

Information Systems - What Are They?

Based on Chapter 1 of Bennett,
McRobb and Farmer:

*Object Oriented Systems Analysis
and Design Using UML, (4th Edition),
McGraw Hill, 2010.*

In This Lecture You Will Learn:

- How to define an information system (IS)
- Some examples and types of IS
- How to use the concepts of systems theory to explain the parts and behaviour of IS
- How IS can be useful in managing organizations

Introduction

- Information systems (IS) are created by people
- They are used in all kinds of organisations
- They are important in our everyday lives
- All IS must be able to select, store, process and retrieve relevant data
- IS do not necessarily depend on digital IT (but most modern ones do)

IS in History

- IS have existed in some form throughout history:
 - Ancient Mesopotamian records of grain in city storehouses (3500 BCE)
 - Roman Empire records of property and tax
 - 19th Century railway signalling systems
 - The RAF's communication and control system used during the Battle of Britain(1940)

The Emergence of Modern IS

- Most IS today depend on digital electronic computers
- Earliest examples (in Second World War) include code-breaking Colossus Computer
- First business computer, Leo 1, built in 1951, used for routine transactions like payroll and managing inventory
- Modern IS used for vast range of purposes

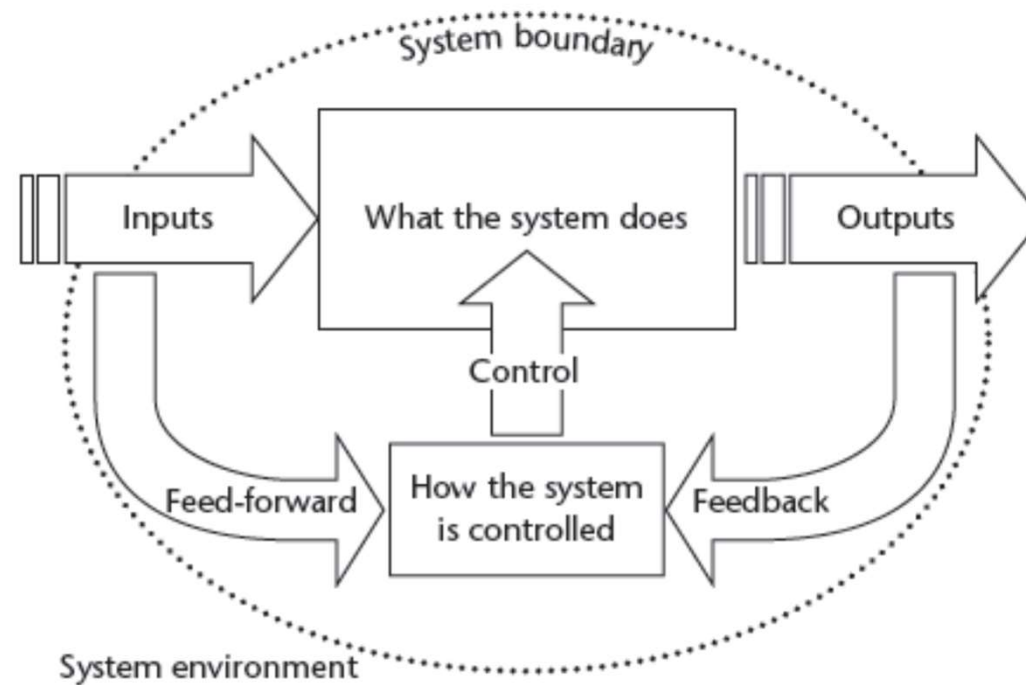
The Role of the Computer

- Computers carry out tasks also done by people and by other technologies
 - *Storage*: signalman's memory / hard disk
 - *Display*: Battle of Britain map / PC screen
 - *Calculation*: abacus / software program
 - *Communication*: telephone line / LAN
- Typical advantages of computers:
 - high speed, low cost, reliability

McGregor On-Line Retail Site

- A typical modern IS with:
 - Online catalogue display and shopping cart
 - Back-office systems store stock details, orders, payment transactions, and more
 - Communications link to credit-card processing centre
 - Robot warehouse control system
 - Delivery scheduling

IS are *Systems*



Characteristics of Systems

- Every system has:
 - Inputs and outputs
 - A purpose (related to transformation)
 - A boundary and an environment
 - Subsystems and interfaces
 - Control using feedback and feed-forward
 - Some emergent property

Elements of an IS

- Every IS must have:
 - A human activity that needs information
 - Some stored data
 - An input method for entering data
 - Some process that turns the data into information
 - An output method for representing information
- May also have:
 - Subsystems that we can also regard as systems
 - Interfaces with other systems

System Transformation

- All useful systems *transform* their inputs into useful outputs
- For IS, inputs are typically data or information and outputs are typically also information
- This *transformation* is the whole reason for building and operating the system
- It must render the input data useful in some new way

Transformation Example

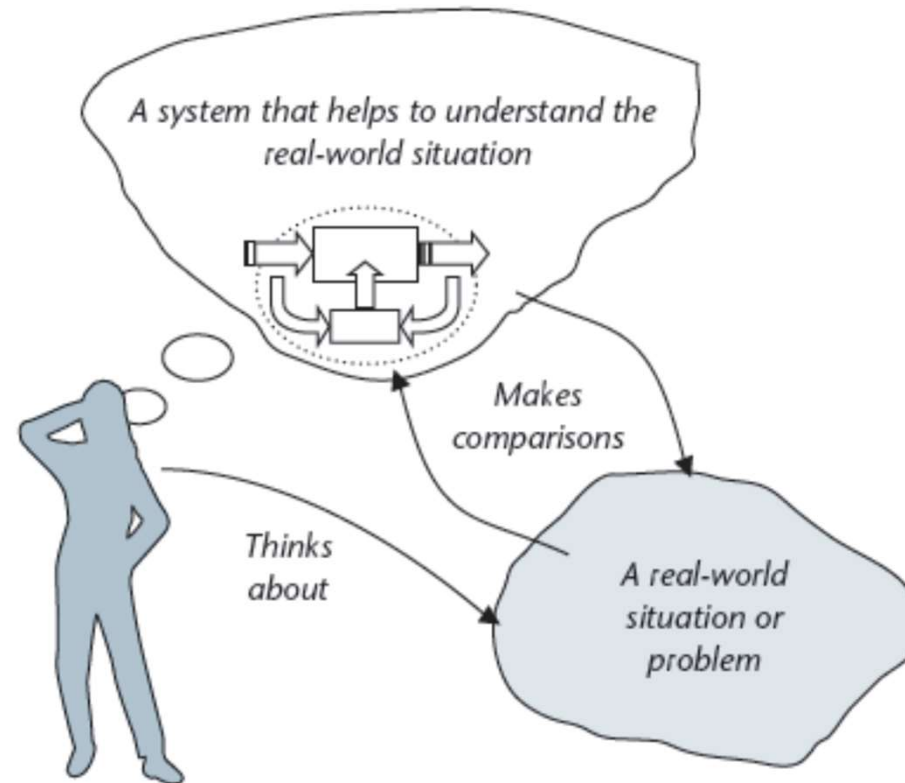
- McGregor's *Delivery Scheduling System* may have inputs:
 - Information about orders, available stock, customer addresses, vehicle capacities...
- ...And may have outputs:
 - Which orders to load on each vehicle, what route the vehicle should follow...
- How does this benefit McGregor?

Are Systems Real?

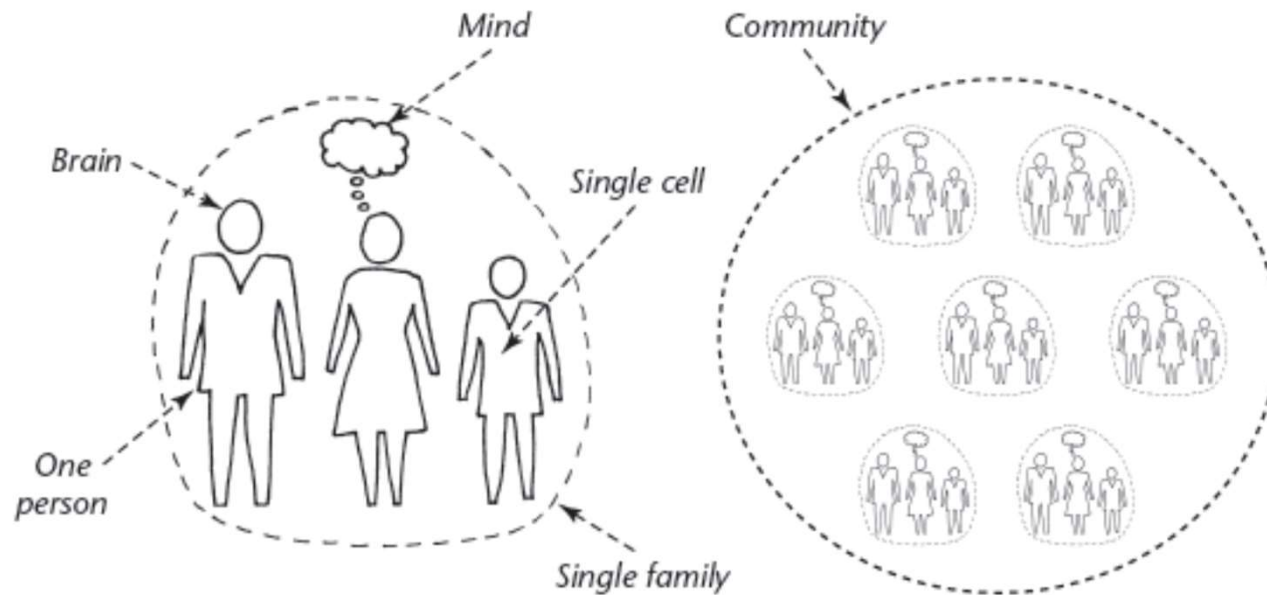
Maybe, maybe not!

- Systems thinking is useful because it helps to analyse and understand problems
- What matters is the understanding you achieve
- You can choose to see *anything* as a system, whether or not it really is one

Systems and the Real World



Systems and Subsystems



Types of IS

- Information Systems are used to support people's activities
 - Store and retrieve information
 - Carry out calculations
 - Aid communication
 - Control and schedule work
 - Other support ?

Types of IS (cont'd)

- Operational Systems assist or control business operations
 - An Accounting System replaces costly and error-prone human clerks
- Management Support Systems help managers to decide or to communicate
 - A Delivery Scheduling System helps decide how to load and route the delivery trucks

Types of IS (cont'd)

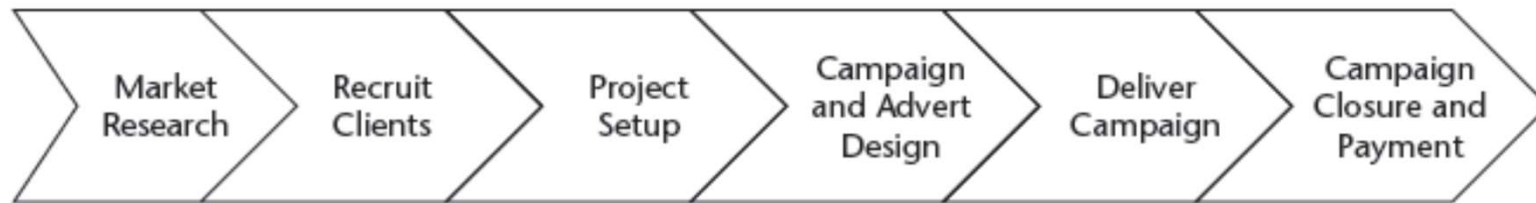
- Real-time Control Systems typically operate physical equipment, often in safety-critical settings
 - Some cars have an Engine Management System to control fuel supply and ignition

How Do IS Relate to the Human Activity System?

- We can view an organization as a system, perhaps with many subsystems
- Ideally, each subsystem helps the overall system fulfil its purpose
- IS are also subsystems and should help to meet goals of people in the organization

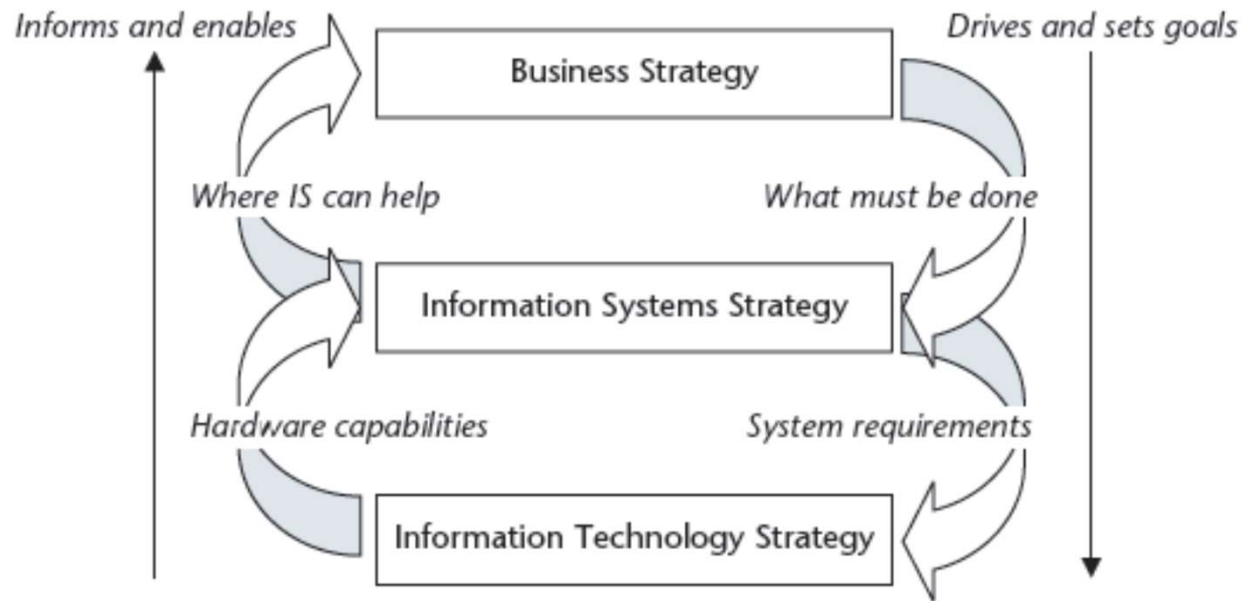
Strategy and Planning for IS

- Value Chain analysis is one popular way to analyse an organisation:



- Managers can focus on IS that help each of the critical activities along the 'chain'

Multiple Strategies for IS and IT



Summary

In this lecture you have learned about:

- What an information system is
- Some examples and types of IS
- Basic concepts of systems theory, and how to apply them to understanding IS
- How IS are related to organizations

References

- Bennett, McRobb and Farmer (2010)
- Checkland and Holwell (1998)

(For further bibliographic details, see Bennett, McRobb and Farmer)