BENEFITS TO THE ORGANIZATION DECISION SUPPORT SYSTEMS ARCHITECTURE

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Abstract. *The main objective of this paper is to present in a systematic way some basic concepts of decision support systems architecture. These concepts are used in the area of computer-assisted decision used in various economic fields.*

Being technical support of semistructured and unstructured decision problems, Decision Support System (DSS) has a complex architecture which consists of the following basic subsystems: data management subsystem, management subsystem of models, knowledge management subsystem, management subsystem of the dialog (user interface and interface with the external environment).

Cuvinte-cheie: decision, *Decision Support System, decision support systems architecture*

I. Introduction

The functions of a Decision Support System (DSS) are: data management, model management, knowledge management and communication between user and system management and between data and models, knowledge.

Based on these functions, a DSS will contain appropriate subsystems architecture functions.

II. Architecture components of DSS

These components will be integrated within a computer system architecture.

Architecture of a computer system refers to how the components (hardware and software subsystems) are integrated, what types of tasks are allocated to each component and how the components interact with each other and with the external environment.

For a DSS architecture the best definition is the definition of system architecture by Martin and others (1991). Under this definition computer system architecture is a way of managing and using information in an organization, which creates favorable context for optimal decision making by employees.

According to Alter (1980), components of a DSS can be classified into seven categories, depending on the degree of influence that each component has on decision making. Alter treats each component of DSS as a subsystem with clearly defined functions and operations.

According to Turban and Aronson (2001), DSS's structure includes: data management, model management, external models, subsystem of knowledge base, user interface and user.

III. Types of DSS architecture

Different ways in which components can be integrated into decision support systems have led to obtaining their standard architectures: mesh architecture, bridge, tower and sandwich architecture. Criteria that can be used to evaluate these architectures target accessibility, cost, performance, speed.

Mesh architecture involves integrating components in the form of a network (or graph) in which nodes correspond to the components, and arcs correspond to interfaces. In this structure each dialog component or modeling component corresponds to its own interface which serves communication, the main advantage of the structure being the opportunity to include heterogeneous components into the network, built at different times, in programming languages and different operating environments. Presence of several interfaces and especially the coordinator interface makes this structure have lower performance.

Bridge architecture uses a single interface, but does not diminish the possibility of integrating new functional components, provided they are developed in the same programming language.

Sandwich architecture joins several components of a single dialog component and a single database, being useful in assisting decision-making processes that require modeling decision situations.

Tower architecture makes it possible to operate multiple source databases through a mechanism of data mining, database of decision support system being thus, the interface between source database and models management. In addition, in this case dialogue component is separated into two parts: one that creates output formats which interprets input commands of various components and a second that supervises input-output devices connected to the decision support. This is done through user interface.

The purpose of an information system architecture is to provide the following: systems:

- interoperability, so that the information can be used quickly and easily;
- compatible systems so that resources are easily shared and distributed throughout the organization.
- extension systems so that monofunctional components do not create bottlenecks which may prevent the development of the organization.

Benefits

A well-defined DSS architecture provides the organization with major benefits. These benefits may be non-technical and technical.

Non-technical benefits include the ability to create a common vision to enable project team members to work together, the ability to communicate system concepts to the management, ability to communicate needs to potential suppliers and other teams' ability to implement systems which must work with the DSS.

Technical benefits of a DSS architecture include: ability to effectively plan and coordinate systems and to evaluate the technological options in the context of the way they work.

Architecture of a DSS should be considered and understood before decisions for system hardware and software selection. The nature of this architecture depends on the type and complexity of the DSS that will be implemented. Thus, when designing an architecture of DSS there should be taken into account organizational aspects regarding:

- strategic decisions, tactical and operational decisions;
- unstructured, semi-structured and structured decisions;

- all levels of management and decision makers in the organization;
- all major functions, activities and organization units.

A DSS architecture designed by taking into account the requirements of these categories will be comprehensive and robust enough to withstand the organization.

Requirements that a DSS architecture must meet

Generally DSS architecture should reflect the following elements:

- database or system database, including any existing organization database, internal or external. Architecture should make clear who is responsible for different types of databases to ensure the accuracy, integrity and security;
- model or system models, including information about data sources and organizational responsibilities for their maintenance;
- system users, including information about their locations, their occupations, education and any other factor that may affect the use of DSSs;
- software tools with which users access the database and models. Some of these tools, especially those for simple database queries, can be provided by the database package. Others may be developed or obtained separately. One of the categories of instruments that require special attention are OLAP applications for accessing data warehouses;software tools used by system administrators to manage the database and models; hardware platform and operating systems, in which are stored databases, models, programs and through which users access the DSS;
- communication infrastructure through which hardware platforms are interconnected.

They must reflect: individual needs for connection to one or more servers and databases and communication integration in working groups. As with most DSSs, the interlinking mechanism will be only the local network; organizational culture that will use DSS. If culture is a centralized one, you can deploy and use a central database, a central library for models with central control over all system components and standardize on a package of applications. If culture is decentralized, it is recommended that each division of the organization should have control, separately, on its own information resources, but with resource sharing capabilities.

IV. Conclusions

Components of a DSS are designed and configured according to the type of DSS, decision-making context in which it will be used and the complexity of decision-making problems that it is supposed to assist.

A well designed DSS architecture brings major non-technical and technical benefits to the organization, taking into account all conditions and characteristics of the organization that operates the DSS.

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