Levels of Decision making

**Strategic decision-making** determines the objectives, resources and policies of the organisation. A major problem at this level of decision making is predicting the future of the organisation and its environment and matching the characteristics of the organisation to the environment. This process generally involves a small group of high level managers who deal with complex, non-routine problems.

Decision making for **management control** is principally concerned with how efficiently and effectively resources are utilised and how well operational units are performing. Management control requires close interaction with those that are carrying out the tasks of the organisation. It takes place within the context of broad policies and objectives set out by strategic decision making and the behaviourists have described, it requires an intimate knowledge of operational decision making and task completion.

**Knowledge based decision making** deals with evaluating new ideas for products and services, ways to communicate new knowledge and ways to distribute information throughout the organisation.

Decision making for **operational control** determines how to carry out the specific tasks set forth by strategic and middle management decision makers. Determining which units in the organisation will carry out the task, establishing criteria for completion and resource utilisation and evaluating outputs all require decisions about operational control.

**Types of decisions: Structured versus Unstructured**

Within each of these levels of decision making, Simon (1960) classified decisions as being either programmed or non programmed. Other researchers refer to these types of decisions as structured or unstructured. **Unstructured** decisions are those in which the decision maker must provide judgement, evaluation and insights into the problem definition. These decisions are novel, important and non-routine, there is no well understood or agreed upon procedure for making them. **Structured** decisions by contrast are repetitive, routine and involve a definite procedure for handling so that they do not have to be treated each time as if they were new. Some decisions are **semi-structured** decisions; in such cases only part of the problem has a clear cut answer provided by an accepted procedure.

**Stages of Decision making**

Making decisions consists of several different activities that take place at different times. The decision maker has to perceive and understand problems. Once perceived solutions must be designed, once solutions are designed choices have to be made about a particular solution, finally the solution has to be implemented. Simon described 4 different stages in decision making: intelligence, design, choice and implementation.
### Stages in Decision making, Information requirement and supporting information systems

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<th>Stage of Decision making</th>
<th>Information requirement</th>
<th>Example system</th>
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<td>MIS</td>
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<td>Choice</td>
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- **Intelligence** consists of identifying the problems occurring in the organisation. Intelligence indicates why, where and with what effects a situation occurs. This broad set of information gathering activities is required to inform managers how well the organisation is performing and to let them know where problems exist. Traditional MIS that deliver a wide variety of detailed information can help identify problems, especially if the systems report exceptions.

- During design the individual designs possible solutions to the problems. This activity may require more intelligence so that a manager can decide if a particular solution is appropriate. Smaller DSS are ideal in this stage of decision making because they
operate on simple models, can be developed quickly and can be operated with limited data.

The third stage, choice consists of choosing among alternatives. Here a manager can use information tools that can calculate and keep track of the consequences, costs and opportunities provided by each alternative designed in the second stage. The decision maker might need a larger DSS to develop more extensive data on a variety of alternatives and to use complex analytic models needed to account for all the consequences.

The last stage in decision making is implementation. Here managers can use a reporting system that delivers routine reports on the progress of a specific solution. The system will also report some of the difficulties that will arise, will indicate resource constraints and will suggest possible improvement actions. Support systems can range from full-blown MIS to much smaller systems as well as project planning software operating on PCs.

In general the stages of decision making do not necessarily follow a linear path from intelligence to design, choice and implementation. At any point in the decision making process you may have to loop back to a previous stage. For instance one can often create several designs but may not be certain about whether specific design meets the requirements for the particular problem. This situation requires additional intelligence work. Alternatively one can be in the process of implementing a decision only to discover that it is not working. In such a case one is forced to repeat the design or the choice stage.

Types of Decision Support Systems

Two basic types, model driven and data driven. Early DSS systems developed in the late 70s and 80s were model driven. Model driven DSS were primarily stand-alone systems isolated from major organisational information systems that used some type of model to perform “what if” and other kinds of analyses. Such systems often developed by end user divisions or groups not under central IS control. Their analysis capabilities were based on strong theory or model combined with a good user interface that made the model easy to use.

Data driven DSS analyse large pools of data found in major organisational systems. They support decision making by allowing users to extract useful information that previously was buried in large quantities of data. Often data from Transaction processing systems (TPS) are collected in data warehouses for this purpose. On line analytical processing (OLAP) and data mining can then be used to analyse the data. Companies are starting to build data driven DSS to mine customer data gathered from their websites as well.
**Components of DSS**

**DSS Database**
Collection of current or historical data from a number of applications or groups. It may be a small database residing on a PC that contains a subset of corporate data that has been downloaded and possibly combined with external data. Alternatively it may be a massive data warehouse that is continuously updated by a major organisational TPS. The data in DSS databases are generally extracts or copies of production databases so that using the DSS does not interfere with critical operational systems.

**DSS software systems**
Contains software tools that are used for data analysis. It may contain various OLAP tools, data mining tools or a collection of mathematical and analytical models that easily can be made accessible to the DSS user. A model is an abstract representation that illustrates the components or relationships of a phenomenon. A model can be a physical model, a mathematical model or a verbal model. Each DSS is built for a
specific set of purposes and will make different collections of models available depending on these purposes.

Perhaps the most common are libraries of statistical models. Such libraries usually contain the full range of expected statistical functions including, means, medians, deviations and scatter plots. The software has the ability to project future outcomes by analysing a series of data. Statistical modelling software can be used to help establish relationships, such as relating product sales to differences in age, income or other factors between communities. Optimisation models often use linear programming, determine optimal resource allocation to maximise or minimise specified variables such as cost or time. The advanced planning system uses such software to determine the effect that filling a new order will have on meeting target dates for existing orders. A classic use of optimisation models is to determine the proper mix of products within a given market to maximise profits.

Forecasting models are often used to forecast sales. The user of this type of model might supply a range of historical data to project future conditions and the sales that might result from those conditions. The decision maker could vary those future conditions to determine how these new conditions might affect sales. Companies often use this software to attempt to predict the actions of competitors. Model libraries exist for specific functions such as financial and risk analysis models.

The most widely used models are sensitivity analysis models that ask “what if” questions repeatedly to determine the impact of changes in one or more factors on outcomes. “What if” analysis – working forward from known or assumed conditions – allows the user to vary certain values to test results in order to better predict outcomes if changes occur in those values. Desktop spreadsheet software is often used for this purpose. Backward sensitivity analysis is used for goal seeking.

The DSS interface permits easy interaction between users of the system and the DSS software tools. A graphic easy to use flexible user interface supports the dialogue between the user and the DSS. The DSS users are generally corporate executives or managers, people with well-developed working styles and individual preferences. Often they have little or no computer experience and no patience for learning how to use a complex tool, so the interface must be relatively intuitive. In addition what works for one may not work for another. Many executives offered only one way of working simply will not use the system. To mimic a typical way of working a good user interface should allow the manager to move back and forth between activities at will. Building a successful DSS requires a high level of user participation and often the use of prototyping to ensure these requirements are met.

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<tr>
<th>Organisation</th>
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<tr>
<td>American Airlines</td>
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<tr>
<td>General Accident Insurance</td>
<td>Customer buying patterns and fraud detection</td>
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<tr>
<td>Bank of America</td>
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<tr>
<td>Burlington Coat Factory</td>
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</table>
MRPII – Manufacturing resources planning, includes applications such as master production scheduling, purchasing, material requirements planning and general ledger. Many MRPII are too large and slow to be used for “what if” analysis.

APS – Advanced planning system, gives the user DSS functionality using the data from existing MRPII systems. Allows a range of “what if” processing by pulling the relevant data from the manufacturing software and performing calculations based on user-defined variables.

GIS – Geographic Information Systems, are a special category of DSS that can analyse and display data for planning and decision making using digitised maps. The software can assemble, store, manipulate and display geographically referenced information, tying data to points, lines and areas on a map. GIS can thus be used to support decisions that require knowledge about the geographical distribution of people or other resources in scientific research, resource management and development planning.

Web based DSS – DSS based on the web and the internet are being developed to support decision making providing on line access to various databases and information pools along with software for data analysis.

CDSS – Customer decision support systems, support the decision making process of an existing or potential customer. People use more information from multiple sources to make purchasing decisions.

**Group Decision Support Systems (GDSS)**

A GDSS is an interactive computer based system to facilitate the solution of unstructured problems by a set of decision makers working together as a group.

GDSS were developed in response to the growing concerns over the quality and effectiveness of meetings. The underlying problem in group decision making have been the explosion of decision maker meetings, the growing length of those meetings and the increased number of attendees. Estimates on the amount of a manager’s time spent in meetings range from 35 –70%.

Meeting facilitators, organisational development professionals and information systems scholars have been focusing on this issue and have identified a number of discrete meeting elements that need to be addressed:

1. Improved preplanning to make meetings more effective and efficient.
2. Increased participation so that all attendees will be able to contribute fully even if the number of attendees is large.
3. Open, collaborative meeting atmosphere, in which attendees from various organisational levels feel able to contribute freely. The lower level attendees must be able to participate without fear of being judged by their management, higher status participants must be able to participate without having their presence or ideas dominate the meeting and result in unwanted conformity.
4. Criticism free idea generation, enabling attendees to contribute without undue fear of feeling personally criticised.
5. Evaluation objectivity, creating an atmosphere in which an idea will be evaluated on its merits rather than on the basis of the source of the idea.

6. Idea organisation and evaluation, which require keeping the focus on the meeting objectives, finding efficient ways to organise the many ideas that can be generated in a brainstorming session, and evaluating those ideas not only on their merits but also within appropriate time constraints.

7. Setting priorities and making decisions, which require finding ways to encompass the thinking of all the attendees in making these judgements.

8. Documentation of meetings, so that attendees will have as complete and organised a record of the meeting as may be needed to continue the work of the project.

9. Access to external information, which will allow significant factual disagreements to be settled in a timely fashion, thus enabling the meeting to continue and be productive.

10. Preservation of “organisational memory” so that those who do not attend the meeting can also work on the project. Often a project will include teams at different locations who will need to understand the content of a meeting at only one of the affected sites.

**GDSS software tools**

- Electronic questionnaires aid the organisers in premeeting planning by identifying issues of concern and by helping to ensure that key planning information is not overlooked.
- Electronic brainstorming tools allow individuals simultaneously and anonymously to contribute ideas on the topics of the meeting.
- Idea organisers facilitate the organised integration and synthesis of ideas generated during brainstorming.
- Questionnaire tools support the facilitators and group leaders as they gather information before and during the process of setting priorities.
- Tools for voting or setting priorities make available a range of methods from simple voting, to ranking in order, to a range of weighted techniques for setting priorities or voting.
- Stakeholder identification and analysis tools use structured approaches to evaluate the impact of an emerging proposal on the organisation and to identify stakeholders and evaluate the potential impact of the stakeholders on the proposed project.
- Policy formation tools provide structured support for developing agreement on the wording of policy statements.
- Group dictionaries document group agreement on definitions of words and terms central to the project.

An EMS (electronic meeting system) is a type of collaborative GDSS that uses IT to make group meetings more productive by facilitating communication as well as decision making. It supports any activity in which people come together whether at the same place at the same time or in different places at different times.
Executive Support Systems (ESS)

Helps managers with unstructured problems focusing on the information needs of senior management. Combining data from internal and external sources, ESS create a generalised computing and communications environment that can be focused and applied to a changing array of problems. ESS help senior executives monitor organisational performance, track activities of competitors, spot problems, identify opportunities and forecast trends.

Benefits
These systems put data and tools in the hands of executives without addressing specific problems or imposing solutions. Executives are free to shape the problems as necessary using the system as an extension of their own thinking processes. These are not decision making systems, they are tools to aid executives in making decisions.
The most visible benefit of ESS is their ability to analyse, compare and highlight trends. Executives are using ESS to monitor performance more successfully in their own areas of responsibility. Some are using these systems to monitor key performance indicators. Problems can be handled before they become too damaging.

A well designed ESS could dramatically improve management performance and increase upper management's span of control.