?

DELIVERY

As indicated earlier, recent advances in IT have made large amount of data available and have provided access to such data at decreasing cost levels not conceivable even a few years ago. Likewise, there are plethora of analytic models that are used to analyze data for decision support purposes. While information retrieval and data base research have focused primarily on large data sets, data warehouses, and document management, relatively little research has focused on analytic models as a decision resource that also need to be managed for increased reuse and sharing.

Along this theme, my research agenda focuses around the development of mechanisms and technologies for representing, reusing, and sharing analytic models. A particular focus is on leveraging the Internet as a delivery environment. Examples of problems/questions include: How can we represent analytic models at a higher level of abstraction that captures model structure and semantics? How can such representations enhance model reuse and sharing in a distributed environment? Are such representations amenable to different modeling/analytic paradigms? What is the needed underlying technological infrastructure to deliver analytic models in a distributed setting?

Recent advances in mobile technologies are also creating new opportunities for related research. iPad, iPod, Android, iPhone, and various smart phones are becoming common household names. Such ubiquity coupled with a reliable and increasingly capable underling communication infrastructure raises questions such as can such technologies for delivering 'analytics to the masses'? What are the requirements for such systems? And what are the implications for decision support?

APPLICATION

DSS and analytics are inherently applied areas of research. As noted earlier, research in these areas aim to advance the state of knowledge with the ultimate goal of improving decision-making in a particular domain. From another perspective, the application of decision support and analytics in other domains help inform, guide, and validate pertinent research in these areas.

Along this theme, my research agenda centers around three area of significant interest at the national and international levels, namely, healthcare informatics, environmental informatics and security informatics. Regardless of the application area, my research interest focuses utilizing a design science research methodology (Hevner, March, Park, & Ram, 2004; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007) where I rely on information systems theory to develop theoretically-grounded analytic and decision support artifacts that addresses a specific decision need/problem. Examples include developing of IT-based systems for the self-management of diabetes, improving the design of patient health record systems for improved decision support, developing a DSS for renewable energy assessments, developing a DSS for regional aquacultural planning, and developing a DSS for security planning and management in organization.

EVALUATION

Despite the proliferation of decision support technologies, the impact of the use of such technologies is difficult to quantify. Moreover, decision support systems, the acceptance and diffusion of such systems is an area of continued concern. Analogous to other types of information systems,

acceptance is a function of factors such as perceived usefulness, ease of use, etc. However, complicating the evaluation of DSS is the decision component and the decision task, context, and behavior that the component is aimed to support. Examples of such questions include what additional factors may play a role to increase the acceptance and diffusion of DSS? What are the critical success factors for DSS implementation? Can existing IS models such as (DeLone & McLean, 1992) success model be applied in a DSS context? And how can the impact of DSS be meaningfully and objectively quantified?

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