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Topic Title 9: Information Systems

ICT170: Foundations of Computer Systems

Overview

- Information Systems as Systems
- Information Systems Components
- Types of Information Systems
- Information Systems Sourcing
- Some challenges in information systems

Objectives

In order to achieve the unit learning objectives, on successful completion of this topic, you should be able to:

- Define the components and structure of an information system and identify the relationships between those components
- Explain how and why some common types of information systems will be adopted and implemented in organisations
- Discuss the different ways in which information systems can be sourced
- Compare and contrast common approaches to systems management

Reading

Stair, R.M., (2011), *Principles of Information Systems 10th Ed.*, Cengage, Chapter 1, "Information Systems"

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Information Systems as Systems

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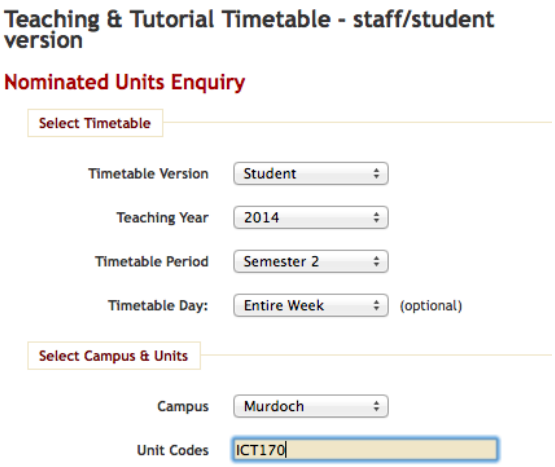
What is an Information System?

- Earlier, you met "Systems" as being:
  - "A group of interacting, interrelation, or interdependent elements forming a complex whole" (Topic 1)
- In the previous topic, we discussed systems as being a purposive organisation of elements that interacted to take inputs, transform them in some way and produce outputs
  - We also discussed the role of feedback in that process

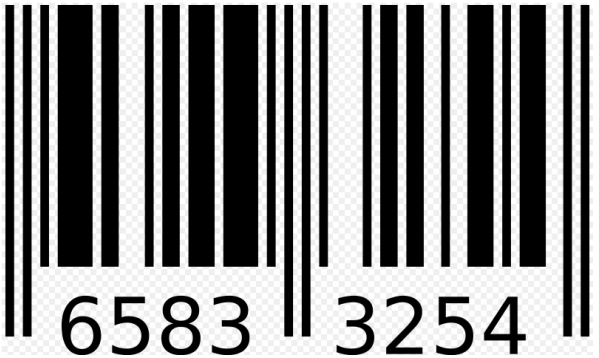
Information Systems

- The focus in this topic is a particular type of system, called an Information System
  - *"…a set of interrelated components that collect, manipulate, store and disseminate data and information and provide a feedback mechanism to meet an objective"* (Stair, 2011, p.5)
  - *collect → INPUT*
  - *manipulate, store → PROCESS/TRANSFORM*
  - *disseminate → OUTPUT*

Systems Theory



INPUT



- In information systems, INPUT is the process of identifying, gathering and capturing data
  - What data would be required for an information system that outputs pay cheques?
  - Data input can be manual
    - E.g., Unit enrolments, class sign-ups
  - …or automated
    - E.g., bar code scanning

For data to be useful…

- The text suggests 11 characteristics of valuable information
  - Accurate
  - Complete
  - Economical
  - Flexible
  - Reliable
  - Relevant
  - Simple
  - Timely
  - Verifiable
  - Accessible
  - Secure

TABLE 1.2

Characteristics of Valuable Data

Characteristics	Definitions
Accurate	Accurate information is error free. In some cases, inaccurate information is generated because inaccurate data is fed into the transformation process (this is commonly called garbage in, garbage out [GIGO]).
Complete	Complete information contains all the important facts. For example, an investment report that does not include all important costs is not complete.
Economical	Information should also be relatively economical to produce. Decision makers must always balance the value of information with the cost of producing it.
Flexible	Flexible information can be used for a variety of purposes. For example, information on how much inventory is on hand for a particular part can be used by a sales representative in closing a sale, by a production manager to determine whether more inventory is needed, and by a financial executive to determine the total value the company has invested in inventory.
Reliable	Reliable information can be depended on. In many cases, the reliability of the information depends on the reliability of the data collection method. In other instances, reliability depends on the source of the information. A rumor from an unknown source that oil prices might go up may not be reliable.

Relevant	Relevant information is important to the decision maker. Information that lumber prices might drop may not be relevant to a computer chip manufacturer.
Simple	Information should also be simple, not overly complex. Sophisticated and detailed information may not be needed. In fact, too much information can cause information overload, whereby a decision maker has too much information and is unable to determine what is really important.
Timely	Timely information is delivered when it is needed. Knowing last week's weather conditions will not help when trying to decide what coat to wear today.
Verifiable	Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information.
Accessible	Information should be easily accessible by authorized users to be obtained in the right format and at the right time to meet their needs.
Secure	Information should be secure from access by unauthorized users.

Processing

- Involves transforming data into useful outputs
  - Can involve
    - Calculation
    - Aggregation
    - Classification
    - Storing for use later
  - Think about the processing involved in GPA calculation

OUTPUT

- The results of the processing/transformation will generally become outputs
  - In information systems, the outputs will generally be reports or documents
    - Transcripts, bank statements, annual reports
    - Outputs do not have to be hard-copy
    - …and can be inputs for other systems
      - Much of business intelligence is based around reports and other outputs from operational systems

Feedback

- An important aspect of many systems (not just information systems) is feedback
  - As we discussed in the previous topic, feedback allows a system to dynamically adjust to changes
  - In information systems, feedback will change the inputs or processing
    - This is useful for error trapping and checking
    - Can also be useful for automating some decision-making
      - E.g., inventory levels

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Information Systems Components

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Computer-based information systems

- Consist of:
  - Hardware
  - Software
  - Databases
  - Telecommunications
  - People
  - Procedures

Hardware

- Hardware is used in all aspects of information systems
- You have concentrated on this so far in this unit
  - Input devices
  - Processing devices
  - Output devices

Software

- Computer programs that control the computer
  - These allow organisations to perform the tasks they need to
  - Systems software
  - Applications software

Databases

- Organised collection of facts
  - Will contain data recording items of interest
    - Customers, employees, inventory, competitors' sales information, etc…
  - Can be organised in different ways, but an important goal is to be able to store and process data in an efficient way

Telecommunications…

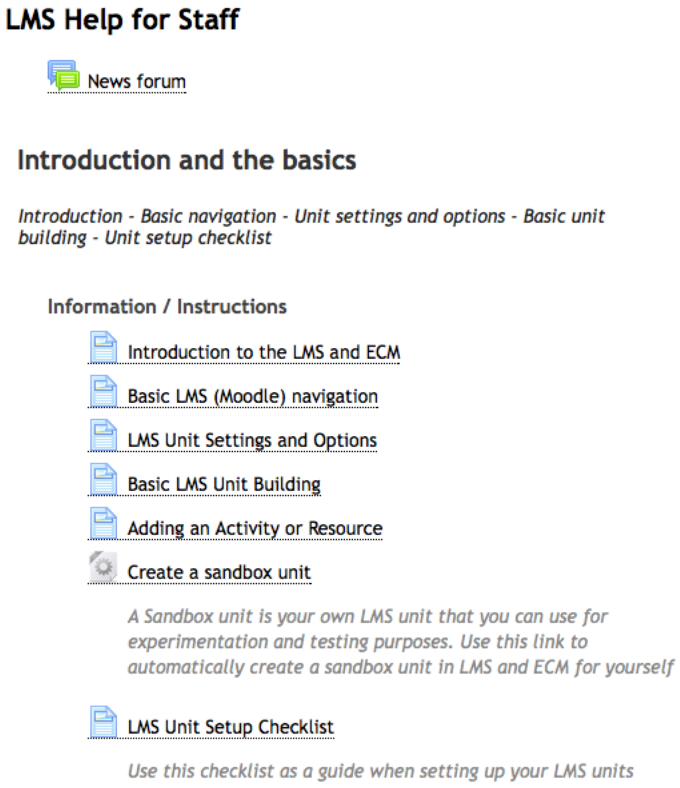
- There are very few organisations that operate in isolation
  - Murdoch has several campuses in Perth, Singapore and Dubai
    - The student records system needs to be able to deal with that geographical distribution
      - Students need to be able to log into Moodle from home, or to access Facebook on their own devices in a lecture ☹
  - Networks are now such an important part of information systems that we tend to forget they are there!

People…

- An important aspect of information systems
  - People who manage, run, program and maintain the system
  - Users of the system

Procedures

- Strategies, policies, methods and rules for using the information system
    - Can include normal operational rules, but also what happens in unusual circumstances



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Types of Information Systems

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Types of Information Systems

- There are many different ways of classifying information systems
  - Some by the organisational level at which the system exists
  - …others by the type of processing and the use to which the outputs are put

Organisational Information Systems

- The text suggests the following categories:
  - E- and M-commerce systems
  - Transaction Processing Systems
  - Management Information Systems
  - Decision Support Systems
  - Other specialised systems
    - E.g., AI, Expert, VR

E- and M-Commerce Systems

- Systems that deal with electronic transactions
  - Pretty much all now!
  - B2B, B2C, C2C

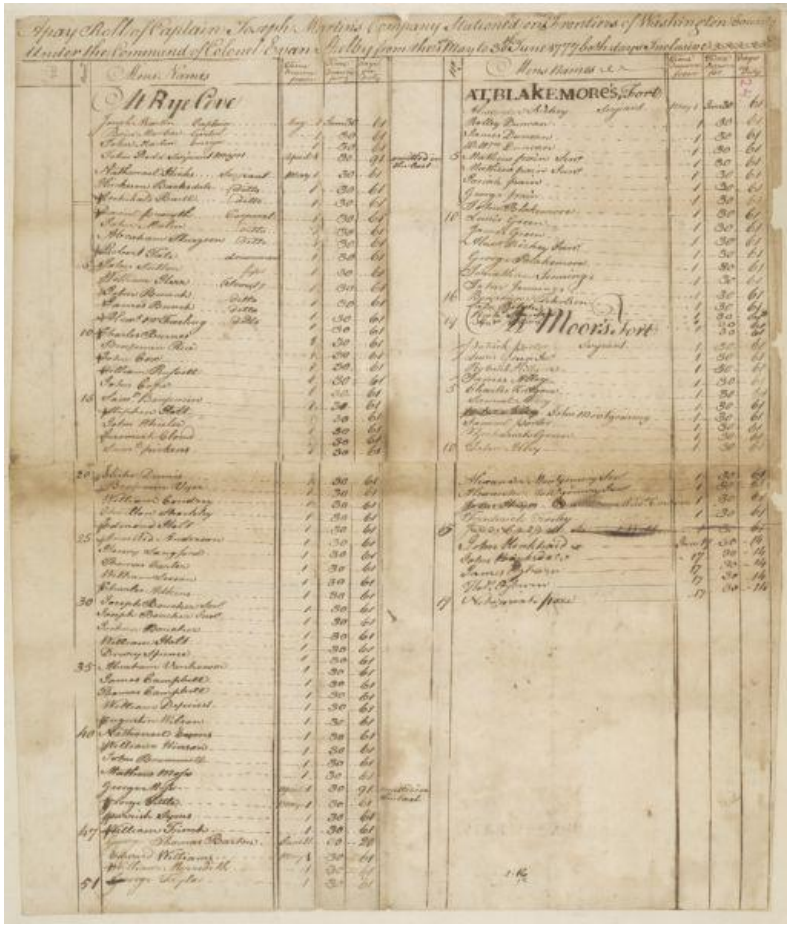
  -M-commerce
  - …anywhere, anytime, any device

  -Do consumers prefer doing business in this way?

  -Do businesses prefer doing business in this way?

Transaction Processing Systems

- Automation and recording of repetitive business transactions
  - Payroll, billing, payment
    - Also allows for easy creation of reports, use of transaction data for more strategic purposes



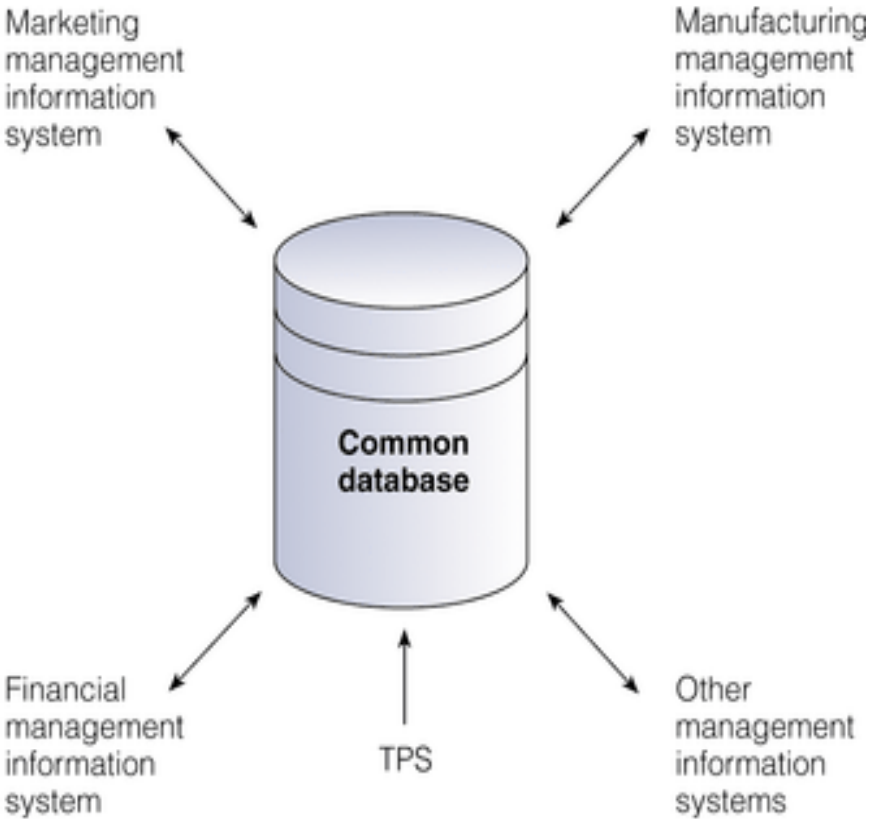
Enterprise Resource Planning

- ERP is a set of integrated programs capable of managing an organisation's business operations
  - Can replace many applications with a single interface
  - E.g., in a manufacturing business
    - Forecast prepared estimating customer demand several weeks ahead of time
    - ERP system will check what is available in inventory
      - If there is a shortfall, manufacturing will be directed to create more inventory
      - Will then check to see if there is adequate raw materials etc and perhaps order to cover any shortfall

Management Information Systems

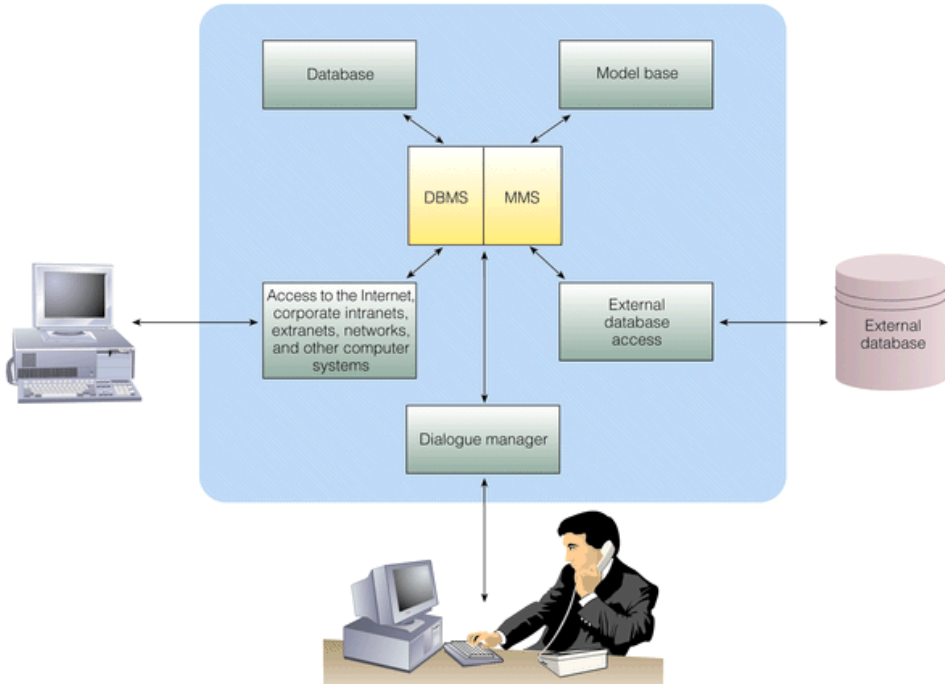
FIGURE 1.11

Functional management information systems draw data from the organization's transaction processing system.



Decision Support Systems

The focus of these systems is to provide data to support decision making



Other specialised systems

- AI
  - Robotics for dangerous or repetitive tasks
  - Processing of visual elements such as face recognition
  - Natural language processing
    - Learning systems
    - Expert systems
    - “act like an expert”
    - Design

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Information Syste
Sourcing

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Outsourcing

- Developing, maintaining and supporting information systems in-house is expensive
  - Staffing, infrastructure
    - Outsourcing involves using an external organisation to provide all or part of a system
    - E.g., recruitment, advertising, CRM

Outsourcing – why/why not?

- Reasons for outsourcing:
  - Allows organisation to focus on its core business
  - Make better use of resources
    - Cost savings
    - Reasons for not outsourcing:
    - Security
    - Strategic reasons

Exercise 01 –Starbucks

- Transaction Processing Systems
- The date can be used for

  Scheduling inventory/Employees

  Revenue model

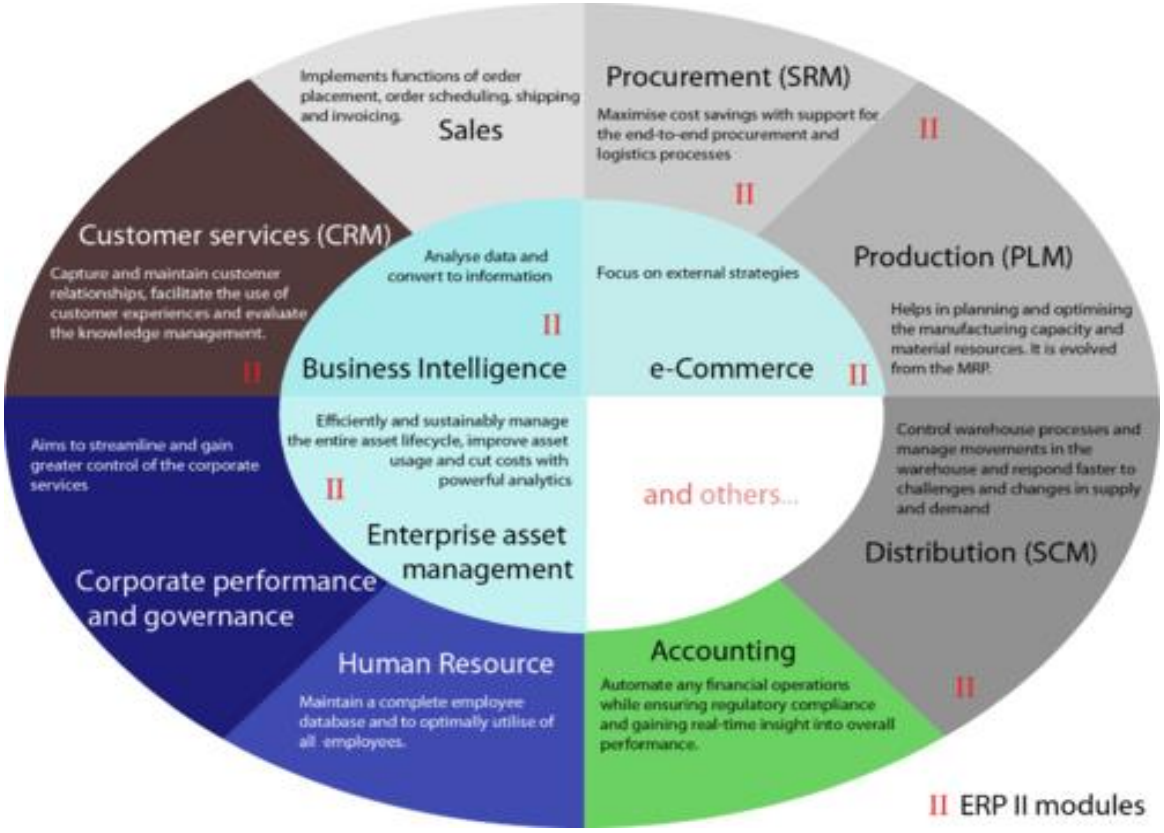
  … next café!

Enterprise Resource Planning

ERP Major scopes:

- Product planning, cost
- Manufacturing or service delivery
- Marketing and sales
- Inventory management
- Shipping and payment

ERP


Implements functions of order placement, order scheduling, shipping and invoicing.
Sales
Procurement (SRM)
Maximise cost savings with support for the end-to-end procurement and logistics processes
Customer services (CRM)
Capture and maintain customer relationships, facilitate the use of customer experiences and evaluate the knowledge management.
Analyse data and convert to information
Business Intelligence
Focus on external strategies
e-Commerce
Production (PLM)
Helps in planning and optimising the manufacturing capacity and material resources. It is evolved from the MRP.
Aims to streamline and gain greater control of the corporate services
Efficiently and sustainably manage the entire asset lifecycle, improve asset usage and cut costs with powerful analytics
Enterprise asset management
and others...
Control warehouse processes and manage movements in the warehouse and respond faster to challenges and changes in supply and demand
Distribution (SCM)
Corporate performance and governance
Human Resource
Maintain a complete employee database and to optimally utilise of all employees.
Accounting
Automate any financial operations while ensuring regulatory compliance and gaining real-time insight into overall performance.
II ERP II modules

Specific issues:

- Platform
- Size
- Complexity
- Cost
- Implement duration
-

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Additional Materia for Self-Learning Activities

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On-demand computing

- AKA utility computing
  - Responding to the organisation's need for computing at a given time
  - Can be less expensive, particularly when used to respond to peak loads
  - Treats computing as a commodity

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Summary

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Summary

- Information systems are systems that process information
- They consist of Hardware, Software, Databases, People, Telecommunications and Procedures
- There are many types of information systems in organisations that are designed to achieve different organisational aims
- There are also different ways in which information systems can be sourced

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