INST0031
Systems Management

Lecture 10

Information Systems in Complex `Organisations

Learning objectives

- After this lecture, you will be able to:
  - identify systems and their components;
  - identify and describe the behaviour of systems;
  - identify types of BIS, distinguishing them by category and the organisational level at which they are used;
  - describe ERP and evaluate their relevance to the organisation;
  - identify basic strategies and methods used to gain competitive advantage through the use of BIS.
  - identify and describe the major components of an enterprise system;
  - appreciate the importance of transaction processing systems, process control and office automation systems to the operational management of a business;
  - appreciate the importance of decision support, information reporting and executive information systems to decision making in the organisation;
  - assess the potential for using business information systems in different parts of an organisation.

Management issues

- From a managerial perspective, we will address the following areas:

  - How systems theory is used as a means of defining problems and situations so that they can be understood more easily and BIS can be developed to support them.

  - How managers can maximise an organisation's use of technology by understanding BIS.

  - How BIS can help achieve competitive advantage.

Business strategy

- How can IS support business strategy:

'the direction and scope of an organisation over the long-term: which achieves advantage for the organisation through its configuration of resources within a changing environment to meet the needs of markets and to fulfil stakeholder expectations'.

Strategy

- **Setting organisational direction towards vision of the future**
- **People, organisation, technology, and processes have to fit with strategy**
- **A much broader view than that of our day to day work**
- **The chief exec's view**
  - E.g. the BT chairperson
  - or a market stall holder!

What is my strategy for getting where I want to be?

5

Strategies are interlinked...

If **Business strategy** is the plan an organisation uses to move towards its objectives,

then **IS strategy** is the plan an organisation uses in providing IS to support the business strategy plan

and **IT strategy** is the plan an organisation uses in providing IT to support the IS strategy needs

• But how do we ensure that these are in step? Are there conflicts?

Elements of IS strategy

- Business information strategy: This defines how information, knowledge and the applications portfolio will be used to support business objectives. Increasingly, a chief information officer (CIO) or chief knowledge officer (CKO) who is part of, or reports to, the senior management team is appointed to be responsible for defining and implementing this strategy.

- IS functionality strategy: This defines, in more detail, the requirements for e-business services delivered by the range of business applications (the applications portfolio).

- IT strategy (IS/IT strategy): This defines the software and hardware standards and suppliers which make up the e-business infrastructure.

- Applications portfolio: The range of different types of business information systems deployed within an organisation.

Systems theory

- Systems theory provides a powerful means of analysing and improving business processes. It can be applied to a wide variety of different areas and is fundamental to gaining a good understanding of the managerial application of BIS.

- A system can be defined as a collection of interrelated components that work together towards a collective goal. The function of a system is to receive inputs and transform these into outputs.
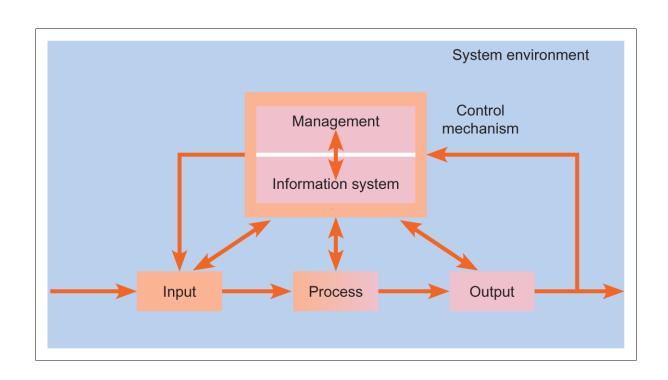
- The components of a system work towards a collective goal. This is known as the system's objective. The objective of a system is normally very specific and can often be expressed in a single sentence. As an example, the objective of a car might be expressed simply as follows: to transport people and goods to a specified location.

- System objective: All components of a system should be related to one another by a common objective.

Business information systems as an organisational control mechanism

System characteristics (2 of 7)

- Systems do not operate in complete isolation. They are contained within an environment [2] that contains other systems and external agencies. The scope of a system is defined by its boundary [3]. Everything outside of the boundary is part of the system's environment, everything within the boundary forms part of the system itself. The boundary also marks the interface [4] between a system and its environment. The interface describes exchanges between a system and the environment, or other systems.

- [2] Environment: The surroundings of a system, beyond its boundary.

- [3] Boundary: The interface between a system and its environment.

- [4] Interface: Defines exchanges between a system and its environment, or other systems.
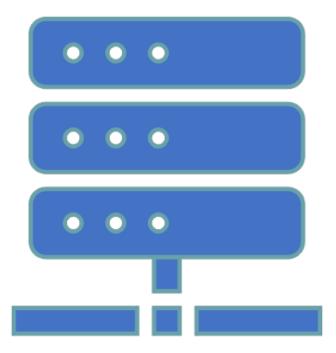
System characteristics (3 of 7)

- Systems can be complex and can be made up of other smaller systems. These are known as subsystems [5]. Systems composed of one or more subsystems are sometimes referred to as suprasystems [6].

- The objective of a subsystem is to support the larger objective of the suprasystem. For an organisation, the subsystems such as marketing and finance would lie within the system's boundary, while the following elements would lie outside as part of the business environment:

  - Customers, sales channel/distributors, suppliers, competitors, partners, government and legislation, the economy.

System characteristics (4 of 7)

- An organisation will interact with all these elements that are beyond the system boundary in the environment. We refer to this as an open system [7]. Most information systems will fall into this category since they will accept input and will react to them. Totally closed [8] systems which do not interact with their environment are unusual.

- [5] Subsystem: Large systems can be composed of one or more smaller systems known as subsystems.

- [6] Suprasystem: A larger system made up of one or more smaller systems (subsystems).

- [7] Open system: Interaction occurs with elements beyond the system boundary.

- [8] Closed system: No or limited interaction occurs with the environment.

- *Subsystems in an information system interact by exchanging information.* This is known as the interface between systems. For information systems and business systems, having clearly defined interfaces is important to an efficient organisation.

- For example, sales orders must be passed from the sales subsystem to the finance subsystem and the distribution subsystem in a clear, repeatable way. If this does not happen, orders may be lost or delayed and customer service will be affected.

System characteristics (6 of 7)

- The linkage or coupling between subsystems varies. The degree of coupling defines how closely linked different subsystems are. It is a fundamental principle of systems theory and BIS design that subsystems should be loosely coupled.

- Systems or subsystems that are highly dependent on one another are known as close-coupled systems. In such cases, the outputs of one system are the direct inputs of another.

- Decoupled systems (or subsystems) are less dependent on one another than coupled systems and so are more able to deal with unexpected situations or events. Such systems tend to have higher levels of autonomy, being allowed more freedom to plan and control their activities. Although decoupled systems are more flexible and adaptive than close-coupled systems, this very flexibility increases the possibility that inefficiencies might occur. The traditional method of production where material is held 'in-hand' as inventory is decoupled. In this arrangement, it is not necessary for production to match sales so closely, but this results in higher costs of holding inventory.

- Coupling. Defines how closely linked different subsystems are. Loose coupling means that the modules pass only the minimum of information between them and do not share data and program code. Close-coupled systems are highly dependent on each other.

- Systems are hierarchical. Systems are made up of subsystems that may themselves be made up of other subsystems. From this, one should realise that the parts of a system are dependent on one another in some way. This interdependence means that a change to one part of a system leads to or results from changes to one or more other parts.

- Interdependence: Interdependence means that a change to one part of a system leads to or results from changes to one or more other parts.

What is a BIS?

- *'A business information system is a group of interrelated components that work collectively to carry out input, processing, output, storage and control actions in order to convert data into information products that can be used to support forecasting, planning, control, coordination, decision making and operational activities in an organisation.'*

Resources that support BIS

1. PEOPLE RESOURCES: PEOPLE RESOURCES INCLUDE THE USERS OF AN INFORMATION SYSTEM AND THOSE WHO DEVELOP, MAINTAIN AND OPERATE THE SYSTEM.

2. HARDWARE RESOURCES: THE TERM HARDWARE RESOURCES REFERS TO ALL TYPES OF MACHINES, NOT JUST COMPUTER HARDWARE.

3. SOFTWARE RESOURCES: IN THE SAME WAY, THE TERM SOFTWARE RESOURCES DOES NOT ONLY REFER TO COMPUTER PROGRAMS AND THE MEDIA ON WHICH THEY ARE STORED, BUT THE TERM CAN ALSO BE USED TO DESCRIBE THE PROCEDURES USED BY PEOPLE.
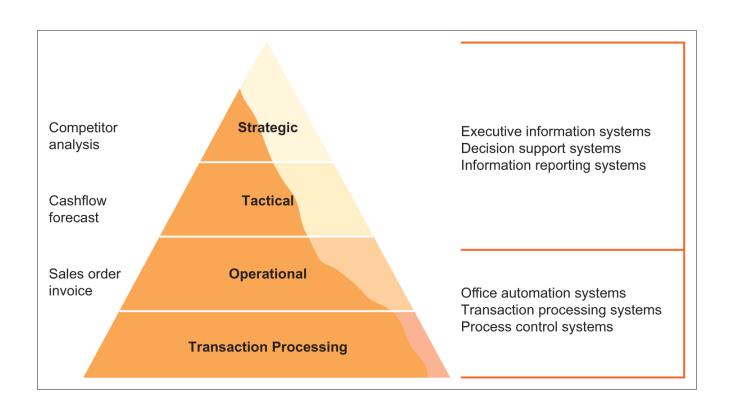
4. COMMUNICATIONS RESOURCES: RESOURCES ARE ALSO REQUIRED TO ENABLE DIFFERENT SYSTEMS TO TRANSFER DATA.

5. DATA RESOURCES: DATA RESOURCES DESCRIBE ALL OF THE DATA THAT AN ORGANISATION HAS ACCESS TO, REGARDLESS OF ITS FORM.
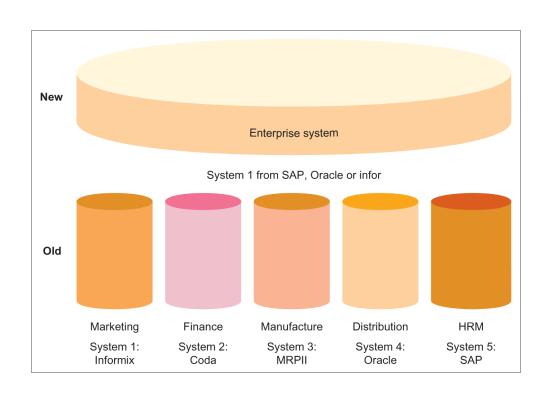
Enterprise and functional BIS

- Business information systems can be categorised into operations and management systems which can be implemented as either enterprise or functional business systems.

Enterprise systems

- Enterprise systems aim to support the business processes of an organisation across any functional boundaries that exist within that organisation. They use Internet technology to integrate information within the business and with external stakeholders such as customers, suppliers and partners.

- Four main elements of an enterprise system are the following:
  - Enterprise resource planning (ERP) which is concerned with internal production, distribution and financial processes
  - Customer relationship management (CRM) which is concerned with marketing and sales processes
  - Supply chain management (SCM) which is concerned with the flow of materials, information and customers through the supply chain
  - Supplier relationship management (SRM) which is concerned with sourcing, purchasing and the warehousing of goods and services.

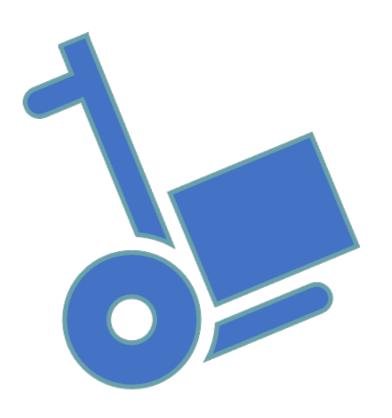# Enterprise system in comparison to separate functional applications

Types of enterprise systems

- Enterprise resource planning (ERP) systems are enterprise systems which support processes within an organisation. These processes include procurement, product development, manufacturing and sales.

- An ERP system can be extended to service processes across organisations with the addition of enterprise systems such as supply chain management (SCM) systems, customer relationship management (CRM) and supplier relationship management (SRM).
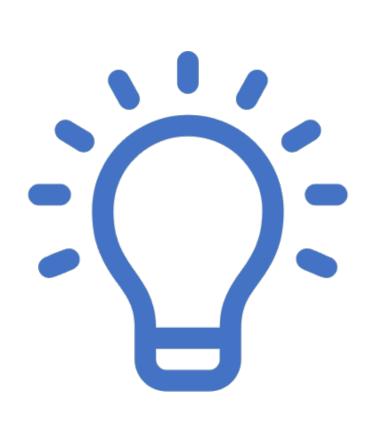
Enterprise resource planning (ERP)

- Enterprise resource planning (ERP) systems offer a single solution from a single supplier with integrated functions for major internal processes such as production, distribution, sales, finance and human resources management.

- Three core ERP processes are procurement, fulfilment and production.

Supply chain management (SCM)

- A supply chain consists of the series of activities that moves materials from suppliers through the organisation to customers.

- Supply chain management is the management of this material flow.

- Organisations in the supply chain can have varying degrees of cooperation and integration.

Customer relationship management (CRM)

- CRM systems are designed to integrate the range of information systems that contain information regarding the customer.

- These can include customer data collection, customer data analysis and salesforce automation.

Supplier relationship management (SRM)

- These systems refer to all the activities involved with obtaining items from a supplier, including procurement, transportation and warehousing.

- Procurement is an important aspect of SRM as the cost of materials can represent a substantial amount of the total cost of a product or service.

- Choosing a supplier is another important aspect of SRM.

Business information systems

- BIS can be divided into two broad categories:

- Operations information systems (OIS)

  ○ Systems that support an organisation's business activities.

- Management information systems (MIS)

  ○ Systems that support (managerial) decision making.

Types of operations information systems

- Transaction processing systems (TPS): These are used to manage the exchange of information and funds between a company and third parties such as customers, suppliers and distributors.

- Office automation systems (OAS): OAS are used to manage the administrative functions in an office environment and are often critical to service-based industries.

- Process control systems: These are important in manufacturing industries for controlling the manufacture of goods.

Industry 4.0

- A major element of Industry 4.0 is cyber-physical systems (CPS) that allow the physical components of an industrial process such as machines, workers and robots to be integrated with the virtual network of the Internet of Things (IoT).

- The goal is to have embedded computers and networks monitor and control the physical processes and enable information to be shared at the different stages of creating and manufacturing a product.

Questions?