

## *: Is decision support research still needed?*

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Digital transformation is occurring globally and data-driven decision support, machine learning, and Artificial Intelligence (AI) are major drivers of the significant changes. These computer-based tools are widely accepted as both useful and desirable. These tools are familiar, accepted and widely used. Innovation and research have therefore centered on commercial product development and systems integration, rather than more basic research in the academic community. This shift to commercialization presumed that everything was known about the impact and consequences of decision replacement and decision support technologies. As decision automation becomes more commonplace it is timely to explore the concrete realities and familiar stereotypes of these technologies in real situations.

After more than 70 years of research and application development related to computerized tools to support decision making, it seems especially appropriate to assess both the accomplishments and failures of Decision Support Systems (DSS) research. Now is an opportune juncture to determine what if any research is needed in the next 70 years. Angehrn and Jelassi (1994) asserted that the three main dimensions of DSS research and practice were "1) supporting human decision-making processes, 2) integrating DSS into the organizational context, and 3) identifying new application domains." More than 10 years later, Eom & Kim, (2006) argued the goal motivating DSS research was to create DSS applications that would "improve personal, departmental, organizational, and inter-organizational decisionmaking (p. 1274)". Eom and Kim found in their survey of DSS applications in the literature, that 51% of all DSS applications were classified as using optimization models.

Much of DSS development has been driven by technology innovation and entrepreneurs rather than academic researchers. DSS applications and marketing promises have generally **not** been based upon research, but rather upon perceived needs and marketing strategies. DSS like ERP systems, DW and BI, F&R (Forecasting and Replenishment), etc. have become basic business requirements that managers must adopt to compete successfully. Eom and Kim found 210 published DSS applications in the literature from 1995–2001. Approximately 53% were operational systems in use. About 43% of articles were about prototype systems under various testing stages. The remaining 4% were in the conceptual design stages. Production and operations management(POM) represented the largest number of application articles published (44.16%). Eom and Kim also found that in their survey 51% of all DSS applications were classified as using optimization models.

Research related to quantitative models including optimization, machine learning, and Artificial Intelligence has been primarily "tool" focused rather than including a "behavior" focus. Funding from Government/Military/Corporate sources for basic research has been limited, especially since 2005. Researchers involved in the broad computerized decision-making community need to address the

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challenges that exist and transform the realms of computer-automated, computer-augmented, and computed-aided decision making into a less familiar, more expansive narrative. Orthodox, normative decision theory has dominated prior research and theory. Maximizing expected utility and focusing on the choices of agents and only focusing our attention on instrumental outcomes from computer applications is limiting and even counter-productive. Our theoretical lens must be broadened and even questioned. The so-called common sense acceptance that intelligent machines make better decisions is a weak assumption. Decision autonomy for people is the central premise of the concept of informed consent and shared decision making.

We must explore alternative assumptions that complement the current dominant thinking about both human and machine decision making. Value and utility must be explored broadly in this domain. We must investigate a research agenda that is relevant in the pervasive computing era. Perhaps the best-case scenario is automated decisions in some specialized situations. Perhaps the worst case is keeping people in the decision-making loop in all decisions. Perhaps the mixed case of people and computers as partners is the practical, socially viable "sweet spot". Empirical research must inform those commercial and social choices.

To make substantial progress in building the next generation of decision support more research is needed on many topics including human impacts of computerized decision support, individual differences in using computerized decision support, and gaps in computerized decision support capabilities.

### **References**

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