

Advanced Business Decision Support Systems
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Lecture 02
Overview of Decision Support Systems (Part-2)

Good afternoon, everyone. Welcome to yet another new course in the NPTEL MOOCs and I am Deepu Philip from IIT, Kanpur. Today we are going to discuss new course which is called the Advanced Business Decision Support System. You may have taken our preliminary course on Business Decision Support System, actually the Web-based Business Decision Support System which basically introduced due to the major components of the Decision Support System and its functionalities and how would you design each component.

So, without any delay let us get into the topic today. It is called the Web-Based Business Decision Support System Architecture, DSS Architecture. So, schematically we have gone through this in the previous course, but I am just going to use a diagram to you know make you understand this.

So, you have a computer with web browser or some internet thing. We studied this in the previous course and here is a human being who interacts with the computer with a web browser. If you remember it talked to another computer, you know floppy, all those kinds of things this. This is another computer and this one is a web server. We talked about where it runs all the different type of Apache and those kinds of things. From there, it interacts with what we call another computer. It will slightly bigger. I am just drawing a floppy disk and start button etcetera. And, here is a compact disk drive. It is another computer; we call it the application server.

And then, the application server is divided into two. One is here, I am not very good at drawing, but we can do this still. It is another computer, that is a floppy thing and we will draw the usual cylinder next to it which shows that this is a data server.

And then, also we have what is called another server. So, this is the model server which is your optimization, simulation etcetera, all these models. They interact both ways with the application server and these guys also interact among themselves, but there is another thing in the behind which we call it Data Warehouse where this is the data server interacts with it. So, the data gets kept on storing.

So, this is the overall architecture, but the implementation will be situation or problem specific. So, you may have different components, all components of the DSS, but they may not all occur in the same strength or same fashion at this point.

So, let us talk about the Classifications of DSS. The major DSS categories, let us talk about them.

- 1) We will discuss all this in detail later, Institutional and Ad-hoc DSS. So, Ad-hoc is making Ad-hoc decisions on the fly kind of a system. Whereas, something that is institutionalized judicial systems etcetera are institutionalized one. We will talk about this later.
- 2) There are Personal Decision Support System, Group Decision Support System and Organizational Decision Support System. So, these three levels of support it provides. Personal, Group and Organizational Support.
- 3) Then, the third one is Individual Support System is tailor made to a single decision maker versus a Group Support System (GSS). This focuses more on what you call this Committee Based Decision Support, the Group Decision Support System. We will discuss this in the later class.
- 4) And then, the last one is the Custom-Made System versus Ready-Made System. So, somebody may hire by an MRP (Material Requirement Planning) which is standard built-in system or an inventory management system where Ready-Made, Tailor-Made systems are available. Whereas, somebody may have production capacity planning, aggregate capacity planning systems which might be specific for a specific organization. So, that is the Custom-Made versus Ready-Made Systems.

So, these categories the Institutional versus Ad-hoc then, the Personal, Group and Organizational Support, then, Individual Decision Support or Group Decision Support, Custom and Ready-Made. So, all these ones are the major classifications of DSS.

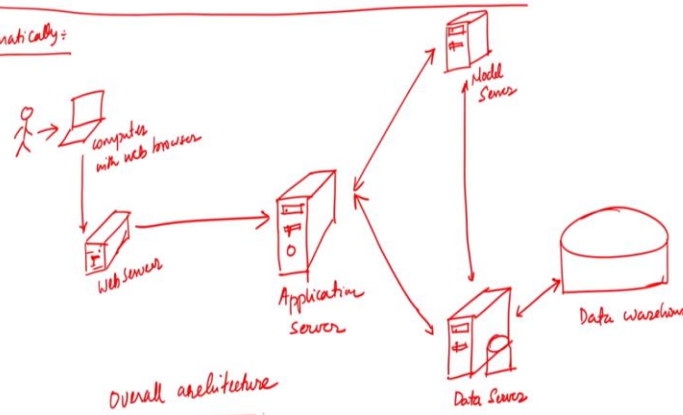
So, now let us move forward with the classifications proposed by two leaders in this domain. So, Holsapple and Whinston classified many of the DSS or the business DSS. There are about 6 of them.

- 1) They call it Text-oriented DSS. You interact with the Decision Support System using a textual interface and the textual interface is usually, like what we interact with a command shell of Linux or stuff like that.
- 2) Next is Database-oriented DSS . Many of the financial systems are Database-oriented DSS specifically.

- 3) Then, the Spreadsheet-oriented DSS, excel or other spreadsheets. Lot of the time, marketing sales people work on this.
- 4) Then, the fourth one is Solver-oriented DSS, type of solver that you are going to use. OPL studio optimization program, the CPLEX solver driven systems are an example of this.
- 5) The fifth one is the Rule-oriented DSS. This includes most of the Knowledge-driven DSS and data mining. So, these are rules driven by Holsapple and Whinston. So, if it walks like a dog, barks like a dog is probably a dog, kind of a rule, kind of thing. And then, the last one is the Compound DSS.
- 6) When you mix and match all the other 5, 1 or 2 or 3 of them, then, you may get what you call Compound DSS where things are you know lack of better term. It is a potpourri.

Web-Based Business DSS Architecture

Schematically:



Then, the second aspect we are going to discuss is the Alter's Output Classification. And, we can represent it in the form of a table. We will call it the Orientation or the Focus.

The first focus is data. The two things to this, you can talk about as the File drawer system and the Data analysis system. So, the interesting, the focus, the type of operation. We can talk about here the type of operation or the major operation that we focus here is, the File drawer system is Access relevant data items. I need to know what was the sales 10 years ago. It is a File drawer system. Whereas, the Data Analysis System is Ad-hoc analysis of data files. In the last 5 years what is the average sales that comes from this aspect.

Then, you have the second orientation is Data or Models. This is another orientation we have. We can think about it, Analysis Information System, this is the major or the lucrative, the encompassing word. What the difference here is the previous case in data, you are only focusing on data files. So, this Ad-hoc analysis involving multiple databases and small models. You have sales data, marketing data, HR data, etcetera.

So, multiple Data you take that and then, small models are also added into this. And then, the last orientation is the pure models based, Models, the orientation is Models. And, you have one you call this Accounting Models, and then, the second one what we call Optimization Models. So, when we come across different examples in the class, you can decide what we are discussing in the class.

And, the type of operation, the Accounting Models is standard calculations that estimate future results based on accounting definitions. So, something like net present worth, what will be the future value, depreciation, all these kinds of things, those Models. That is all part of the Accounting Models.

The Optimization Models that involves calculating optimal or near optimal solution to a combinatorial problem. You might have heard this word combinatorial decision making, combinatorial optimization, etcetera. We will talk about what it is later in the class because that is a critical word for us, but we can think about it as a mixed problem. We will give a proper definition. I do not want to give you something confusing at this point, but that is the idea. According to Alters these are the main classifications; the Data, the Data or Models or the Models focused or that is the orientation of the kind of system.

DSS Classifications

Alter's Output Classification

Orientation		Type of operation
Data	- File driven system	Access relevant data items
	- Data analysis system	Adhoc analysis of data files
Data (or) Models	Analysis information system	Adhoc analysis involving multiple databases and small models.
Models	Accounting models	Standard calculations that estimate future results based on accounty definitions.
	Optimization models	Calculating optimal/near optimal solutions to a <u>combinatorial</u> problem ?

Now, we will get into the Components of the DSS and this is again recap from previous course. I will speed up through this and we will recap it in the form of schematic. Picture is for 1000 words. Instead of writing and reminding you everything it is easy for me to draw s that you can understand that.

We start from what we call the user or the user is also the decision maker. You can also call it the manager if you want to does not matter to me. And then, the user has most important thing for them is the User Interface. The user interacts with the User Interface and then, the User Interface has 3 aspects. So, we will put 3 things here.

One is the Knowledge-base sub-system. Then, you have the Data Management sub-system and you have the Models. Let us call it External Models. Models are specifically created. So, the User Interface interacts with all the 3. And, the Knowledge-Base Management System also interacts with the External User. And, it will also interact with the Database System as required.

And then, among these you have a Model Management. The Model Management typically connects Data and Models through this fashion. See this loop, what we see here? If you want to think about this loop. This is the critical aspect in certain cases. You may not require any knowledge, but the other loop, the Model Management loop will be available, important loop will be present there, preferly.

Now, we have all of this. This we can call the DSS Engine or architecture or whatever you want to call it. That is the heart of the DSS.

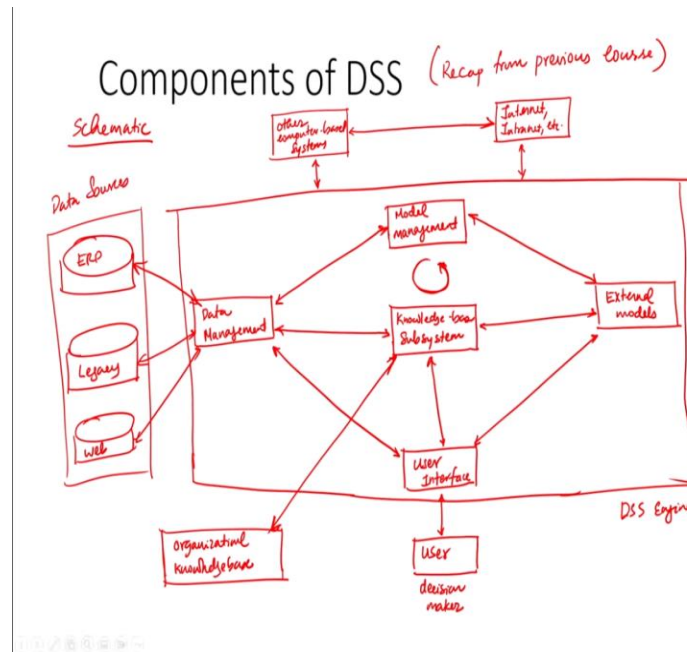
Then, you can have another one. Let me reduce this line. We have what you can call it other Computer Based Systems. This heart of the DSS can interact with them. So, for example, when you have weather forecasting or something. A local weather forecast may take information from lot of RWIS (Remote Weather Information System) which is also small DSS by itself. You can have internet, intranet, extranet, etcetera, that also the system can interact with. Through this internet, intranet, extranet you can interact with those kinds of systems as well.

And then, there is another part something called Organizational Knowledge Base. Each organization will have its own specific knowledge base which they will interact. The knowledge base subsystem will interact with that which is usually kept outside the DSS system because it is a generic stuff.

And, the other part also we have data sources Instead of doing that let me do one data ERP, POS (Point Of Sales), etcetera.

Then, you have your legacy database data and then, you have web etcetera. There are so many of databases, and the data management or the DBMS, whatever you want to call it, that interacts with all of these and we call all of these things Data Sources.

If you think about what we just drew here, that gives you an overall idea of what the architecture of the DSS is. We have already discussed this component, the major aspects of the components in the previous course. This is more of a schematic for you to quickly refresh the concept.



Now, let us look into the next concept which is called the Data Subsystem. And again, we have discussed this is a recap from the previous module, but we will again do it as schematic. So, we will study it in the diagrammatic format.

The major aspect of this is, let us say you have multiple data internally. You have Finance, you have Marketing, you have Production, I am just giving you some of the Major Data Systems, then, you have Personal or what we call HR, etcetera. Then, there we will add an Other also. All these Data Sources, we call it Internal Data Sources . These are the Internal Data Sources of the system.

So, then there is a process, let us call it Extraction. And, its job is to extract data from all of these, Production, Personal, Other. It extracts data from all of these.

Then, also you have other things, something like the Internal Data Sources, you have External Data Sources and Organizational Knowledge Base. They extract stuff from there also.

And then, certain times you have Private Data, that is also possible like intellectual properties and other things. And, you have also Corporate Data Warehouse, that is also part of the Extraction Process.

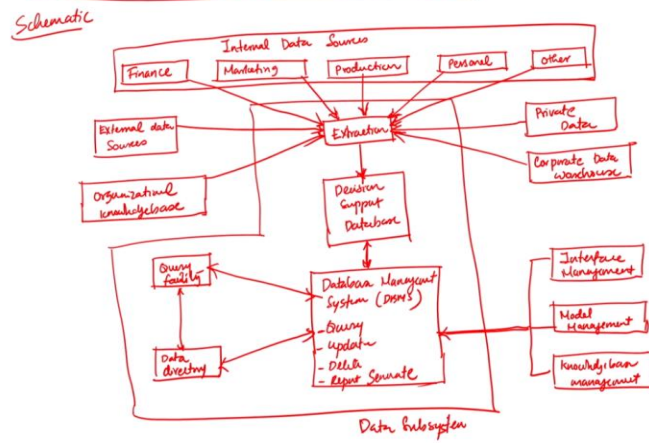
All these Extraction Process you have created, what we call Decision Support Database. Remember, I told you that every DSS will have its own dedicated Data and Models. And, the Decision Support Database, from there you have Database Management System. That is called DBMS, we discussed this in the previous class. The focus is Query, Update, then Delete, Report generation, etcetera. These are all part of this, which is created the DBMS, interacts closely with the Decision Support Database to do it.

And then, you have something called three aspects. The Interface Management, then you have the Model Management and the Knowledge Base Management, that is called all these guys. They are in a way interconnected and they interact through the DBMS.

And then, also you have something called the Query facility and, you have the Data directory, we talked about this what is Data directory. And, the Query facility uses the Data directory and with which it interacts with the DBMS to creates query results or whatever you want to do.

The DBMS, when we say the Data Subsystem, we can draw something like this. This is the Data Subsystem for us. I am focusing more at this point, there are Internal Data Sources, but for us this is the aspect of DSS, where this database is specific to a decision problem. Remember, that is how the DSS happens at this point. So, I hope that you guys remember the Data Subsystem, aspect of this.

Business DSS: Data Subsystem (Recap)



So, we will take a short break here for few minutes and we will finish the remaining of the lecture and we will take it up the next one. Thank you.