BCA 612 - Information System Management

Unit-V

1) **Introduction to Decision support system (DSS)**
2) **Structure of Decision Making,**
3) **Users Introduction to Expert system (ES)**
4) **Support in Decision making process,**
5) **Approaches to development of DSS,**
6) **Management of Knowledge**
7) **Types of Knowledge work.**

Introduction to Decision support system (DSS)

Management information Systems (MIS) is the discipline covering the application of people, technologies, and procedures — collectively called information systems — to solving business problems. Management Information Systems are distinct from regular information systems in that they are used to analyze other information systems applied in operational activities in the organization.

Information Systems provide support for management at all levels: operational control, management control, and strategic planning. This unit focuses on support operations for these three functions. In terms of a support system, all of the systems described in the unit are decision support systems; planning and control support systems are subsets of the broad concept of DSS. The unit first explains the design of systems which support decision making. A special class of support systems called expert systems is described. This is followed by a discussion of approaches to development of DSS. This unit also explores the elements of a planning support system and notes features that may be included in a control support system.
Academically, the term MIS is commonly used to refer to the group of information management methods tied to the automation or support of human decision making. There are many elements to Management Information Systems (MIS) which include:

· **Data** - The data input to the system must be as accurate as it can be, subject to its costs and timescales for capture. It should then be stored in the most logical way. This often differs from how the data is input. The data then needs to be summarized to create information in a way that best meets the needs of the systems users - this may not necessarily be the most logical way or the easiest or cheapest for the IT team.

· **People** - People are involved both in capturing the data and in exploiting the information. It is important to motivate those who capture the data by highlighting the value that the exploited data brings to the organization.

· **Hardware** - In a small organization, the MIS may run on just the sales or finance director's PC. In larger businesses, it usually runs on a server, shared or dedicated, with Internet or intranet access for those who need it. It is unusual to require specialized software.

· **Software** - the simplest MIS can be built using standard software. However, most MIS use specialized software, which has the most common features of an MIS already built in. The developer configures this by describing the database and its structure, where the data comes from, how to summarize the data and what standard queries will be required. The cost of this software varies widely. The cheapest offers limited functions for one PC. The most expensive is highly functional, providing high performance and many features for hundreds or thousands of users and vast amounts of data.

Without these things effective MIS system would be forfeit to many problems, including Information flaws, which if exploited and proved to be wrong could bring about harsh fines from publishing false information.

Information supports decisions, decisions trigger actions, and actions affect the achievements or performance of the organization. If we can measure the differences in performance, we can trace the impact of information, provided that the measurements are carefully performed, the relationships among variables are well defined, and possible.

Definition (DSS)

The term decision support system (DSS) refers to class of systems which support the process of making decisions. The emphasis is on "support" rather than on automation of decisions. Decision support systems allow the decision maker to retrieve data and test alternative solutions during the process of problem solving.

Decision support systems are a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

Decision support systems are some new applications that are computerized to act as a support system. This system supports organizational and business decision making in the activities going on in business and other industries. However, the great system that is effective can compile the most important information from documents, business models, and raw data and even help solving problems and making useful decisions. There are many effective decision support systems that can carry out the following requirements. Collecting data from different sources such as inventory data, market research data, sales data, supplier data and others. Applications software and robust tools that are used to report, analyze and monitor the data. Uses in database location and formatting the decision made by business or any report analysis.

Characteristics of DSS

The concept of decision support systems is based on several assumptions about the role of the computer in effective decision making.

1) The computer must support the manager but not replace his or her judgment. It should therefore neither try to provide the "answers" nor impose a predefined sequence of analysis.

2) The main payoff of computer support is for semi structured problems, where parts of the analysis can be systematized for the computer, but where the decision maker's insight and judgment are needed to control the process.

3) Effective problem solving is interactive and is enhanced by a dialog between the user and the system. The user explores the problem situation using the analytic and information providing capabilities of the system as well as human experience and insights.

The decision support system should provide ease of access to the database containing relevant data and interactive testing of solutions. The designer must understand the process of decision making for each situation in order to design a system to support it.

Decision Making

The word decision is derived from the Latin root decido, meaning to cut off. The concept of decision, therefore, is settlement, a fixed intention bringing to a conclusive result, a judgment, and a resolution. A decision is the choice out of several options made by the decision maker to achieve some objective in a given situation.

Business decisions are those, which are made in the process of conducting business to achieve its objectives in a given environment. In concept, whether we are talking about business decisions or any other decision, we assume that the decision maker is a rational person who would decide, with due regard to the rationality in decision making.

Decision making can be regarded as an outcome of mental processes (cognitive process) leading to the selection of an appropriate course of action among several alternatives. Every decision making process produces a final choice. The output can be an action or an opinion of choice.

Human performance in decision making terms has been the subject of active research from several perspectives. From a psychological perspective, it is necessary to examine individual decisions in the context of a set of needs, preferences an individual has and values they seek. From a cognitive perspective, the decision making process must be regarded as a continuous process integrated in the interaction with the environment. From a normative perspective, the analysis of individual decisions is concerned with the logic of decision making and rationality and the invariant choice it leads to. Yet, at another level, it might be regarded as a problem solving activity which is terminated when a satisfactory solution is found. Therefore, decision making is a reasoning or emotional process which can be rational or irrational, can be based on explicit assumptions or tacit assumptions.

Logical decision making is an important part of all science-based professions, where specialists apply their knowledge in a given area to making informed decisions. Some research shows, however, that in situations with higher time pressure, higher stakes, or increased ambiguities, experts use intuitive decision making rather than structured approaches.

A major part of decision making involves the analysis of a finite set of alternatives described in terms of some evaluative criteria. These criteria may be benefit or cost in nature. Then the problem might be to rank these alternatives in terms of how attractive they are to the decision makers when all the criteria are considered simultaneously. Another goal might be to just find the best alternative or to determine the relative total priority of each alternative (for instance, if alternatives represent projects competing for funds) when all the criteria are considered simultaneously. Solving such problems is the focus of multi-criteria decision analysis (MCDA) also known as multi-criteria decision making (MCDM). This area of decision making, although it is very old and has attracted the interest of many researchers and practitioners, is still highly debated as there are many MCDA / MCDM methods which may yield very different results when they are applied on exactly the same data. This leads to the formulation of a decision making paradox.

Problem Analysis Vs. Decision Making

It is important to differentiate between problem analysis and **decision making**. The concepts are completely separate from one another. Problem analysis must be done first, then the information gathered in that process may be used towards decision making.

Problem Analysis

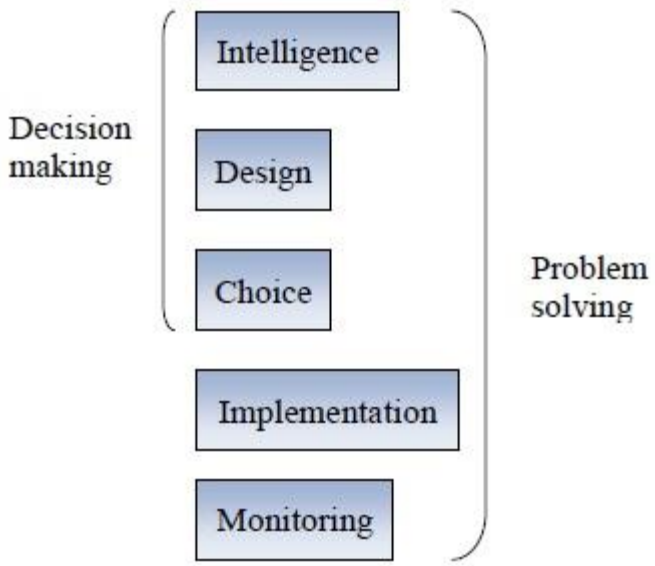
· Analyze performance, what should the results be against what they actually are

- Problems are merely deviations from performance standards
- Problem must be precisely identified and described
- Problems are caused by some change from a distinctive feature
- Something can always be used to distinguish between what has and hasn't been effected by a cause
- Causes to problems can be deducted from relevant changes found in analyzing the problem
- Most likely cause to a problem is the one that exactly explains all the facts

Decision Making

· Objectives must first be established

- Objectives must be classified and placed in order of importance
- Alternative actions must be developed
- The alternative must be evaluated against all the objectives
- The alternative that is able to achieve all the objectives is the tentative decision
- The tentative decision is evaluated for more possible consequences
- The decisive actions are taken, and additional actions are taken to prevent any adverse consequences from becoming problems and starting both systems (problem analysis and decision making) all over again
- There are steps that are generally followed that result in a decision model that can be used to determine an optimal production plan.
- In a situation featuring conflict, role-playing is helpful for predicting decisions to be made by involved parties.



Decision Planning

Making a decision without planning is fairly common, but does not often end well. Planning allows for decisions to be made comfortably and in a smart way. Planning makes decision making a lot more simpler than it is. Decision will get four benefits out of planning:

- Planning give chance to the establishment of independent goals. It is a conscious and directed series of choices.

- Planning provides a standard of measurement. It is a measurement of whether you are going towards or further away from your goal.

- Planning converts values to action. You think twice about the plan and decide what will help advance your plan best.

- Planning allows to limited resources to be committed in an orderly way. Always govern the use of what is limited to you (e.g. money, time, etc..)

Major Characteristics of Business Decision Making

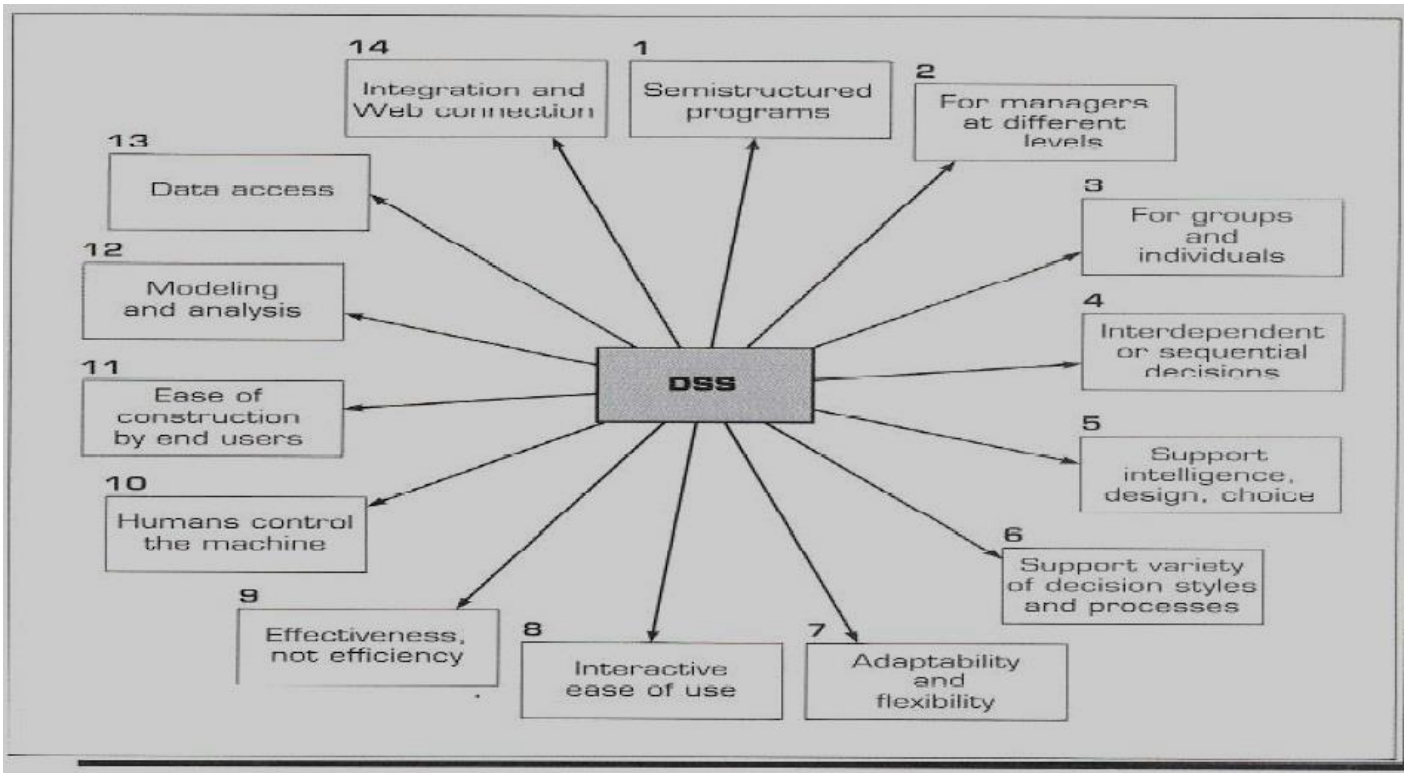


FIGURE 3.1 THE IDEAL CHARACTERISTICS AND CAPABILITIES OF DSS

The major characteristics of a decision making system are:

(a) Sequential in nature.

The business decision making is sequential in nature. In business, the decisions are not isolated events. Each of them has a relation to some other decision or situation. The decision may appear as a "snap" decision but it is made only after a long chain of developments and a series of related earlier decision.

(b) Exceedingly complex due to risks and trade offs.

The decision making process is a complex process in the higher hierarchy of management. The complexity is the result of many factors, such as the inter-relationship among the experts or decision makers, a job responsibility, a question of feasibility, the codes of morals and ethics, and a probable impact on business.

(c) Influenced by personal values.

The personal values of the decision maker play a major role in decision making. A decision otherwise being very sound on the business principle and economic rationality may be rejected on the basis of the personal values, which are defeated if such a decision is implemented. The culture, the discipline and the individual's commitment to the goals will decide the process and success of the decision.

(d) Made in institutional settings and business environment.

Whatever may be the situation, if one analyses the factors underlying the decision making process, it would be observed that there are common characteristics in each of them. There is a definite method of arriving at a decision: and it can be put in the form of decision process model.

The decision making process requires creativity, imagination and a deep understanding of human behavior. The process covers a number of tangible and intangible factors affecting the decision process. It also requires a foresight to predict the post-decision implications and a willingness to face those implications. All decisions solve a problem but over a period of time they give rise to a number of other problems.

Expert System

One of the most practical and widely implemented applications of artificial intelligence in business is the development of expert systems and other knowledge-based information systems. A knowledge based information system (KBIS) adds a knowledge base to the major components found in other types of computer-based information systems. An expert system (ES) uses its knowledge about a specific, complex application area to act as an expert consultant to end users. Expert systems provide answers to questions in a very specific problem area by making humanlike inferences about knowledge contained in a specialized knowledge base. They must also be explained their reasoning process and conclusions to a user. So expert systems can provide decision support to end users in the form of advice from an expert consultant in a specific problem area.

Components of Expert system

An expert system is typically composed of at least three primary components. These are the **inference engine**, the **knowledge base**, **working memory,** and the **user interface.**

1) Knowledge base

The knowledge base is a collection of rules or other information structures derived from the human expert. Rules are typically structured as If/Then statements of the form:

IF <antecedent> THEN <consequent>

The **antecedent** is the condition that must be satisfied. When the antecedent is satisfied, the rule is triggered and is said to "fire". The **consequent** is the action that is performed when the rule fires.

2) The inference engine

The inference engine is the main processing element of the expert system. The inference engine chooses rules from the agenda to fire. If there are no rules on the agenda, the inference engine must obtain information from the user in order to add more rules to the agenda. It makes use of knowledge base, in order to draw conclusions for situations. It is responsible for gathering the information from the user, by asking various questions and applying it wherever necessary.

3) Working Memory

Working memory contains the data that is received from the user during the expert system session. Values in working memory are used to evaluate antecedents in the knowledge base. Consequents from rules in the knowledge base may create new values in working memory, update old values, or remove existing values.

4) User interface
A user interface is the method by which the expert system interacts with a user. These can be through dialog boxes, command prompts, forms, or other input methods. Some expert systems interact with other computer applications, and do not interact directly with a human. In these cases, the expert system will have an interaction mechanism for transactions with the other application, and will not have a user interface.

Uses of Expert system

Expert system: Personality profiler.

HR (Human Resources) want to assign only one of a large group of people to a new role. Each person answers a number of psychological questions that the expert system presents them with.

Expert system: Sales mix modeler

A car company has a large number of options on a new model they are about launch. The car has a dozen paint colour options, three engine sizes, 24 optional accessories. The expert system has a complete record of what sold well in the past with previous models and some trends for the future.

Expert system: Medical diagnostics

This contains a body of knowledge about thousands of diseases. It is used by the doctors at a hypothetical clinic to help diagnose patient illnesses based on their symptoms.

Expert system: A loan approval system

The expert system has a body of knowledge about the results of past loans made by the credit company. It has knowledge about all the factors that point to a low risk or high risk loan.

A decision which cannot be made by using a rule or a model is the non-programmed decision.

Such decisions are infrequent but the stakes are usually larger. Therefore, they cannot be delegated to the lower level. The MIS in the non-programmed-decision situation can help to some extent, in identifying the problem, giving the relevant information to handle the specific decision making situation. The MIS, in other words, can develop decision support systems in the non-programmed-decision-making situations.

A significant part of decision making skills is in knowing and practicing good decision making techniques. One of the most practical decision making techniques can be summarized in those simple decision making steps:

1. Identify the purpose of your decision. What is exactly the problem to be solved? Why it should be solved?

2. Gather information. What factors does the problem involve?

3. Identify the principles to judge the alternatives. What standards and judgment criteria should the solution meet?

4. Brainstorm and list different possible choices. Generate ideas for possible solutions.

5. Evaluate each choice in terms of its consequences. Use your standards and judgment criteria to determine the cons and pros of each alternative.

6. Determine the best alternative. This is much easier after you go through the above preparation steps.

7. Put the decision into action. Transform your decision into specific plan of action steps. Execute your plan.

8. Evaluate the outcome of your decision and action steps. What lessons can be learnt? This is an important step for further development of your decision making skills and judgment.

In everyday life we often have to make decisions fast, without enough time to systematically go through the above action and thinking steps. In such situations the most effective decision making strategy is to keep an eye on your goals and then let your intuition suggest you the right choice.

APPROACHES TO DEVELOPMENT OF DSS

There is no standard approach or methodology to design the best decision support system. There are three main approaches to system design and development:

1) the traditional system development life cycle (SDLC) approach;

2) rapid prototyping and

3) end-user approach.

We may want to choose a methodology that ensures that the final product accomplishes your objectives. But each approach has its pros and cons, making it difficult to choose the best one.
Most of these issues can be resolved by:

- Identifying clear agendas
- Brainstorming with team members
- Communicating the expectations clearly to the programmers
- Educating yourself about various technologies used in DSS development
- Trying to reach at a common platform with the developers

System Development Approach

As mentioned above, choosing a system development approach is an underlying issue. This is because there is no single process that can be termed as 'best'. What development approach you choose depends upon the results of feasibility study and a mutual agreement between decision maker and programmer.

However, you will need to choose a developmental approach only when you decide to make a custom decision support system. If you decide to buy a packaged solution, you simply consult the expert, choose a suitable software system and implement it. It is less expensive than making a support system.

But if you're not convinced with the functionality of a packaged solution, it's ideal to make it and equip with all the functions and features that you need. Here are three approaches to system development that you may want to learn about:

1. SDLC - System Development Life Cycle Approach

The formal SDLC is a sequential process which begins with identifying the system objectives (needs of end users) and goes through various stages, including

- System analysis (technical components required)
- System design (architecture)
- Coding (programming)
- Testing (errors and bug fixing)

- Implementation (execution in the organization)
- Use (end users employing DSS)
- Evaluation (verification of functions and capabilities)
- Modification (adjustments required)

It's the most commonly used and most rigid system development approach. In complex situations, it becomes difficult to use this approach, as the requirements of users are constantly changing. It doesn't promote recurring development and testing.

2. Rapid Prototyping Approach

As the name suggests, rapid prototyping is a method that promotes faster system development. Moreover, it's combined effort of decision maker and analyst. A DSS analyst works closely with a decision maker, to chart out specific requirements. Though a decision maker uses general terms, the analyst uses DMS (database management system) to support rapid development of the application.

Rapid prototyping goes through:

- Identifying objectives/ user requirements
- Developing the first model
- Evaluating the first model, identifying adjustments required and modification
- Testing the developed DSS. Go back to evaluation and modification, if needed
- Implementing

As the communication lines are always open, evaluation and modification happen at a rapid pace. This is why it's considered a better approach than SDLC in complex situations.

3. End-User DSS Development Approach

End-user DSS development approach promotes the designing and development of a software system depending upon the specific or individual needs of a decision maker. It's like customizing your laptop. As managers make extensive use of various applications, they may want a system that integrates all the functions that they need.

The plus side of this approach is that a decision maker makes his DSS on his own. The negative side is that he or she may end up choosing the inappropriate software. Moreover, they may make mistakes unknowingly when developing a decision support system because of the lack of technical expertise. This approach is very rarely used.

Management of Knowledge

All the systems we are discussing here come under knowledge management category. A knowledge management system is not radically different from all these information systems, but it just extends the already existing systems by assimilating more information.

As we have seen, data is raw facts, information is processed and/or interpreted data, and knowledge is personalized information.

What is Knowledge?

- Personalized information
- State of knowing and understanding
- An object to be stored and manipulated
- A process of applying expertise
- A condition of access to information
- Potential to influence action

Sources of Knowledge of an Organization

- Intranet
- Data warehouses and knowledge repositories
- Decision support tools
- Groupware for supporting collaboration
- Networks of knowledge workers
- Internal expertise

Definition of KMS

A knowledge management system comprises a range of practices used in an organization to identify, create, represent, distribute, and enable adoption to insight and experience. Such insights and experience comprise knowledge, either embodied in individual or embedded in organizational processes and practices.

Purpose of KMS

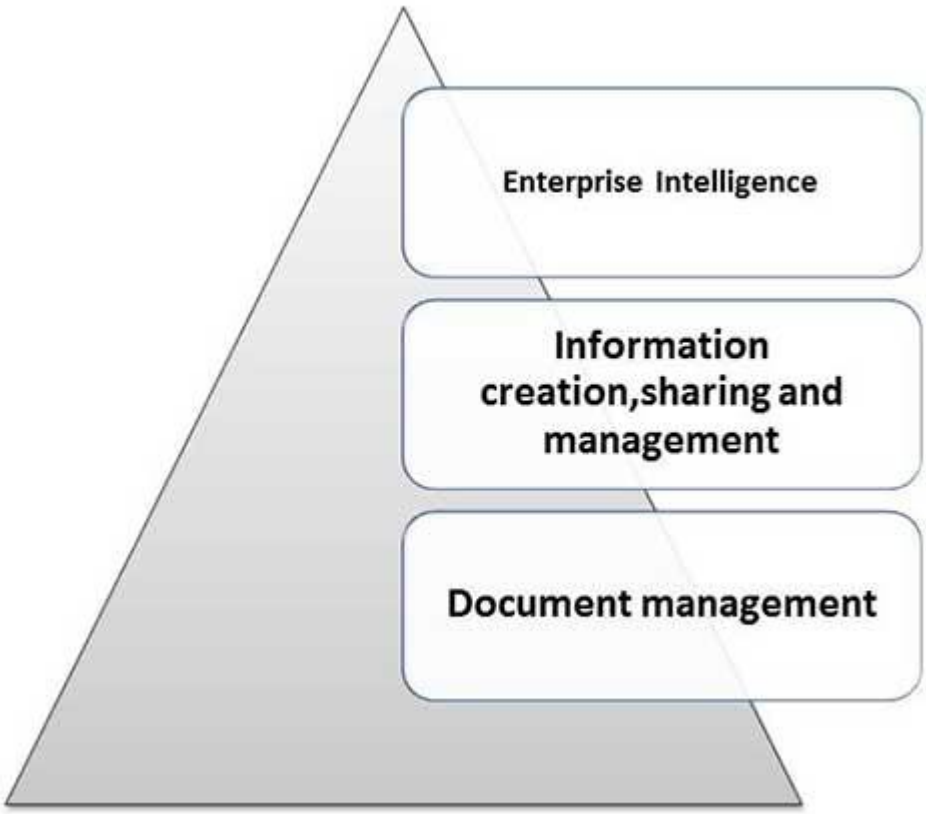
- Improved performance
- Competitive advantage
- Innovation
- Sharing of knowledge
- Integration

- Continuous improvement by −
    - Driving strategy
    - Starting new lines of business
    - Solving problems faster
    - Developing professional skills
    - Recruit and retain talent

Activities in Knowledge Management

- Start with the business problem and the business value to be delivered first.
- Identify what kind of strategy to pursue to deliver this value and address the KM problem.
- Think about the system required from a people and process point of view.
- Finally, think about what kind of technical infrastructure are required to support the people and processes.
- Implement system and processes with appropriate change management and iterative staged release.

Level of Knowledge Management



Knowledge Work Types

As there are different opinion on **Knowledge Work Types** in **Thinking for a Living**: How to Get Better Performances and results from Knowledge Workers using a variety of classifications. One was based on the complexity of the work. Work that requires greater interpretation/judgment vs. work that is relatively routine. He also classified these according to the level of dependence on others. Within that he then defined the following types of knowledge workers:

- Transaction Worker - Routine, individual, ex. call center.
- Integration Worker - Routine, collaborative, ex. systems development
- Expert Worker - Interpretation/judgment, individual, ex. family physician
- Collaboration Worker - Interpretation/judgment, collaborative, ex. investment banker

Concept workers work on things that are higher on the interpretation/judgment side. Developers and call center employees for the most part are not concept workers. However, they will shift into concept work for some kinds of problems. It's generally when new situations arise that are outside the norm. A new technology is encountered. A particularly hard customer situation. etc. These require the worker to shift into a mode of judgement and interpretation.

A decision support system may present information graphically and may include an expert system or artificial intelligence (AI). It may be aimed at business executives or some other group of **knowledge workers.** A **knowledge worker** is anyone who works for a living at the tasks of developing or using knowledge. For example, a **knowledge worker** might be someone who works at any of the tasks of planning, acquiring, searching, analyzing, organizing, storing, programming, distributing, marketing, or otherwise contributing to the transformation and commerce of information and those (often the same people) who work at using the knowledge so produced.

The information system is a support system for an organization. That part of the information system designed to support organizational operations is an operational support system, the part designed to support decision making is a decision support system (DSS), and the part that supports **knowledge work** is a **knowledge work support system.**