PANEL: INTEGRATING DSS INTO EIS

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1. Introduction

In addition to displaying information, most executive information systems (EIS) provide decision support system (DSS) capabilities. For example, at British Gas an embedded expert system helps executives decide whether to engage in joint drilling ventures with foreign countries. At Lockheed Aeronautical Systems, users share information through the daily diary, a customized electronic bulletin board. At the International Finance Corporation, bank lending information can be dropped into an Excel spreadsheet for further analysis. The World Bank's EIS allows executives to search the personnel database using multidimensional criteria such as nationality, gender, grade level, and job skills. Price setters at Hertz are automatically sent information about situations where rental rate adjustments might be in order. As these examples show, a variety of DSS capabilities can be included in an EIS.

The purpose of this panel is to bring together leading EIS researchers and practitioners to share their insights and experiences about integrating DSS into EIS. The following are summaries of the panelists' presentations.

2. Lloyd W. Belcher

Executive information systems have changed dramatically since their introduction in the late 1970s and early 1980s. From the original fixed screen systems, today's systems offer a variety of powerful features to assist the executive, some of which can be classified as decision support systems.

This transformation, which will accelerate in the future, has been driven by several factors, two of which are the subject of this presentation.

2.1. Executives have become more demanding

Today's executives are typically much more computer literate than those of the past decade. At the time executive information systems were introduced, few senior executives had any hands-on computer experience. Personal computers were still in their infancy, and executives at the senior level had little if any hands-on experience with mainframe technology. Over the last ten years, however, executives have gained a better understanding of computer technology, much of which is reflected by the increased demands on their information systems.
In addition to senior management, increased demands are also imposed on the system by middle and operating management levels, often in the form of decision support applications.

2.2. Increased functionality of commercial software

Commercial vendors are beginning to develop a totally new class of software to serve the executive information systems market. It provides easy-to-use EIS interfaces coupled with powerful data access and graphic tools. As users begin to understand and exploit the new technology, they will inevitably expect even more from their executive information systems.

User demands and the increasing power of hardware technology will accelerate the improvements in EIS software. Many of these enhancements will have DSS characteristics; so much perhaps, that the demarcation lines between EIS and DSS could begin to blur.

3. David R. King

In the past EIS provided an intuitive, easy-to-use interface to relatively static management reports of aggregate level data. The data in these reports were often the result of complex computations carried out by analysts with the aid of a decision support system. With restructuring, re-engineering and increasing competitive demands, managers can no longer rely on middle men for their analysis. Executives and managers at all levels of the organization require a direct link to data and ad hoc computation. This requirement has lead to a new breed of EIS -- the surfacing of decision support capabilities through an easy to use interface for purposes of strategic analysis, planning, and monitoring by managers and executives.

In this segment of the panel, I will describe and illustrate the “technical” character of these integrated systems, especially the need for handling and analyzing large-scale data sets. I’ll also examine some emerging market needs, including the requirements for “asynchronous information delivery, alternative user interfaces, agent-based executive support and data mining capabilities.”

4. Ronald S. Swift

Organizations, like all other organisms, go through stages of maturity. This is particularly true of IT organizations where the pace of change is rapid and where there is constantly a need to know where the next stage in the process is unfolding a new pathway to maturity. This phenomenon was first identified by Richard L. Nolan in the early 1970s, when he described the “four stages of EDP growth.” Nolan observed that most companies delay in developing strong management processes in the growth stage and continuously go through stages of transitions.

It appears, after a dozen years of observation and analysis, that decision support systems and executive information systems are merging quickly into a singular management support system (MSS) with applications to address individual managerial requirements. This merging of applications appears to happening due to several concurrent developments.

First, there is often the requirement for shared-data and shared-decisional applications among multiple levels of management within a distributed geographical organization.
Second, due to the 'mature' cycles being experienced with IT and its user community, there is a clear integration of databases, systems, architectures, and ever increasing client/server solution approaches. Third, as management reorganizes the enterprise and IT reorganizes its application portfolio, the definitive lines of separation between decision support applications and EIS is disappearing. And lastly, management is advancing beyond the separation of data and decision functions, therefore requiring a multitude of preparations.

Based on Nolan's stages theory, it appears that data management can also be charted similarly, and therefore the integration of key managerial applications utilized over time. Consider the evolution of data management throughout the stages and its effect on DSS and EIS. Stage 1 and Stage 2 organizations may enjoy shared access to data, but it is more likely that they do not know what data exist to support decision-making processes. Even the Stage 3 organization is grappling with the problem of basing key decisions on data that has been extracted from other extracts across the enterprise. The Stage 3 managers are asking the question: "What is the real value of IT investments?" Just prior to the control stage, there appears to be a utilization of database technologies and there may be many different software engines to support. In addition, many groups may have their own data dictionaries or none at all. The chances of getting a single correct response to any given query is limited. Most likely there will be many correct, but different, answers to any question because of the differences in naming conventions and entity definitions across the various business units. Most large companies may be situated in painful transition from late Stage 2 to early Stage 4.

The enterprise aspiring to succeed through Stage 4, the Integration Stage, will be planning DSS with a data warehouse infrastructure and replication/propagation technologies as a means of integrating the data in the enterprise. But, before the technology solutions can be decided upon, it is more viable and important to first establish a corporate architecture with standards for data through an "enterprise data model."

This model can provide a design basis for the data warehouse and client/server systems and will provide business value by eliminating the inconsistencies in the IT systems to provide effective decision support solutions. Numerous organizations are challenged by the limited commitment to fully integrated and utilized DSS. Therefore, Nolan's Stage 4 and 5 may be interchanged.

Relatively few organizations have reached Stage 5, Integration, which is signaled by the existence of enterprise-wide metadata which provides a basis for connection, authorization, access, use, and exploitation of the corporate databases. Another characteristic of achieving success in Stage 5 is the use of integrated DSS and shared management support systems. Thus the ability for full integration of DSS and EIS.

To date only the brightest stars, with dedicated long-term plans and management teams, have reached Stage 6 (Maturity). These enterprises have not only integrated the data in a warehouse but distribute IT data resources throughout the network in a stratified topology. This allows for advanced uses of decision support and EIS software to fully exploit the business value of the information gathered. In a Stage 6 organization, the task of obtaining more and more data is resolved in the transforming and warehousing of data into useable informational databases.
In many of the very advanced decision support and data warehouses sites, the focus of attention is not on the data. In these organizations, the DSS with data warehouse seems to metamorphose into a transparent architecture, invisible to the business end-users.

The original intent of the many DSS, EIS, and/or data warehouses was summarization and transformation of data into information. Each of these systems required creating “informational databases.” As organizations mature in the development and use of “informational” or “decisional” infrastructures, “operational data stores” emerge to be included in the data warehouse for customer, service, financial, and investigatory/mining applications.

In the new DSS/EIS/MSS (“Data Warehouse”) environment, the data is transformed through defined processes, made available for use for decision making, and provided throughout multiple business environments. It is then not necessary for the individual applications to manage and connect to specialized data or for the user to know where the data is located. In fact, the decisions about technology and the software to support the users, should not be dependent on the data or the database technologies. This is an architected and integrated business solution. The management may exploit the infrastructure and create new value. Mature organizations do not make software or hardware decisions based on the technology itself. Mature organizations consider the business first and the implications of the effects of technology on the people along with its applicability to the business processes.

Recently, IT and business users have joined in a partnership of planning and implementation of the databases, data warehouses, metadata dictionaries, and EIS and decision support software systems. These have also been implemented using localized/departmental servers. These “datamarts” are evolving from the requirement for individual departments to access, pull, and manage the transition of data from sources into data warehouse stores within the departmental environment. Datamarts provide the capability for multiple business (end) user applications to access their common database.

These solutions may become the norm, rather than the exception, even when organizations create a central/enterprise data warehouse. The access to the warehouse, and subsequent movement of data through the network, will create multiple levels of data warehouses utilizing datamarts.

The journey from Stage 1 to Stage 6 is a journey from limited reporting, structured reporting, then ad hoc queries, onto advanced data pattern recognitions, and enterprise managerial decision making. It is the pathway and viable use of: query to DSS to EIS, of data to information to knowledge.

Summary: The Challenge

The task is for organizations to identify exactly what stage is being managed and facilitating the merging of the various technologies to provide enterprise management. Having accomplished that, the next step is to plot a course to achieve architecting and data administration leading to integration and maturity. This is an attainable aspiration and ultimately maturity is becoming more viable for many more organizations. The value of the system is the belief in its contents, not the dependence on the level of EIS/DSS/MSS application used.