: What should managers know about business intelligence and data-driven decision support?

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Most managers want to make fact-based decisions. Many large organizations have implemented database systems called data warehouses to organize facts for timely retrieval. Some organizations have implemented business intelligence (BI) systems based upon earlier management and executive information systems (EIS). BI refers to extracting, analyzing and distributing data from corporate databases to support decision making. For many years, the prospects and problems of providing managers with timely management information have been discussed and debated (cf., Dearden, 1966). Overall managers and information systems specialists seem interested in learning more about new types of data-driven decision support systems. So the debate about costs, advantages, problems and possibilities for data-driven decision support must continue. This discussion answers 14 important questions related to BI and data-driven decision support.

The expanded DSS framework (Power, 2002) categorizes data warehouses, Executive Information Systems, Spatial DSS, and Business Intelligence (BI) systems as data-driven decision support systems. Some authors include data mining and analytics as data-driven DSS.

Data-driven DSS are often very expensive to develop and implement in organizations. Despite the large resource commitments that are required, many companies have implemented data-driven DSS. Technologies are changing and managers and MIS staff will need to make continuing investments in this category of DSS software. So it is important that managers understand the various terms and systems that use large databases to support management decision-making.

So what is the future for data-driven decision support? Gartner and Forester analysts forecast (cf., Finley, 2011) that:

By 2013, 15% of BI deployments will combine BI, collaboration and social software into decision-making environments.

By 2013, 33% of BI functionality will be delivered to handheld devices.

By 2014, 30% of analytic applications will use in-memory functions to add scale and computational speed.

By 2014, 30% of analytic applications will use proactive, predictive and forecasting capabilities.

By 2014, 40% of spending on business analytics will go to system integrators, not software vendors.

What else is important to know about data-driven decision support? The following topics are especially relevant and important.

What do I need to know about Data Warehousing? Managers need to be familiar with some DW/OLAP terminology (the basic "what is" questions) and they need to have an idea of the benefits and limitations of these decision support components (the why questions). More technical people in Information Systems need to know how and when to develop systems using these components. Read more ...

What is mobile business intelligence? Mobile business intelligence refers to data-driven decision support applications on mobile devices like smartphones and tablet computers. Mobile BI uses wireless devices to support data transfer and operations decision making. Mobile BI applications exist for Android, Blackberry, iPhone/iPad, and Windows Mobile operating systems. In general, the phrase refers to a rapidly emerging decision support application area. More applications are becoming available from start-ups and traditional BI vendors for innovative dashboards, live reports, CRM and performance monitoring. Read more ....

What questions are important for evaluating a BI proposal? Introducing a major project to provide enterprise-wide business intelligence is much more than just another technology project. Often the culture and decision making processes must changed to reward and reinforce fact-based decision making. Gartner, IBM Cognos and many others have discussed questions to ask to help insure "flawless business intelligence" or "avoid fatal flaws". Asking the right questions is important and perhaps a checklist will help improve system implementation and your discussions with vendors. Read more ....

What are best practices for BI reports? Structured, periodic reports remain at the center of data-driven decision support for managerial decision-making. The reports may be in portable document format (PDF) and the reports are probably web accessible, but we still create and use reports. Twenty-five years ago, one would see piles of computer printouts in a manager's office. Today reports include graphs in color with professional looking tables, but we still print reports.

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Managers and IS/T staff need to know how to design reports. Why do we print reports? Managers can quickly scan a paper report while multi-tasking and many managers are reluctant to read reports online. Read more ....

What are examples of routine decision support queries? In the mid-1980s, the introduction of powerful relational database management systems (RDBMS) like Oracle and IBM DB2 encouraged managers to expect they could get answers directly from the company database. The idea was that managers would write their own English-like questions using structured query language (SQL). That hope was not fulfilled. Writing even simple queries can be challenging and a poorly constructed query can slow other computer processing. Let's examine SQL, pronounced see-quel or "S" "Q" "L", and some of the routine decision support questions a manager might ask using an RDBMS. Read more ....

What SQL knowledge do managers need for decision support queries? Structured Query Language (SQL)is considered difficult for most managers to learn and use. SQL is a complex language with many capabilities, but managers can learn to manipulate and retrieve data in a decision support query. The knowledge of SQL needed by a manager is limited. The decision support question or query to the database must be structured however to conform to the SQL command language rules. An SQL command is a statement composed of a sequence of key words, identifiers, delimiters and constants. Read more ....

What method is best for building an enterprise-wide, data-driven DSS? Using a methodology like the Systems Development Life Cycle (SDLC) provides one way business organizations can systematically approach the development of a decision support database and decision support end user capabilities. Once requirements are fixed, SDLC limits changes and reduces development flexibility. Development of a large, shared enterprise-wide, data-driven decision support system is usually an undertaking of great complexity. Organizational decision making information needs are varied and needs often change in response to problems and new tasks. Some flexibility in the development process is usually needed. Read more ....

What are sources of data for building a data-driven DSS? Managers and IT staff who are thinking about opportunities for building innovative, data-driven decision support systems should be exploring this question. Too often it is answered hurriedly and without reflection and the answer given is to use data from transactional systems, accounting systems or operational data stores. Nevertheless, many other sources both internal and external to an organization are possible decision support data sources. In many cases, the internal source data is not being recorded or captured and the external sources may be expensive or require new data collection methods.

Despite these difficulties, data-driven decision support systems should not be built using convenient, easy to use, readily available data, unless the data is useful for meeting a decision support need. Read more ...

What is ETL software and how is it related to DSS? Data warehousing practitioners have all experienced the frustration of creating a large data store from existing operating data bases built using a variety of data models and technologies. ETL software attempts to make that task easier. ETL is an acronym for extract, transform and load. This type of software is also called data extraction software. Read more ...

How important are pivot tables in data-driven decision support? Some analysis tools are used more and are used more effectively than others. For example, pivot tables have become key analysis tools since Microsoft included the capability with Excel. Companies have massive amounts of information and have difficulty managing, retrieving and analyzing it (cf., Lohr, New York Times on April 23, 2011). Lohr discusses this problem and asserts that "data-driven decision making" can increase productivity by 5 to 6 percent. Pivot tables are a key tool for analyzing and summarizing large amounts of data. Read more ...

What is a data warehouse appliance? In general, a data warehouse (DW) appliance is an integrated hardware and software bundled application. A DW appliance includes server hardware and premium storage technology with an installed operating system, database management system and application software tuned for data warehousing. Most DW appliances use massively parallel processing (MPP) architectures to provide fast query performance and platform scalability. An appliance is a purpose specific device. Read more ...

What is Hadoop? Data-driven DSS may need to access and process very large data sets to support decision-making. One way to provide this capability is with Hadoop. Apache Hadoop is an open source Java framework for processing, storing and querying large amounts of data distributed on clusters of commodity hardware. Hadoop is a top level Apache project that Yahoo! initiated. The Hadoop project (http://hadoop.apache.org/) develops open-source software for reliable, scalable, distributed computing. Read more ...

Is parallel database technology needed for data-driven DSS? Few managers have heard of parallel computer processing and parallel databases. Nonetheless the desire of managers for more and better historical data is increasing the need for such capabilities. The call for papers for the ACM Eighth International Workshop on Data Warehousing and OLAP states that "Data Warehouse (DW) and Online Analytical Processing (OLAP) technologies are the core of current Decision

Support Systems. ... Research in data warehousing and OLAP has produced important technologies for the design, management and use of information systems for decision support."
Read more ...

What software companies sell data-driven DSS? Although a number of software companies, independent software vendors and value-added resellers market and sell data-driven DSS products, in many cases their "solution" requires additional customization. Buying a data-driven DSS is not like buying a car or an existing house. The situation is more like choosing to build a house using an existing plan, modifying an existing plan or going to an architect for a unique plan. In some cases people even choose a manufactured or prefabricated house. The big four vendors of products that can be used to build a variety of data-driven DSS are: IBM, Microsoft, Oracle and SAP. Read more ...

We use many different terms for systems labeled data-driven DSS. What is important for managers is understanding the concepts associated with helping people access, analyze and understand large amounts of complex data. We can call this category of systems and software data-driven DSS, Business Intelligence, data warehouse software, analytics, multi-dimensional analysis software, OLAP or Executive Information Systems.

Data-driven DSS support decision-makers who need access to large amounts of business data. These systems have evolved from simple verification of facts to analysis of the data and now to discovery of new relationships in large historical data sets. Data-Driven DSS software products are also evolving to better support this wide range of activities. Managers can verify facts using intuitive, easy to use query and reporting tools. Decision-makers can conduct analyses using On-line Analytical processing and statistical tools. Also, managers and DSS analysts can discover new relationships in data using knowledge discovery and data mining tools.

Data-driven DSS are also evolving in terms of technology and architecture. Organizations are delivering these DSS capabilities using mobile and World-Wide Web technologies to managers located almost anywhere in the world. Mobile decision support is an exciting frontier that is broadening the use of data in decision-making.

Data-driven DSS are crucial systems for providing managers with the information they want, when they want it, and in a format that is "decision impelling". When we build a data-driven DSS we are organizing and summarizing data in multiple dimensions for fast retrieval and for ad hoc analysis. The primary goal of these systems is to help managers transform data into information and knowledge. Real-time operations, management control and strategic planning activities can be supported.

In conclusion, managers and especially technical managers need a broad foundation of knowledge about business intelligence and data-driven decision support.

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