7.2 Compares and contrasts different types of manmade systems in terms of their objectives and functionality

Time: 4 periods

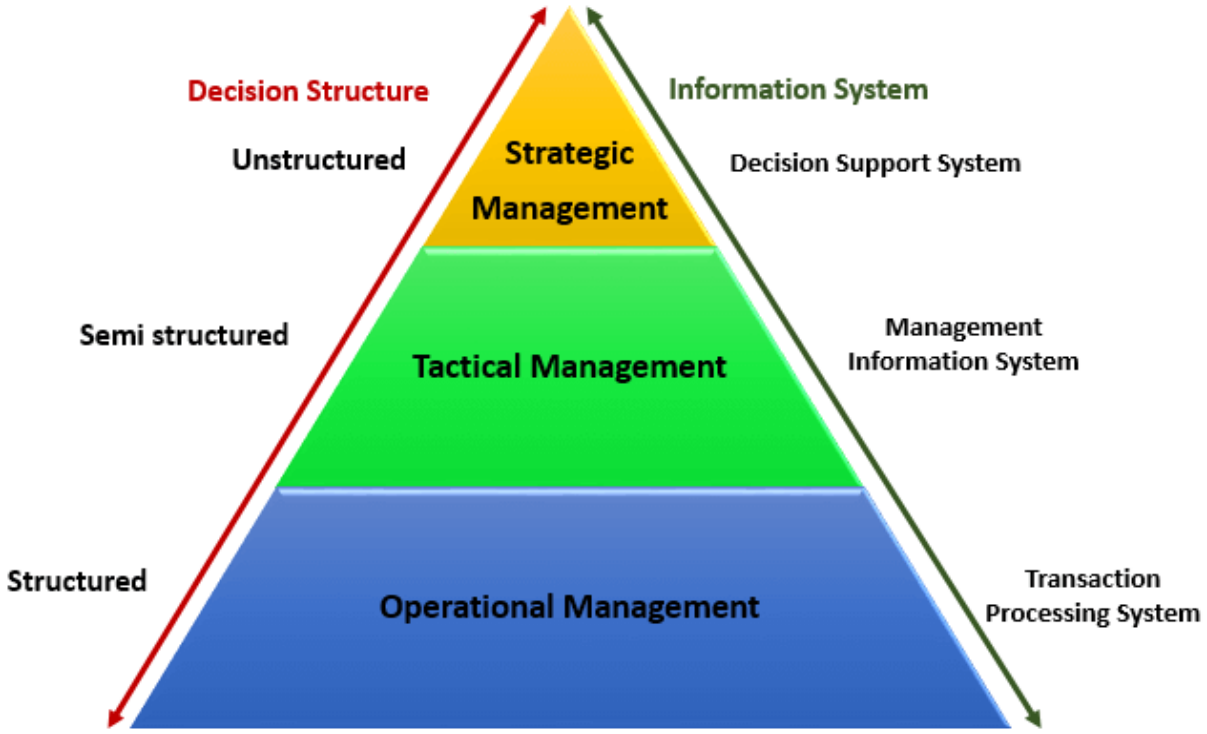
Learning Outcomes

- Compares the objectives and functionality of different types of manmade systems
- Distinguishes the different types of manmade systems in terms of objectives and functionality

What is an Information System?

Information systems are interrelated components working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization.

A typical organization is divided into operational, middle, and upper level. The information requirements for users at each level differ. Towards that end, there are number of information systems that support each level in an organization.



Operational management level

The operational level is concerned with performing day to day business transactions of the organization.

Examples of users at this level of management include cashiers at a point of sale, bank tellers, nurses in a hospital, customer care staff, etc.

Users at this level use **make structured decisions**. This means that they have defined rules that guides them while making decisions.

For example, if a store sells items on credit and they have a credit policy that has some set limit on the borrowing. All the sales person needs to decide whether to give credit to a customer or not is based on the current credit information from the system.

Tactical Management Level

This organization level is dominated by middle-level managers, heads of departments, supervisors, etc. The users at this level usually oversee the activities of the users at the operational management level.

Tactical users **make semi-structured decisions**. The decisions are partly based on set guidelines and judgmental calls. As an example, a tactical manager can check the credit limit and payments history of a customer and decide to make an exception to raise the credit limit for a particular customer. The decision is partly structured in the sense that the tactical manager has to use existing information to identify a payments history that benefits the organization and an allowed increase percentage.

Strategic Management Level

This is the most senior level in an organization. The users at this level **make unstructured decisions**. Senior level managers are concerned with the long-term planning of the organization. They use information from tactical managers and external data to guide them when making unstructured decisions.

Different Types of Manmade Information Systems

- Transaction Processing Systems (TPS)
- Management Information Systems (MIS)
- Decisions Support Systems (DSS)
- Office Automation Systems (OAS)
- Executive Support Systems (ESS)
- Geographical Information Systems (GIS)
- Knowledge Management Systems (KMS)
- Content Management Systems (CMS)
- Enterprise Resource Planning Systems (ERPS)
- Expert Systems
- Smart Systems

Transaction Processing System (TPS)

Transaction processing systems are used to record day to day business transactions of the organization. They are used by users at the operational management level. The main objective of a transaction processing system is to answer routine questions such as;

How printers were sold today?

How much inventory do we have at hand?

What is the outstanding due for Oshan?

By recording the day to day business transactions, TPS system provides answers to the above questions in a timely manner.

The decisions made by operational managers are routine and highly structured.

The information produced from the transaction processing system is very detailed.

For example, banks that give out loans require that the company that a person works for should have a memorandum of understanding (MoU) with the bank. If a person whose employer has a MoU with the bank applies for a loan, all that the operational staff has to do is verify the submitted documents. If they meet the requirements, then the loan application documents are processed.

If they do not meet the requirements, then the client is advised to see tactical management staff to see the possibility of signing a MoU.

Examples of transaction processing systems include,

- Point of Sale Systems – records daily sales
- Payroll systems – processing employees' salary, loans management, etc.
- Stock Control systems – keeping track of inventory levels
- Airline booking systems – flights booking management

Management Information System (MIS)

Management Information Systems (MIS) are used by tactical managers to monitor the organization's current performance status. The output from a transaction processing system is used as input to a management information system.

The MIS system analyzes the input with routine algorithms i.e. aggregate, compare and summarizes the results to produced reports that tactical managers use to monitor, control and predict future performance.

For example, input from a point of sale system can be used to analyze trends of products that are performing well and those that are not performing well. This information can be used to make future inventory orders i.e. increasing orders for well-performing products and reduce the orders of products that are not performing well.

Examples of management information systems include,

- Sales management systems – they get input from the point of sale system
- Budgeting systems – gives an overview of how much money is spent within the organization for the short and long terms.
- Human resource management system – overall welfare of the employees, staff turnover, etc.

Tactical managers are responsible for the semi-structured decision. MIS systems provide the information needed to make the structured decision and based on the experience of the tactical managers, they make judgement calls i.e. predict how much of goods or inventory should be ordered for the second quarter based on the sales of the first quarter.

Decision Support System (DSS)

Decision support systems are used by senior management to make non-routine decisions. Decision support systems use input from internal systems (transaction processing systems and management information systems) and external systems.

The main objective of decision support systems is to provide solutions to problems that are unique and change frequently. Decision support systems answer questions such as;

- What would be the impact of employees' performance if we double the production lot at the factory?
- What would happen to our sales if a new competitor entered the market?

Decision support systems use sophisticated mathematical models, and statistical techniques (probability, predictive modeling, etc.) to provide solutions, and they are very interactive.

Examples of decision support systems include,

- Financial planning systems – it enables managers to evaluate alternative ways of achieving goals. The objective is to find the optimal way of achieving the goal. For example, the net profit for a business is calculated using the formula Total Sales less (Cost of Goods + Expenses). A financial planning system will enable senior executives to ask what if questions and adjust the values for total sales, the cost of goods, etc. to see the effect of the decision and on the net profit and find the most optimal way.
- Bank loan management systems – it is used to verify the credit of the loan applicant and predict the likelihood of the loan being recovered.

Office Automation Systems (OAS)

Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks.

OAS used to execute a variety of office operations, such as word processing, electronic spreadsheet, e-mail, and video conferencing.

Advantages are:

- Office automation can get many tasks accomplished faster.
- It eliminates the need for a large staff.
- Less storage is required to store data.
- Multiple people can update data simultaneously in the event of changes in schedule

Executive Support Systems (ESS)

ESS are information systems that address unstructured decision making through advanced graphics and communications for the strategic level users of an organization.

Or

Executive Support System (ESS) is a reporting tool (software) that allows you to turn your organization's data into useful summarized reports. These reports are generally used by executive level managers for quick access to reports coming from all company levels and departments such as billing, cost accounting, staffing, scheduling, and more.

In addition to providing quick access to organized data from departments, some Executive Support System tools also provide analysis tools that predicts a series of performance outcomes over time using the input data. This type of ESS is useful to executives as it provides possible outcomes and quick reference to statistics and numbers needed for decision-making.

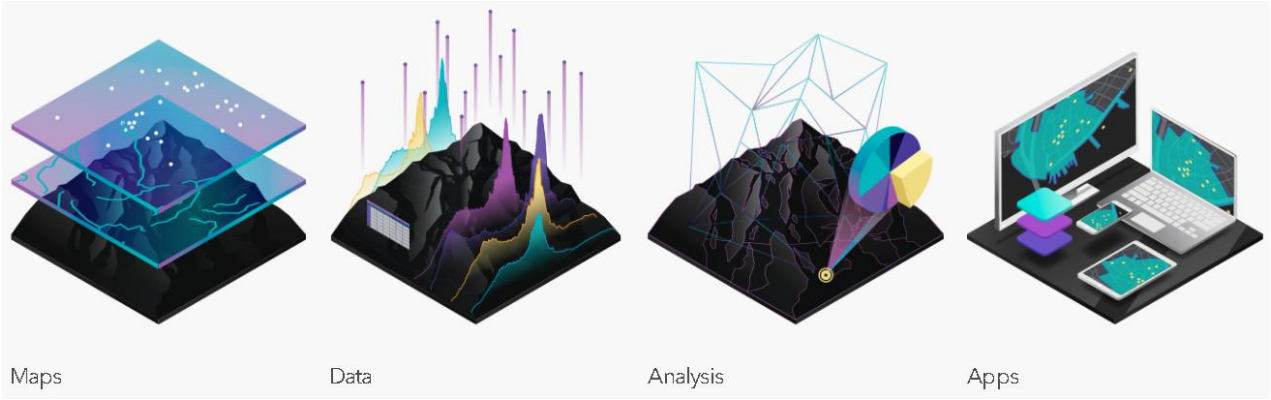
The exact reporting tools and outcome of an Executive Support System completely depends on the ESS developer and its intended industry use.

For example, Srilankan Systematics has ESS to support the investment planning process for the Ministry of Transportation. The features and functions of this Executive Support System are entirely different from the Executive Support System developed by Meditech, which is useful to health care organizations.

Several companies offer pre-designed Executive Support System packages (usually suited to one particular industry), while others offer packages which can be customized your organization's needs.

Geographic Information Systems (GIS)

Geographic Information Systems (GIS) are computer systems that allow to map, model, query and analyze large quantities of data within a single database according to their location. GIS facilitates to create maps, integrate information, visualize scenarios, present powerful ideas and develop effective solutions.



Maps

Maps are the geographic container for the data layers and analytics you want to work with. GIS maps are easily shared and embedded in apps, and accessible by virtually everyone, everywhere.

Data

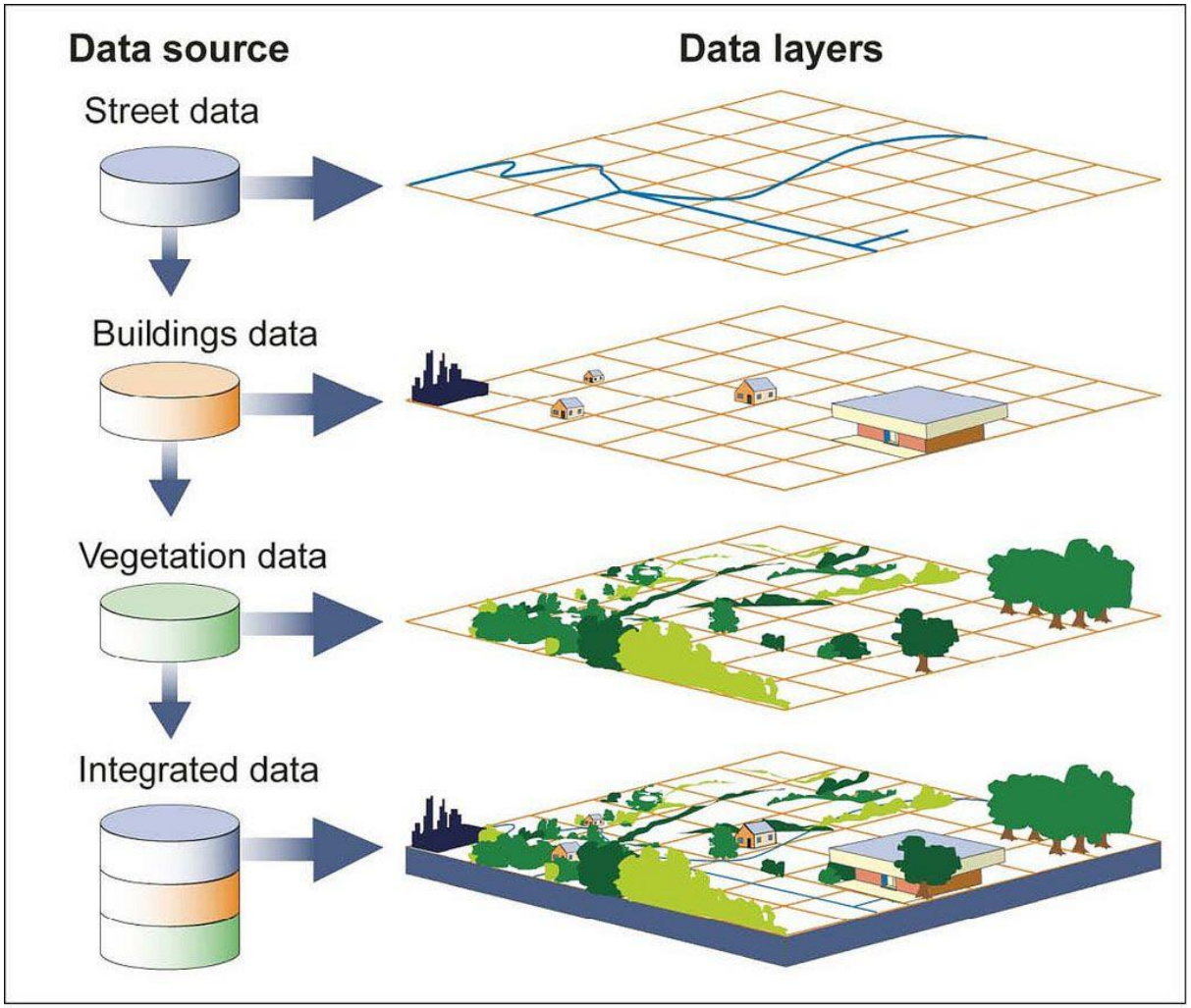
GIS integrates many different kinds of data layers using spatial location. Most data has a geographic component. GIS data includes imagery, features, and basemaps linked to spreadsheets and tables.

Analysis

Spatial analysis lets you evaluate suitability and capability, estimate and predict, interpret and understand, and much more, lending new perspectives to your insight and decision-making.

Apps

Apps provide focused user experiences for getting work done and bringing GIS to life for everyone. GIS apps work virtually everywhere: on your mobile phones, tablets, in web browsers, and on desktops.



Source: GAO.

Knowledge Management Systems (KMS)

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

A knowledge management system is made up of different software modules served by a central user interface. Some of these features can allow for data mining on customer input and histories, along with the provision or sharing of electronic documents. Knowledge management systems can help with staff training and orientation, support better sales, or help business leaders to make critical decisions.

Content Management Systems (CMS)

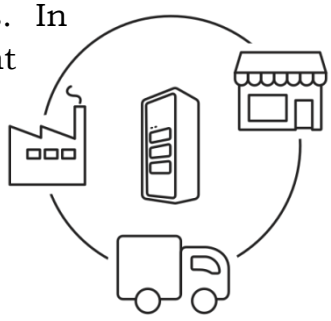
CMSs are computer applications that support the creation and modification of digital content. It supports to multiple users working in a collaborative environment. Examples for CMS are web-based publishing, format management, history editing and version control, indexing, search and retrieval etc. CMS supports the separation of content and presentation.

WordPress is a Content Management System that allows you to create and publish your content on the web. Although it is mostly used for web publishing, it can be used to manage content on an intranet, or in a single computer.

Enterprise Resource Planning (ERP) Systems

ERP Systems are business process management systems that allow organizations to use integrated applications to manage the businesses. An ERP system automates many back office functions related to technology, services and human resources. ERP software integrates product planning, development, manufacturing, sales and marketing.

The central feature of all ERP systems is a shared database that supports multiple functions used by different business units. In practice, this means that employees in different divisions—for example, accounting and sales—can rely on the same information for their specific needs.



Expert Systems

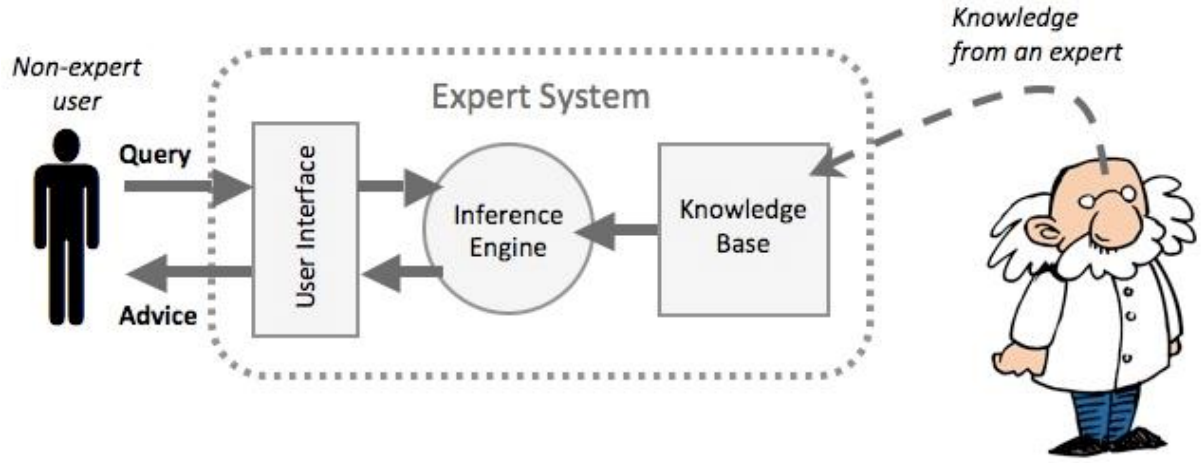
Expert Systems are computer applications that use artificial intelligence. To design an expert system, one needs a knowledge engineer, an individual who studies how human experts make decisions and translates the rules into terms that a computer can understand.

An expert system is computer software that attempts to act like a human expert on a particular subject area.

Expert systems are often used to advise non-experts in situations where a human expert in unavailable (for example it may be too expensive to employ a human expert, or it might be a difficult to reach location).

An expert system is made up of three parts:

- A user interface - This is the system that allows a non-expert user to query (question) the expert system, and to receive advice. The user-interface is designed to be a simple to use as possible.
- A knowledge base - This is a collection of facts and rules. The knowledge base is created from information provided by human experts
- An inference engine - This acts rather like a search engine, examining the knowledge base for information that matches the user's query



The non-expert user queries the expert system. This is done by asking a question, or by answering questions asked by the expert system.

The inference engine uses the query to search the knowledge base and then provides an answer or some advice to the user.

Where Are Expert Systems Used?

- **Medical diagnosis** the knowledge base would contain medical information, the symptoms of the patient would be used as the query, and the advice would be a diagnose of the patient's illness

- **Playing strategy games** like chess against a computer (the knowledge base would contain strategies and moves, the player's moves would be used as the query, and the output would be the computer's 'expert' moves)
- **Providing financial advice** - whether to invest in a business, etc. (the knowledge base would contain data about the performance of financial markets and businesses in the past)

- **Helping to identify items** such as plants / animals / rocks / etc. (the knowledge base would contain characteristics of every item, the details of an unknown item would be used as the query, and the advice would be a likely identification)

- **Helping to discover locations to drill for water / oil** (the knowledge base would contain characteristics of likely rock formations where oil / water could be found, the details of a particular location would be used as the query, and the advice would be the likelihood of finding oil / water there)

- **Helping to diagnose car engine problems** (like medical diagnosis, but for cars!)

Can Expert Systems Make Mistakes?

Human experts make mistakes all the time (people forget things, etc.) so you might imagine that a computer-based expert system would be much better to have around.

However expert systems can some problems:

- Can't easily adapt to new circumstances (e.g. if they are presented with totally unexpected data, they are unable to process it)
- Can be difficult to use (if the non-expert user makes mistakes when using the system, the resulting advice could be very wrong)

- They have no 'common sense' (a human user tends to notice obvious errors, whereas a computer wouldn't)

Smart Systems

Smart Systems make decisions based on the available data in a predictive or adaptive manner, by means of sensing, actuating and controlling. Smart actions incorporate the ways to describe and analyze a situation. Smart systems can be attributed to autonomous operation based on closed loop control, energy efficiency, and networking capabilities.

Smart systems are the ones which makes human life more and more Easier & convenient .It has a huge impact as technology gets updated day by day and influences everyone's life .Smart systems are being adopted by each and every aspect of business . Home Automation System is one of those aspects which have completely adopted Smart Systems.

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