Trends in Executive Decision Support Systems

Owen P. Hall, Jr. and Reta M. Parker
The George L Graziadio School of Business and Management
Pepperdine University, Malibu, CA 90263, (310) 541-5797, ohall@pepperdine.edu

ABSTRACT

The current generation of decision support systems (DSS) offers the potential for significantly improving operational and strategic performance for organizations of various sizes and types. Many DSS are geared toward supporting decision-making activities at the executive management level. During the 1990s most large organizations engaged in enterprise data warehousing projects. The scope of these efforts ranged from combining multiple legacy systems to developing user interface analysis tools. The primary purpose of this paper is twofold: first, to explore recent trends in executive decision support systems and second, to assess how the ongoing industry consolidation will impact future developments.

INTRODUCTION

Decision Support Systems (DSS) are a specific class of computerized information systems that supports decision-making activities. More specifically, DSS are interactive computer-based systems and subsystems intended to help decision makers use communication technologies, data, documents, knowledge and models to identify and solve problems. Generally, DSS can be categorized into two major types: Model-driven and Data-driven. Model-driven DSS tend to utilize analytical constructs such as forecasting, optimization algorithms, simulations, decision trees, and rules engines. Data-driven DSS deal with data warehouses, databases and, online analytical processing (OLAP) technology. A data warehouse is a database that is constructed to support the decision making process across an organization. The data warehouse is the underlying structure that the user interface tools rely on to report information for retrospective and prospective analysis. There may be several databases or data marts that make up the data warehouse. To be effective DSS must be designed to meet the specifics of the management function at hand [9]. Generally speaking, executive decision-making should be based on an evaluation of current trends, historical performance metrics, and forecast planning [11].

Today, there is an ongoing requirement for more precise decision-making because of increased global competition. New and improved decision support systems to support all layers of management continue to emerge to help meet these ongoing requirements [3]. To increase acceptance and use by executive managers the DSS industry is producing new systems that feature graphic based user interfaces. The executive decision support systems (EDDS) feature intuitive graphical interface capabilities that significantly shorten the learning curve and thus increase the likelihood of effective utilization. The current market for business decision support systems and related products and services is at $15 billion with a projected 10% annual growth rate over the next several years [7]. A primary driver of this growth is the ongoing demand for increased productivity.

EDSS DEVELOPMENTS

The new generation of EDSS are designed for executives to access and receive selective information such as competitor behavior, industry trends and current decision options.

Specific attention is being given to the user interface as highlighted by the following list of standard end-user features [8]

- Filter, sort and analyze data
- Formulate ad hoc reports and templates
- Provide drag and drop capabilities
- Produce drillable charts and graphs
- Support multi-languages
- Generate alternative scenarios

There are a number of methodologies for measuring performance that are essential to the executive decision-maker. Specific examples are Six Sigma that embraces the concepts of quality and perfection and the Scorecard that focuses on key performance metrics necessary for evaluating performance. For example, in the manufacturing industry executive decisions may focus on resource allocation optimization and waste reduction. From an executive decision maker's prospective the new DSS visualization tools such as Dashboards and Scorecards provide a useful way to view data and information. Outcomes displayed include single metrics, graphical trend analysis, capacity gauges, geographical maps, percentage share, stoplights, and variance comparisons. A "Dashboard" type user interface design presents complex relationships in a format that is easily understandable and digestible by executive managers. Figure 1 illustrates the relative adoption of these new decision systems.
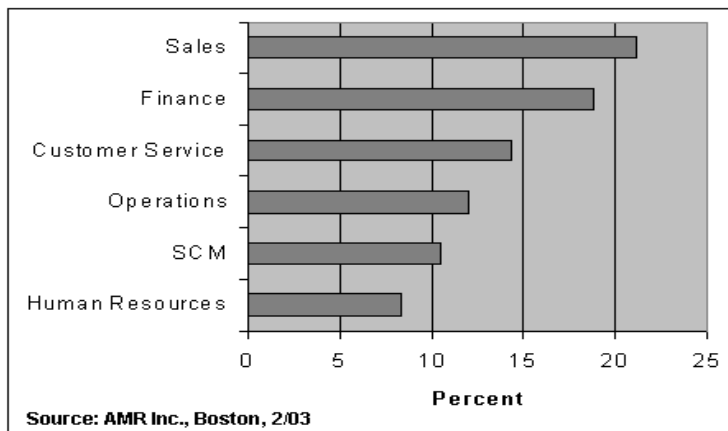

Figure 1 – DSS Adoptions by Management Function

In spite of these adoption trends little systematic attention has been paid in formulating a training regimen to help management better understand and use these new systems. In general, management training has been problematical throughout the organization [6]. Management training is a key ingredient in the successful application of the new DDS technology. One approach for helping insure the ongoing effective usage of these new systems is simulation [1].

SYNTHETIC AGENTS

Synthetic agents, a branch of artificial intelligence, are defined as purposeful autonomous entities capable of adapting to changing requirements and opportunities such as found in many unstructured and semi-structured decision making applications. These systems allow the active reconfiguration of the decision strategy according to current requirements and the availability of information sources of varying quality. Typically, synthetic agents should possess the following four basic characteristics: autonomous, proactive, flexible and user-friendly [2]. The "social" interface between the agent and the manager should be highly visual with limited user required inputs. It is within this design context that the organization's objectives can be best achieved. Figure 2 illustrates the basic structure of how an intelligent agent fits into the decision-making process. The agent would integrate the data warehouses

and analytical models directly into the decision-making process. The agent would facilitate a continuous process based on ongoing environmental scanning and feedback from current performance metrics.
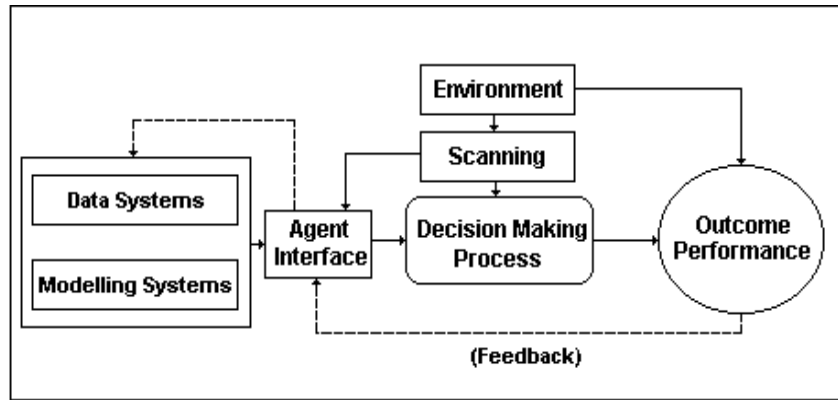

Figure 2 – Agent DSS Interface

INDUSTRY DEVELOPMENTS

There are a number of EDSS vendors offering a wide range of product solutions. However, only a few actually provide a complete EDSS package. With two mergers/acquisition announcements in recent months (Business Objects/Crystal Decisions and Hyperion/BRIO), the industry is beginning to consolidation towards an oligopoly competitive environment where a few firms will determine the future of the industry. Table 1 provides an overview of the major EDSS vendors [5].

Table 1- Industry Leader Summary

Firm	Revenue ($millions)	Product Depth	Pricing
SAS	1,100	Good/Very Good	Fair/Good
Business Objects/Crystal	750	Very Good	Good
Cognos	600	Good/Very Good	Good
Hyperion/BRIO	600	Good/Very Good	Good
Microsoft	400	Good	Excellent
MicroStrategy	160	Good	Good

In term of product/service quality and functionality there appears to be very little difference between the major vendors. Therefore, from the executive manager's point of view selecting the right partner can have significant implications as the shakeout continues. Specific vendor selection issues at hand include return on investment, updating potential, vendor reliability, custom-developed and packaged analytic applications, real-time or "active" data warehouses, and training. Some current technical challenges facing this evolving industry are presented in the following list [4]:

- Integrating optimization based models with enterprise resource planning systems.
- Developing an observation-oriented approach to data modeling that includes manual and automated processing.
- Combining decision support, knowledge management and artificial intelligence in a data-warehousing framework.
- Designing intelligent agents that can be used to support decision-making process.

- Formulating adaptive and cooperating systems that use evaluation and feedback to improve the decision-making process.

One useful consequence of ongoing industry developments is that some DSS products are becoming affordable to smaller organizations. These developments in turn aids in improving supply chain efficiencies as smaller shops are brought into the mix. Nevertheless, user interface and system training represent two key barriers to successful implementation in both large and small organizations [10].

CONCLUSIONS

- The use of executive decision support systems is on the increase as a result of growing global competitive pressures. Improved user friendliness through the use of graphic interfaces is a primary characteristic of the new generation of DSS applications. Specifically, executive managers require interactive interface systems that are easy to understand and use.

- The DSS Industry is a $15 billion market that is experiencing a 10% annual growing rate. The industry is presently is a consolidation mode that may slow the pace of new innovation. Currently, the product quality and functionality of the top DSS vendors is comparable.

- New industry challenges include improving system integration and developing cooperative and adaptive systems that automatically incorporate feedback and evaluation into the decision-making process. Synthetic agents represent an important ingredient in this process.

- Ongoing management training is essential for insuring the continued effective use of the new generation DSS. Simulation is one training strategy that provides an effective and dynamic structure for introducing and supporting new DSS applications.

REFERENCES

[1} Angehrm, A.; Nabeth, T., 1997, "*Leveraging emerging technologies in management education: research and experience,* " European Management Journal, v15, I3, p275.

[2} Allen, M., 2000, "*The myth of intelligent agents,*" Online v24, I6, p45.

[3] Bonabeau, E., 2003, "*Don't trust your gut,*" Harvard Business Review, v81, I5, p116.

[4] Carlsson, C.; Turban, E., 2002, "*DSS: directions for the next decade,* Decision Support Systems, v33, I3, p105.

[5] Folger, D., 2003, "*Business Intelligence Tools & Platforms Report,*" Meta Group, Stamford, CT.

[6] Gale, F., 2002, "*For ERP success, create a culture change,*" Workforce, v81, I9, p88.

[7] Harding, E.; Zschuschen, L., 2002, "*Analytical tools give businesses the big picture, Software Magazine,* v22, I1, p8.

[8] Orefica, J., 2001, "*Moving to the next level,*" Health Management Technology, v22, I7, p46.

[9] Salmeron, J., 2002, "*EIS data: findings from an evolutionary study,*" Journal of Systems & Software, v64, I2, p111.

[10] Setzekom, K.; Sugumanran, V.; Patnayakuni, N., 2002, "*A comparison of implementing resistance factors for DMSS versus other information systems,*" Resources Management Journal, v15, I4, p48.

[11] Singh, S.; Watson, H.; Watson, R., 2002, "*EIS support for the strategic management process,*" Decision Support Systems, v33, i1, p71.