The Systems Perspective of a DSS

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What is a System?

- System – an interrelated set of elements that work together to achieve a common objective
- A closed system seldom interacts with the environment to receive input or generate output. Also called stable or mechanistic.
- An open system is less structured and operates in a self-organizing manner. Also called adaptive or organic.
- A subsystem is one of the "interrelated set of elements" noted above.

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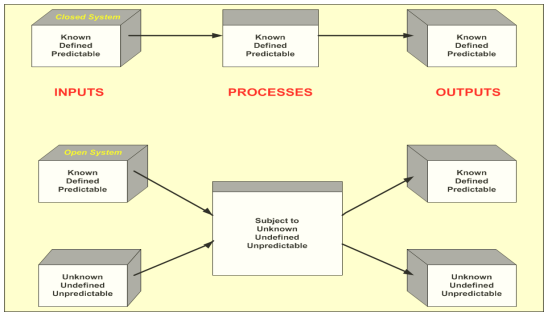
Comparison of Open and Closed Systems



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The Subsystem – Functional Decomposition

- The process of breaking a system down into its component subsystems is called functional decomposition.
- By using a structured decomposition, we can study a subsystem independently from the larger system.
- There can be many layers of decomposition. We stop at the layer that provides the most beneficial and useful information to us.
- We can also apply this to decisions by breaking them down into smaller, more focused decisions.

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DSS in the Context of Information Systems

A DSS is a specific type of information system that has its own set of characteristics:

- Data stores are distributed and there are usually several of them.
- Most data flow into the DSS from external applications. A DSS generally takes, rather than gives, data.
- A DSS usually has few end users and there is a narrow boundary of communication with them.
- These users have a high level of control.

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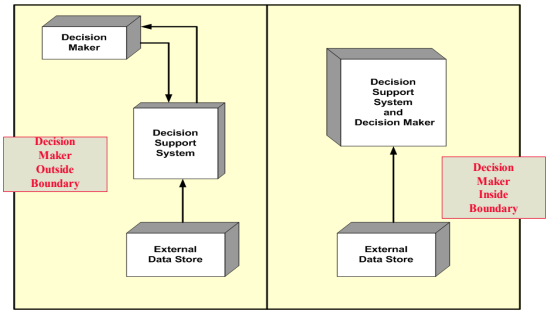
Context Diagrams of Two Design Approaches



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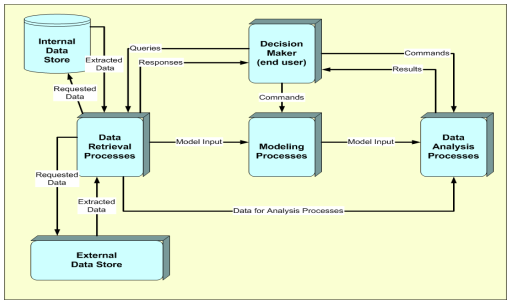
Processes and Data Flows Within the Generalized DSS



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Design Specifics Depend on Several Questions

- What are the specific objections of the DSS application?
- What are the external sources and recipients? How will the DSS communicate with them?
- What is the exact nature of the data flows between the DSS and these external entities?
- What data will reside within the boundary of the DSS application? When will external data be stored within the boundary?
- What are the detailed temporal processes contained within the DSS application?

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Information Quality Issues In DSS Design

- The more information we possess, the less uncertainty we endure about the outcome. Finer granularity in the information leads to greater clarity.
- It is not enough to simply gather more information, however, because we may not have the ability to process it all.

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Information Quality Issues In DSS Design

- In general, relatively structured problems require less information than unstructured problems.
- Since better-quality information costs more to produce, the quality of information becomes a cost-benefit analysis between the cost of information and the sensitivity of the decision.

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Information Quality Service Levels

- Information can be considered a form of service to an end user. The degree to which information contributes to the decision process depends on its quality.
- The quality of information is related to how closely it matches its intended purpose.
- To assess the quality of information needed, we must first ascertain the sensitivity of the decision to the quality of information available.

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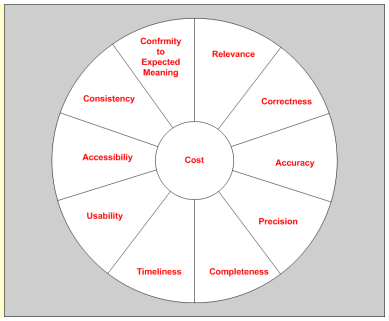
Factors In Determining Information Quality



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Factors In Determining Information Quality

- An agreed-upon set of factors can be used to determine both the level of the information required and the quality of information available.
- These eleven factors were illustrated on the previous slide. Briefly, they are:
  - Relevance – can it be directly applied?
  - Correctness – does it represent reality?
  - Accuracy – is the info 'close enough' to true?

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Factors In Determining Information Quality

Precision – what is the maximum accuracy?
Completeness – are things missing?
Timeliness – When is it needed? When is it available? When was it collected?
Usability – can the user figure out what to do?
Accessibility – can the user get to it?
Consistency – is it stored in predictable way?
Conformity to Expected Meaning – is it presented the way the user needs it?
Cost – what is the total cost of acquiring it?

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Defining the DSS Information System Architecture

When we speak of IS architecture, we focus on these three high-level issues:

- Interoperability – the degree to which information can be delivered to the point of use on an efficient manner.
- Compatibility – the degree to which the DSS will work in harmony with other platforms and data stores in an organization.
- Scalability – the degree to which it can be expanded to accommodate an increase in processing requirements.

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Elements of a Typical DSS Architecture

- The DSS is often defined as a subset of the organization's overall IS, yet still contains most of the same elements as its "parent"
- A robust and well-defined architecture should contain details about the following elements:

Databases	Models
End users	End user tools
Platforms	Communications

Administration Tools

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An Example DSS Architecture

- Once the details about the elements have been articulated, a generic DSS architecture begins to emerge.
- On the next slide, the architecture at Indiana University is portrayed. It shows 10 interconnected servers and three different type of end users.
- In moving from a conceptual architecture to a specific one, a number of questions need to be asked to help determine platform needs.

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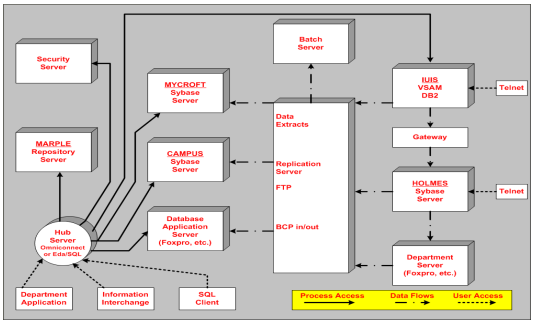
Example of DSS Architecture at Indiana University



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Questions to Ask in Determining Platform Requirements

- Do current policies constrain or dictate platform choice?
- What is the size and distribution of the end user community?
- Will all users employ the same basic set of applications?

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Questions to Ask in Determining Platform Requirements

- To what extent must the existing organizational system be able to share data with the DSS platform?
- Do the necessary development tools exist within the organization now?
- What is the expected processing power required?

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The Role of the Internet in DSS Development and Use

- The Internet is the world's database and is rapidly becoming the world's leading source of information.
- Despite reliance on the Internet, the same basic issues of design, quality and suitability must be addressed.

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The Role of the Internet in DSS Development and Use (cont.)

- The Internet has several advantages: (1) a typical DSS end user can be anywhere, (2) the cost of becoming "DSS connected" is lower, and (3) almost anyone with a computer is a potential end user.
- There are also some disadvantages: (1) access is often slow, (2) good web designers are not necessarily good DSS designers, and (3) we are just now developing programming languages robust enough to handle the most serious DSS applications.

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EXERCISE

- Using a World Wide Web search engine, locate several examples of software packages that claim to include form of decision support capabilities. Make a comparative listing of their hardware and software requirements to determine those most likely to be operational across multiple platforms and architectures.

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