Information Systems Modelling and Design

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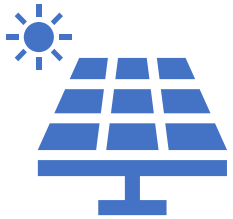
Introduction

This is level 4 module for all our Computing Programmes

Prologue



What is your expectations from the module?

How was the IT used differently in the following activities than they are today ?

Educational

Personal

Professional

Communication

What other significant changes can you think of?

At the end of this module, you will be able to:

- Describe the various methods used in systems development.
- Appraise the information requirements at different levels in an organisation.
- Contrast the roles of data processing, management information and decision support systems.
- Carry out the analysis and design of a simple system.
- Identify the ethical issues involved in information systems development.

Ground Rules

- **No mobile phones**
- **No food**!
- Arrive **on time**!
- **Attendance**
- If you **do not understand** a point, raise your hand and ask me to explain.

Teaching and Learning Methods

Lectures

Tutorial

Practical

Teaching and Learning Methods

Lectures

Tutorial

Practicals

Assessment

This module is assessed by in class tasks & assessment (20%), Presentation (20%) and Coursework Report (60%).

ALL ASSIGNMENTS ARE ELECTRONIC SUBMISSION ONLY. NO HARD COPY SUBMISSIONS WILL BE ACCEPTED AT THE HELPDESK

Essential text

Bocij, Greasley, Simon Hickie, (2018). Business Information Systems, 6th Edition

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Available on Kortext

Module Topics

TOPIC #	TOPIC	CHAPTER
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5	System Analysis	10
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Introduction to Information Systems Modelling and Design

CN4000

Topic 1 -Basic concepts – understanding information

Module aims

To promote an understanding of different methods of developing information systems and the characteristics of information.

To promote an understanding of the role of information in the decision making process

To develop basic skills in certain fundamental techniques of information systems planning and analysis.

To promote an understanding of the social and ethical issues relating to information system design.

Learning outcomes

- After this lecture, you should be able to:
  - distinguish between data, information and knowledge;
  - describe and evaluate information quality in terms of its characteristics;
  - classify decisions by type and organisational level;
  - identify the information needed to support decisions made at different organisational levels;
  - identify some of the tools and techniques used to help make decisions.

Management issues

- From a managerial perspective, this chapter addresses the following areas:
  - the importance of managing information and knowledge as a key organisational asset;
  - the transformation process from data to information of high quality;
  - the process and constraints of decision making;
  - the different kinds of decisions that managers make and how these affect the organisation.

What is data?

Data are raw facts or observations that are considered to have little or no value until they have been processed and transformed into information.

Example definitions:

(a) *a series of non-random symbols, numbers, values or words;*

(b) *a series of facts obtained by observation or research and recorded;*

(c) *a collection of non-random facts;*

(d) *the record of an event or fact.*

What is information?

Information: Data that have been processed so that they are meaningful.

Example definitions:

(a) *data that have been processed so that they are meaningful;*	(b) *data that have been processed for a purpose;*	(c) *data that have been interpreted and understood by the recipient.*

Figure 1.1 Transforming data into information using a data process

Information – summary

- Information:
  - involves transforming data using a defined process;
  - involves placing data in some form of meaningful context;
  - is produced in response to an information need and therefore serves a specific purpose;
  - helps to reduce uncertainty, thereby improving decision behaviour.

5 Types of information processing

Classification: This involves placing data into categories, for example, categorising an expense as either a fixed or a variable cost.

Rearranging/sorting: This involves organising data so that items are grouped together or placed into a particular order. Employee data, for example, might be sorted according to the last name or payroll number.

Aggregating: This involves summarising data, for example, by calculating averages, totals or subtotals.

5 Types of information processing (cont…)

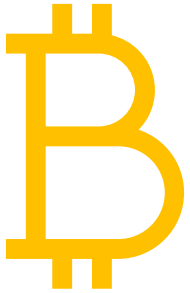
Performing calculations: An example might be calculating an employee's gross pay by multiplying the number of hours worked by the hourly rate of pay.

Selection: This involves choosing or discarding items of data on the basis of a set of selection criteria. A sales organisation, for example, might create a list of potential customers by selecting those with incomes above a certain level.

Activity 1.1 – data versus information

- From the point of view of a student at university, which of the following might be examples of information? Which might be examples of data?
  (a) the date;
  (b) a bank statement;
  (c) the number 1355.76;
  (d) a National Insurance number;
  (e) a balance sheet;
  (f)a bus timetable;
  (g) a car registration plate.

Information value



Tangible value:

Value of information – Cost of gathering information

Intangible value:

Improvements in decision behaviour – Cost of gathering information

Activity 1.2 – tangible and intangible information

- When information is used effectively, it can bring about many of the improvements listed below. State and explain why each of the items listed illustrates a tangible or intangible value of information.

  (a) improved inventory control;

  (b) enhanced customer service;

  (c) increased production;

  (d) reduced administration costs;

  (e) greater customer loyalty;

  (f) enhanced public image.

What is the importance of informal information?

Formal communication: Formal communication involves presenting information in a structured and consistent manner.

Informal communication: This describes less well-structured information that is transmitted by informal means, such as casual conversations between members of staff.

Information quality dimensions

Time	Content	Form	Additional characteristics
Timeliness	Accuracy	Clarity	Confidence in source
Currency	Relevance	Detail	Reliability
Frequency	Completeness	Order	Appropriateness
Time period	Conciseness	Presentation	Received by correct person
	Scope	Media	Sent by correct channels

Table 1.1 Summary of attributes of information quality

Different decision types

Decision behaviour: Describes how managers make decisions and the factors that influence them.

Structured decisions: Situations where the rules and constraints governing the decision are known.

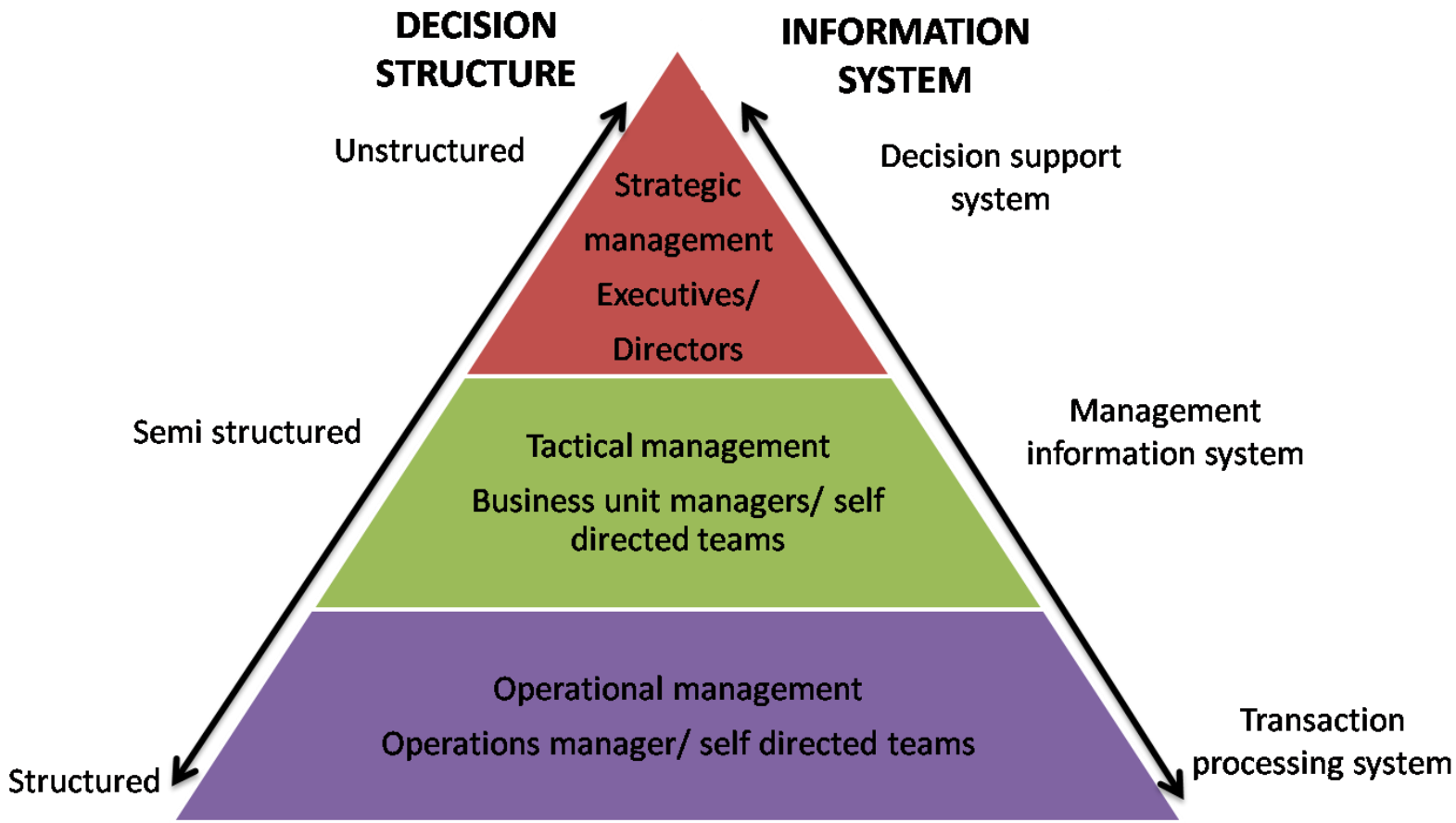
Unstructured decisions: Complex situations, where the rules governing the decision are complicated or unknown.

Cognitive style: This describes the way in which a manager absorbs information and reaches decisions. A manager's cognitive style will fall between analytical and intuitive styles.

Is your data hard or soft?

Hard data, also known as **quantitative data**, tend to make use of figures, such as statistics. Hard data are often collected in order to measure or *quantify* an object or situation.

Soft data, often known as **qualitative data**, tend to focus on describing the *qualities* or characteristics of an object or situation. Interviews, for example, are often used to collect qualitative data related to a person's opinions or beliefs.


DECISION STRUCTURE
INFORMATION SYSTEM
Unstructured
Decision support system
Strategic management
Executives/ Directors
Semi structured
Management information system
Tactical management
Business unit managers/ self directed teams
Operational management
Operations manager/ self directed teams
Structured
Transaction processing system

Decision characteristics and management level

Management level	Decision			
	Type of decision	Timescale	Impact on organisation	Frequency of decisions
Strategic	Unstructured	Long	Large	Infrequent
Tactical	↔	Medium	Medium	↔
Operational	Structured	Short	Small	Frequent

Table 1.2 Decision characteristics and management level

Activity

Organisation-level decisions

- Classify the following decisions by type (structured, semi-structured, unstructured) and organisational level (strategic, tactical, operations)

a) At what level should we set the budget for next year?
b) Does this customer qualify for a discount on a large order?
c) How should we deal with a takeover bid?
d) Should we employ more staff to cope with an urgent order?
e) Should we expand abroad?
f) Should we launch an advertising campaign?
g) Should we take a short-term loan to help our current cash flow position?
h) What new markets should we move into?
i) What should we do about a faulty machine?

A model of decision making

Stage	Activities
Intelligence	■ Awareness that a problem exists ■ Awareness that a decision must be made
Design	■ Identify all possible solutions ■ Examine possible solutions ■ Examine implications of all possible solutions
Choice	■ Select the best solution
Implementation	■ Implement the solution
Evaluation	■ Evaluate effectiveness or success of decision

Table 1.4 A model of decision making

Business rules

Business rule: A rule describing what action the organisation should take when a particular situation arises.

As an example, a bank might have a rule specifying that customers applying for a loan will only be considered if they have held an account for three years or more.

A business rule is broken down into an event that triggers a rule with test conditions that result in defined actions

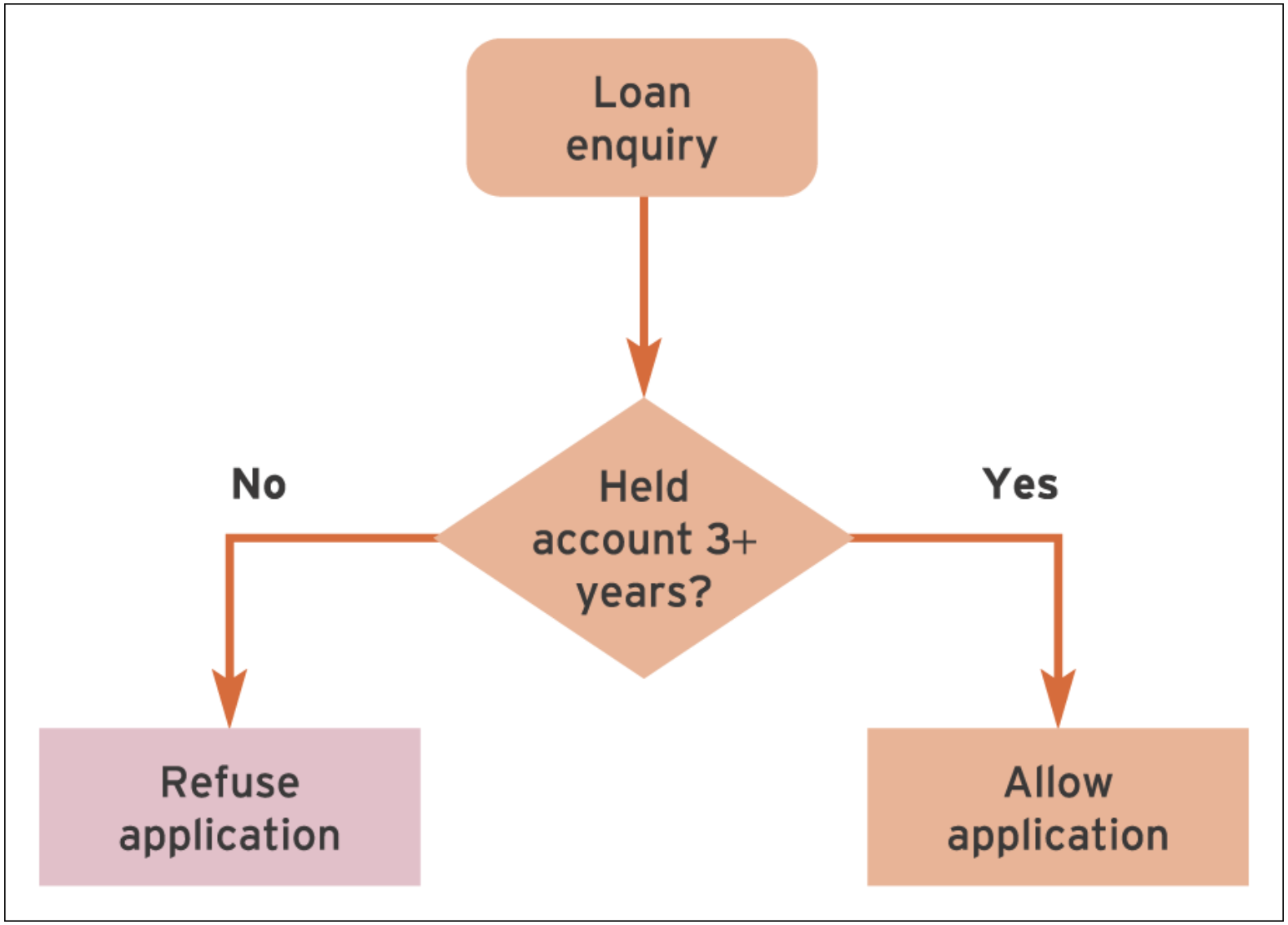


Figure 1.4 Decision tree notation for checking loan application

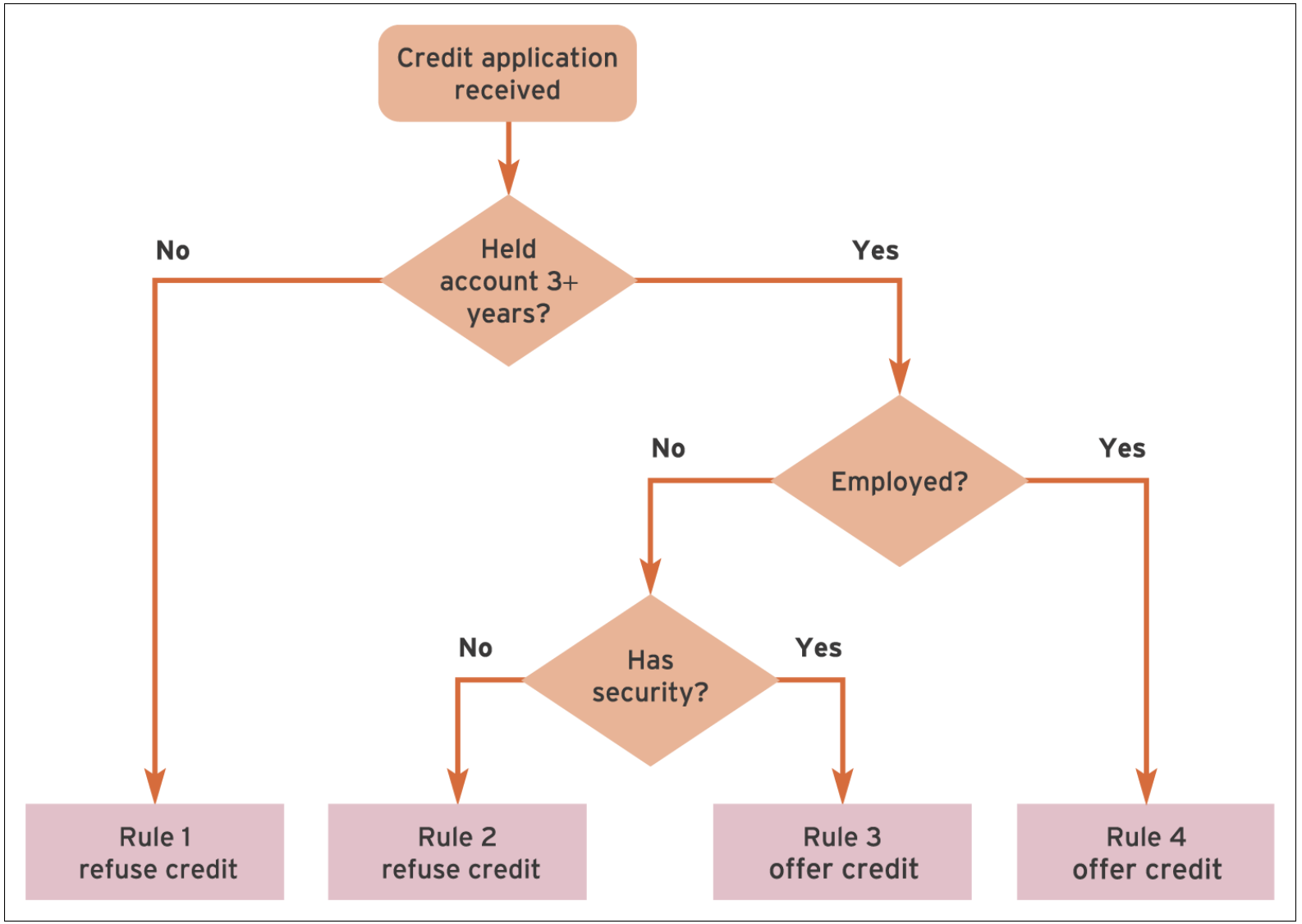
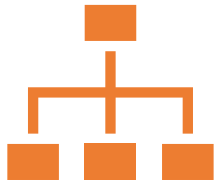
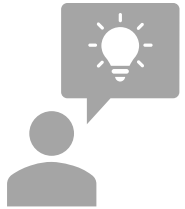


Figure 1.6 Decision tree for the loan application example

Knowledge management



Many organisations have adapted to the knowledge economy by adopting new structures and by creating new roles for managers.



The term **knowledge worker** describes a person whose role is based around creating, using, sharing and applying knowledge.

The work of a **knowledge engineer** focuses on producing knowledge from experts so that it can be recorded and shared with others within the organisation.

Knowledge management

- Knowledge can be thought of as the combined result of a person's experiences and the information they possess.

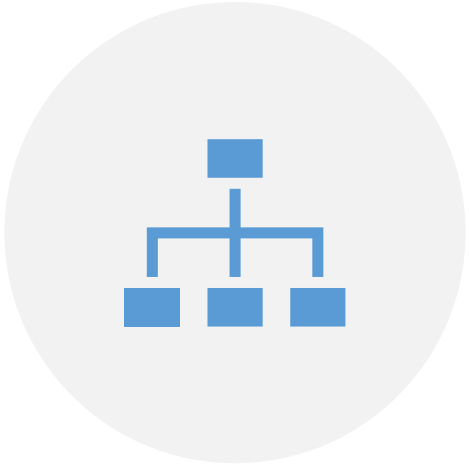
- In general, knowledge can be described as explicit or tacit.

  - Explicit knowledge is easily captured and stored within documents and other media. This type of knowledge tends to be highly detailed, formal and systematic. It is often stored in the form of manuals, documents, procedures and database files.

  - Tacit knowledge is characterised by factors such as perceptions, beliefs, values, intuition and experience. Since a great deal of tacit knowledge may be held unconsciously, it is difficult to elicit, describe or record.

Competitive intelligence (CI)

CI INVOLVES COLLECTING DATA FROM A NUMBER OF DISPARATE SOURCES AND CONVERTING IT INTO USEFUL INFORMATION ABOUT AN ORGANISATION'S COMPETITORS.



THE INFORMATION GATHERED IS USED TO SUPPORT DECISION MAKING WITHIN THE ORGANISATION, ALLOWING IT TO RESPOND MORE EFFECTIVELY TO COMPETITION.

Summary

DATA AND INFORMATION

QUALITIES OF INFORMATION

THE BUSINESS ENVIRONMENT

MANAGERIAL DECISION MAKING

KNOWLEDGE MANAGEMENT

Questions?