# Instructor's Manual

# Business Information Systems

## Technology, Development and Management for the E-Business

## Fifth edition

**Paul Bocij**
**Andrew Greasley**
**Simon Hickie**

**Compiled and edited by**
**Andrew Greasley and Paul Bocij**

**For further instructor material please visit:**
**www.pearsoned.co.uk/bis**

**ISBN: 978-0-273-73648-6**



PEARSON

Harlow, England • London • New York • Boston • San Francisco • Toronto • Sydney • Auckland • Singapore • Hong Kong
Tokyo • Seoul • Taipei • New Delhi • Cape Town • São Paulo • Mexico City • Madrid • Amsterdam • Munich • Paris • Milan

**PEARSON EDUCATION LIMITED**
Edinburgh Gate
Harlow CM20 2JE
United Kingdom
Tel: +44 (0)1279 623623
Web: www.pearson.com/uk

First published 2006

**This edition published 2015 (electronic)**



ISBN: 978-0-273-73648-6

# Contents

PART 1

# Introduction to Business Information Systems

CHAPTER 1

# Basic concepts – understanding information

## Activities

### *Activity 1.1 Data v. information*

**From the point of view of a student at a university, which of the following might be examples of information? Which might be examples of data?**

**(a) the date (data);**

**(b) a bank statement (information);**

**(c) the number 1355.76 (data);**

**(d) a National Insurance number (data);**

**(e) a balance sheet (information);**

**(f) a bus timetable (information);**

**(g) a car registration plate (data).**

Most of the items listed are open to interpretation. It could be argued, for example, that a bus timetable is an example of data. However, if the timetable provides information concerning services to or from the campus, then it might be considered an example of information. The point of the activity is to emphasise the importance of *context*.

### *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 (tangible);**

**(b) enhanced customer service (intangible);**

**(c) increased production (tangible);**

**(d) reduced administration costs (tangible);**

**(e) greater customer loyalty (intangible);**

**(f) enhanced public image (intangible).**

In simple terms, this activity is intended to emphasise the notion that the tangible benefits of information can often be measured in terms of financial value. Items (a), (c) and (d) might be considered tangible benefits since it would be possible to quantify the benefits realised. As an example, if an organisation acts on certain information, with the result that administration costs are halved, then we could suggest that the information has a value equivalent to half of the company's administration costs.

## *Activity 1.3 Information value*

**Using the Internet as a resource, find three case studies of the value of information in the context of a business organisation. As an example, you might locate a news story in *Computer Weekly* (www.computerweekly.com) describing the savings made as a result of implementing a new stock control system.**

This activity is intended to reinforce the concept of the tangible/intangible value of information, and the notion that value can often be measured in financial terms. In addition, the activity introduces students to a valuable resource (*Computer Weekly* is the leading magazine for IS/IT professionals). This activity might also be used as an introduction to the use of the Internet as an information resource.

## *Activity 1.4 Informal communication*

**Consider the role of informal communication within an organisation such as a local government department or hospital.**

1. **In what ways can informal communication support the day-to-day activities of the organisation?**
2. **How important is the role of informal communication within the organisation? Could the organisation function effectively if informal communication were restricted?**
3. **How can informal communication be controlled or harnessed for the benefit of the organisation?**
4. **What negative results might occur if overly strict controls are imposed on informal communication?**

1. Students might be expected to arrive at quite lengthy lists of items in response to this question. Some examples of appropriate responses include the following:
   - Can be used to find solutions to problems at a local level, for example, within a department.
   - Can help to improve the overall efficiency of staff; for example, senior staff members might provide advice and guidance to new members of staff.
   - Allows information to be transmitted between members of staff quickly. However, a disadvantage is that information can become distorted.

2. A strong case can be made for the argument that organisations *require* informal communication in order to function effectively. Informal communication enables the members of an organisation to respond to events quickly and appropriately. Some appropriate examples include the following:
   - In highly competitive industries, informal communication can be used to gather intelligence concerning rival organisations. A casual conversation with a supplier, for example, might reveal information concerning a rival's products.
   - As more organisations adopt an approach based on centralising resources, more reliance is placed on informal means of communication. As an example, many banks and building societies now operate call centres, allowing customers to carry out transactions and make enquiries by telephone. Since the needs of customers are likely to vary a great deal, informal communication serves two purposes: it allows customers to express their individual needs and; allows the organisation to provide a response tailored to the specific requirements of the customer.

- New members of an organisation are often assigned mentors. The role of the mentor is to provide advice, guidance and information as the new staff member acclimatises to his/her new position. One of the reasons for assigning a mentor to a staff member is because much of the advice and information required by new staff members will *not* be found in formal company documents. For example, a company handbook would be unlikely to hold answers to every possible question a new employee might have.

3. Again, students might be expected to arrive at quite lengthy lists of items in response to this question. Some examples of appropriate responses include:

   - Newsletters can be used as a forum for staff and management to express their opinions.
   - Many organisations allow employees to put forward suggestions for new products or improved services. As an example, Rolls-Royce encourages employees to approach supervisors and managers with suggestions as to how the company can improve its products and services. Prizes are awarded to employees who put forward an idea for a new product or a means of reducing costs.
   - Sales organisations often assign a member of staff to a specific group of clients in order to create and sustain good business relationships. Over time, the sales person will begin to learn about each client's particular needs, enabling the organisation to offer a better service to individual clients. In turn, the client is likely to remain loyal to the company as all of his/her business needs are being met.

4. It is worth pointing out that it would be impossible to eliminate informal communication entirely from an organisation; for example, one could never prevent employees from meeting at lunchtimes or social events.

   As the earlier questions should have helped to make clear, the overall efficiency of the organisation may be reduced if informal communication is restricted. Although extreme, consider the example of a sales assistant in a supermarket needing to write a formal memo in order to find out the price of an item. In addition to reducing the efficiency of the organisation, this would also lead to a loss of customer satisfaction and a corresponding reduction in sales. This example should highlight an important point: attempts to restrict informal communication may impact on a wide variety of areas, ranging from customer satisfaction to productivity.

   Although a great deal of research has been carried out in this area, common sense should also make it clear that human beings require some form of social contact with others. By reducing informal communication, one is likely to limit the contact that employees have with others. In turn, this is likely to reduce morale, which will almost certainly have an adverse effect on productivity.

   As a final note for this question, it should be pointed out that organisations may sometimes need to place controls over informal communication. As mentioned in the text of the book, informal communication can lead to inaccurate or incomplete information being transmitted to a large number of people. Unfounded rumours, for example, might easily harm staff morale or reduce public confidence in the organisation.

## *Activity 1.5 Information quality*

**Visit the websites of two different online booksellers. For each example, assess whether the information provided about a particular book is of 'good' or 'poor' quality. Explain your reasoning with reference to the characteristics of information described in this chapter, in particular, in Table 1.1. Can you differentiate between the offerings of the companies using the information provided?**

This activity shows how Table 1.1 can be applied to one example of decision-making. It shows how, of all the elements of information quality in Table 1.1, only some will be relevant in all cases. Before looking at the websites, students should be encouraged to list which factors they think are important when selecting a book, e.g. relevance, depth, clarity, price, recency, etc.

Suitable websites to look at are Amazon (www.amazon.com) and, in the UK, BOL (www.bol.com), WH Smith (www.bookshop.co.uk) and Streets Online (www.streetsonline.co.uk).

Students should then select one or two books and compare them across the sites for the criteria they have identified from Table 1.1.

## *Activity 1.6 What is knowledge?*

**Using the Internet, locate at least five definitions or descriptions of knowledge. What do these definitions have in common and how do they differ from each other?**

This is a research-based activity. A good way to approach this is by entering 'define knowledge' into Google. This will display an entry titled 'web definitions for knowledge'. Students should find a number of common themes in the different definitions given. Some examples follow:

- Knowledge is made up (in part) of information, rather than data.
- Knowledge involves elements such as reasoning, understanding, perception, etc.
- Knowledge draws on experience.
- Knowledge can help to guide future actions.
- There are different forms of knowledge.

## *Activity 1.7 Organisation-level decisions*

**Classify the following decisions by type (structured, semi-structured, unstructured) and organisational level (strategic, tactical, operational). In addition, determine whether or not the decision-making process could be automated, and, if possible, describe the name or type of BIS used.**

**(a) At what level should we set the budget for the 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) Strategic (plus tactical elements): Can be partially automated by the use of spreadsheets and accounting figures from previous years.

(b) Operational: Decision can be taken automatically, on the basis of their credit history and the size of the order. If it was a very large order then it might be reviewed manually, and it could be a tactical decision based on financial constraints.

(c) Strategic issue: Could not be readily automated.

(d) Operational issue: Could not be readily automated.

(e) Strategic: Could not be readily automated.

(f) Tactical: Could not be readily automated.

(g) Operational or tactical: Could not be readily automated.

(h) Strategic: Could not be readily automated.

(i) Operational: Could not be readily automated.

The activity highlights the overlap between tactical and strategic decisions and that these types of decision are difficult to automate.

## *Activity 1.8*

**The marketing department of a construction company is planning the creation of a competitive intelligence system. Its aim is to capture and disseminate information about 30 key competitors and also existing or potential customers served by account representatives. You are designing the system. Working in groups, agree an approach for:**

1. **Capturing data (who is involved, what information they need to collect).**
2. **Entering data (who is responsible for this, how they evaluate and categorise the different types of information entered).**
3. **Output requirements. Using the framework for quality of information in Table 1.1, what are the requirements in terms of types of content, frequency, who can access the data and filtering according to different criteria?**
4. **What types of hardware and software may be required for the system (reference to later chapters may be needed to answer this)?**

This activity is intended to give students an appreciation of the complexity and practical issues involved in managing information within a medium-sized to large company. The activity should highlight a structured approach to solving the problem based on the Input-Process-Output model introduced in Figure 2.2 (p. 41), so it may be best to defer it until that concept has been covered.

Students will find that to answer questions 1 and 2, it is first necessary to have an idea of the output required. Stage 3 should separately identify the types of information needed about competitors (e.g. size [turnover vs. employees], specialism, national or international, bids won, staff movements) and customers (size, industry, key decision makers, previous work or tenders). By considering real examples of data, students will gain an appreciation of the different types of data referred to in the chapter, i.e. hard data, soft data, time-varying data, etc.

# Case studies

## *Case study 1.1: Technology sponsors a complementary form of capitalism*

**1. Using the case study explain how IT enables a sharing economy.**

**2. How does a sharing economy improve overall productivity?**

1. The case study outlines three trends:
    1. IT allows marketing of goods and services at a low cost to a potential large market using platforms such as websites. The web is widely used by customers and always the user to quickly search for particular goods and services using tools such as google.
    2. IT allows resources to be shared and bartered again using the connectivity of the web. If a customer knows they can quickly and easily obtain a resource for a task then they may move from a buyer to a renter of that resource.
    3. IT can enable the customer to be involved in the customisation of goods and services. Many goods and services can be customised to some extent by the use of approaches such as options (electric windows on a car, etc.) specified by the customer. However, IT can enable involvement of the customer in the actual production or design of the good or service, e.g. Wikipedia.

2. Overall productivity is improved using the above approaches by assisting in matching supply and demand in the economy. Much of the supply or capacity in the economy is fixed and so if this capacity cannot be fully utilised at the time it is available then productivity will be reduced. An example if a logistics company transporting good around a country. If it can market any spare capacity on the web and match customers with supply then it can increase the utilisation of its transporters and so increase productivity.

## *Case study 1.2: Dealing with the data deluge*

**1. Explain the social and technical issues involved in extracting personal information from the web.**

In terms of social issues two recent cases can be used as a discussion here:

Google has implemented a new privacy policy despite warnings from the EU that it may violate European law. The change means private data collected by one Google service can be shared with its other platforms including YouTube, Gmail and Blogger. But data regulators in France have launched a Europe-wide investigation after expressing doubts about the legality of the policy.

Google says it is establishing a service that will enable Europeans to ask for online links relating to their personal life to be removed from search results. The world's biggest internet search engine is expecting a barrage of requests after the European Court of Justice ruled that links to outdated or irrelevant data should be erased on request. Critics call it an alarming extension of online censorship.

In terms of technical issues the approaches of the semantic web and analytics as mentioned in the case study can be discussed.

# Exercises

## *Self-assessment exercises*

**1. What are the three dimensions of information quality?**

Time, content and form.

**2. How can the value of information be measured?**

The value of information can be measured in two basic ways:

- By the improvements it brings to managerial decision making (intangible value)
- By attempting to place a financial value on the information (tangible value).

These points might be expressed with two simple formulae:

- (Tangible value) value of information minus cost of gathering information
- (Intangible value) improvements in decision behaviour minus cost of gathering information.

**3. What are the functions of management?**

A classic definition of the functions of management comes from Henri Fayol (1841–1925):

*To manage is to forecast and plan, to organise, to command, to coordinate and to control.*

Note that Fayol's definition is often considered insensitive – nowadays, few people would appreciate being told that their managers 'command' them. Instead, it is more appropriate to place an emphasis on the notion that managers coordinate – or facilitate – the activities of staff.

In general, much of a manager's work involves making decisions about the best ways to achieve the organisation's objectives. It should also be noted that there is a direct link between a manager's decision making and planning activities.

**4. What are the stages involved in making a decision?**

Some models of decision making are based on four stages. Other approaches suggest that the evaluation of the decision is a fundamental part of the process. The stages of decision making are as follows:

- Intelligence
- Design
- Choice
- Implementation
- Evaluation.

**5. How will a manager's cognitive style affect the decisions he or she makes?**

In general:

- A manager's cognitive style will influence the type of information they require.
- The analytical manager is suited to making regular, routine decisions where the rules governing the decision are clear (structured decisions).
- The intuitive manager is more suited to unstructured decisions, where the rules governing the decision may not be clear.

The characteristics of analytical and intuitive managers can be summarised as shown in the table below.

| **Analytical** | **Intuitive** |
|---|---|
| More suited to structured decisions | More suited to unstructured decisions |
| High level of analytical thought | Relies heavily on prior experience, judgement and intuition |
| Can provide detailed justifications for decisions | More willing to accept qualitative information |
| Prefers quantitative information, will often overlook qualitative information | Examines situations as a whole, taking a holistic view |
| Examines situations at a high level of detail, but may overlook wider issues | |

**6. Explain how the concept of knowledge management relates to data and information.**

Students should distinguish knowledge from information by explaining that data is transformed into information, but knowledge is required to interpret and act on the information.

The answer should distinguish between explicit knowledge (e.g. how to deal with a customer complaint) and tacit knowledge (e.g. what actions to take, given a set of sales figures).

**7. What differences in perspective about managerial decision making are introduced by the e-business concept?**

The e-business concept has led to top organisations providing an infrastructure for delivering good-quality (relevant, timely, in-depth, across the whole business environment) information for managerial decision making. The e-business concept involves connecting an organisation with the whole of the business environment shown in Figure 1.2 (p. 16), i.e. it provides more timely information flows about customers, suppliers, employees and external influences.

On a practical level, information is made available to employees through intranets, to suppliers through extranets and to customers through extranets and the public website. This information is delivered through web browser or e-mail alerts/newsletters.

**8. In brief, what is knowledge?**

From the text: Knowledge involves harnessing a person's unique abilities, such as his/her perceptions, experiences, intuition and analytical skills. When these abilities are combined with the information a person holds, this represents knowledge. In other words, knowledge can be thought of as the combined result of a person's experiences and the information they possess.

## Discussion questions

**1. Some people argue that employees should be restricted in terms of the information they have access to in the course of their duties. Others argue that they are able to work more efficiently if they have access to *all* of an organisation's information resources. Using relevant examples, make a case for one side of this argument.**

Some of the points that might be raised are shown in the table below.

| For open access | Against open access |
|---|---|
| • It may not be possible to determine what information an employee might need. Preventing full access may hinder the employee when carrying out his/her duties.<br>• Wider access to information may help the organisation to become more accountable to employees and shareholders.<br>• Providing wider access to information can help employees to examine issues from a wider perspective. An improved understanding of the organisation may help to foster innovation. | • Organisations have a duty to protect sensitive information; customers and clients would lose confidence in the organisation if it became known that their privacy was not protected in some way.<br>• Allowing free/open access to all information might lead to abuses, e.g. employees using information for personal gain.<br>• Open/free access may harm the organisation's competitive position since rivals may gain access to sensitive information.<br>• Providing open/free access to information can make it harder to locate specific items. In addition, it might lead to unnecessary confusion. |

Some relevant examples that students might quote include:

- The late 1980s saw a great deal of public concern arise over the issue of 'insider trading' – the use of privileged stock exchange information for personal gain. Over the past decade, a number of public figures including high-ranking politicians and business people have become the subject of highly publicised investigations. Access to confidential information has resulted in a number of cases where employees have attempted to defraud their employers of extremely large sums. For example, several cases are described briefly in Chapter 17.

- Some people believe that access to the Police National Computer (PNC) is regularly abused by police officers seeking to gain information for personal reasons. Commonly quoted examples include checking to see whether a potential boyfriend or girlfriend has a criminal record; checking whether a second-hand car has been reported stolen before

buying it and locating addresses or telephone numbers on behalf of other people. In reality, however, there are extremely strict controls imposed on the use of the PNC. Genuine abuses of the system are infrequent and are at risk of some extremely severe penalties.

**2. It has been said that decision needs should determine information needs. Is this always true, or is there a case for an organisation gathering *all* available data and information?**

Some of the points that might be raised are shown in the table below.

| **Gathering only relevant data** | **Gathering all data** |
|---|---|
| • May be difficult to identify precisely what information is needed.<br>• Parameters of decision likely to be well defined and clear. Information not gathered until the circumstances of the situation are known and understood.<br>• More efficient – fewer resources used since only relevant information is collected.<br>• Allows decision maker to focus more closely on specific area being considered.<br>• On balance, likely to lead to fastest decision being made. | • Expensive to collect, store and process information that may never be needed.<br>• Less chance that important information may be overlooked.<br>• May prove distracting – decision maker must sift through information to find relevant items.<br>• Decision maker may find new alternatives or gain better understanding of the problem to be solved.<br>• Information gathered might be useful for other purposes, e.g. used to support other decisions. |

**3. Select an article of your choice from a newspaper, journal or magazine. Analyse the information contained within the article using concepts related to the attributes of information quality. Use the web links provided at the end of this chapter to locate suitable articles.**

Depending on the article chosen, students should be encouraged to make judgements about the qualities of information present in the article. As an example, students might make some of the following observations about a newspaper article:

- Timely – the newspaper is printed each day.
- Concise – given the format in which it is presented.
- Accuracy – some newspapers have a reputation for embellishing facts.
- Reliable – some newspapers have a reputation for embellishing facts.
- Frequency – we expect news to be provided daily.
- Order – we expect the most 'important' news stories to be presented first.

**4. 'Knowledge management is nothing new, it is merely a repackaging of existing information management techniques.' Discuss.**

A suggested structure for this answer is:

- Definition of knowledge management.
- Explanation of concept of tacit and explicit knowledge.
- Summary of what is new about KM, i.e. focus on making use of information (applying intelligence that is part of managers' experience and skill-set). Use examples of applications (e.g. Hansen *et al*., 1999 article in chapter references). It is a structured rather than ad-hoc approach to capturing and disseminating knowledge.
- Assess whether or not it is repackaging using examples of applications and practice. For example, information on best practice has always been shared, with or without the KM label.
- To conclude, discuss whether or not KM has caused a change in practice or change in perspective. A combination of the two, but mainly in perspective.

## Essay questions

**1. Select an organisation you are familiar with. Identify at least one major decision that the organisation has taken recently. Describe the decision-making process that took place, paying particular attention to the following points:**

**(a) describe how managers became aware that a problem existed and that a decision was required;**

**(b) describe what information was gathered so that managers could achieve a good understanding of the problem;**

**(c) provide examples of any alternative solutions that were considered and explain why these were eventually rejected;**

**(d) explain why the final solution was selected and describe how it was implemented;**

**(e) discuss how the solution was evaluated and whether or not it was successful.**

This type of essay question is normally used for diagnostic purposes and to help students learn how to produce structured papers. The notes below provide an indication of the contents of each section and identify areas where extra credit might be awarded.

(a) A concise description of the organisation and the problem that arose and the mechanism by which problems are identified and prioritised should be described. In a sales organisation, for example, the existence of a problem would become known when managers examined sales reports. The severity of the problem would help to define what type of decision was required, what constraints existed and who should be responsible for solving the problem. In general, extra credit might be given if students identified the level at which the decision should be taken (strategic, tactical, operational) and the type of decision (structured, unstructured, semi-structured).

(b) In all cases, managers are likely to make use of a wide variety of information sources. The student's response should reflect this by considering the diverse range of sources that a manager might make use of. For example, even when making a structured decision, a manager might use his/her own experience to help evaluate the likelihood of success for a

given course of action. In order to earn extra credit, the student should describe the type of information (internal, external), its form (e.g. written report) and its characteristics (form, time and content dimensions) for each of the sources identified. Additional credit might be given if the student evaluates the information and offers a judgement as to its importance (in the context of the decision being taken).

(c) It is important for the student to justify why a given approach was rejected. In describing the range of potential solutions considered, the student should structure his/her material carefully. A good answer will describe a set of criteria by which each solution was evaluated. The material should then show how these criteria were applied to each potential solution.

(d) The description of the solution that was eventually chosen should refer back to the material in the previous section. The student should attempt to show how the chosen solution meets the selection criteria described earlier. In addition, a good answer will describe how this particular approach overcomes the shortcomings of the potential solutions considered earlier.

(e) It is largely irrelevant whether or not the chosen solution was successful. However, if the solution was unsuccessful, the student should attempt to explain why this was the case. In addition, the student should try to identify which selection criteria are to blame. The evaluation of the decision should be structured carefully and (relevant) evidence should be used to justify any conclusions drawn. If the solution was successful, the student should describe how this judgement was reached. For example, in a sales organisation, increased sales would indicate that the solution chosen was the correct one. Extra credit should be given if the student shows that they realise that the successful solution may have been only one of a number of alternatives. Using the example of the sales organisation again, how do we know that a different solution would not result in even higher sales?

**2. The survival of a large organisation depends upon access to high-quality information. Discuss this statement, providing relevant examples where necessary.**

Essentially, this question asks students to describe the characteristics of information and apply this material in a practical manner. Students should recognise that 'high-quality information' means that they are required to discuss the characteristics of information. Students are also required to make judgements based on the examples they give, determining whether a given piece of information is of 'high' or 'poor' quality. These judgements should be supported by explaining the outcome of the situation described.

As an example, airlines often use sophisticated software applications to predict the demand for seats on particular flights. If the predicted demand is low, a variety of methods are used to sell tickets at discounted prices in order to ensure that the flight is fully booked. Success can be measured very simply: if there are any empty seats when the flight departs, then the actions taken are not entirely successful. In addition, if the airline finds that it needs to turn away passengers because the flight is full, they may have sold too many tickets at discounted prices. The ideal situation is a flight that is fully booked, with the smallest number of passengers travelling at discounted fares. Clearly, in order to achieve this ideal situation, the airline must have access to information that is accurate and timely. In this way, we can demonstrate a direct link between quality of information and the success (or failure) of a given activity.

Extra credit might be given if a student provides a number of examples that demonstrate very clearly how the characteristics of the information used have an impact on a company's activities. Students should also attempt to write in a structured manner, being consistent in the way in which they analyse the information described.

**3. The Microsoft Corporation is arguably one of the most successful company's in the world. Conduct any research necessary to complete the following tasks:**

**(a) Provide an overview of the company and its activities.**

**(b) Selecting appropriate examples, describe the company's physical and conceptual resource bases.**

**(c) Identify and describe some of the factors in the company's business environment. Provide examples of factors that act either to support or obstruct the company's activities.**

(a) This section is a matter of research. Students should describe the overall structure of the company and outline its history. This material should also pay attention to factors such as the company's stated objectives (mission statement) and its major sources of revenue.

(b) Detailed research is likely to lead to a more comprehensive response. Areas that students might investigate include the following:

- Subsidiary companies owned by the organisation provide access to, or ownership of, key technology.
- Microsoft owns a significant number of patents that protect revenues by restricting the actions of competitors.
- Employees or associates of the company have specialist expertise that enhances its activities.
- In examining Microsoft's business environment, students may choose to investigate certain areas in depth. Some possible avenues of research include:
  - The actions of competitors, such as attempts by Netscape Corporation to regain control of the Internet browser market.
  - The company's legal difficulties, such as patent disputes (such as disputes concerning the Java language originally developed by Sun) and the recent anti-trust action (started in 1998 following allegations that Microsoft enjoys an unfair advantage over competitors).
  - Strategic alliances, such as that formed between Microsoft and Intel.

(c) In this section, students should also attempt to describe how factors in the business environment act to influence Microsoft's activities.

**4. Write a report on how knowledge management could enhance an organisation of your choice.**

This question is intended mainly for mature students who have experience of a management role in an organisation.

The concept of knowledge management will need to be explained at the start.

A clear process will need to be demonstrated for introducing knowledge management (KM), e.g.

- Audit of KM capture, dissemination, tools and process
- Identification of weaknesses in tools, process and particular types of knowledge
- Propose prioritised solutions for KM looking at tools and process separately.

There is a range of structures that could be used to assess current use and future potential of knowledge management in an organisation. For example:

- Management decision-taking levels, from strategic to operational
- By department
- By type of knowledge required by managers, e.g. competitors, suppliers and employees
- By decisions that need to be taken, e.g. marketing budgets, recruitment, strategy, etc.

## Examination questions

**1. It is generally agreed that one of the key functions of management is decision making. Using specific examples, you are required to:**

**(a) describe the types of decisions that managers are required to take;**

**(b) explain the stages involved in making a decision;**

**(c) describe the characteristics of decisions taken at different levels in an organisation.**

(a) Students should indicate an understanding of structured, unstructured and semi-structured decisions. In addition, they should describe some of the characteristics of business decisions including the level at which the decision is taken, information requirements, time scale and frequency. In terms of information requirements, students should describe factors such as frequency, scope and level of detail.

(b) The student should describe an accepted model of decision making, such as the table below. Extra credit might be given if the student describes the significance of evaluation as part of the decision-making process. The student may also reproduce the table below.

| **Stage** | **Activities** |
|---|---|
| Intelligence | Awareness that a problem exists<br>Awareness that a decision must be made |
| Design | Identify all possible solutions<br>Examine possible solutions<br>Examine implications of all possible solutions |
| Choice | Select best solution |
| Implementation | Implement solution |
| Evaluation | Evaluate effectiveness or success of decision |

(c) The student should describe the characteristics of decisions taken at different levels in an organisation (see table below), expanding on any points made earlier. Clear distinctions should be made between decisions taken at each level in the organisation: strategic, tactical and operational. Extra credit should be given if relevant examples are given in support of the student's response. Extra credit may also be given if the student reproduces the material given in Chapter 1 of the text.

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

**2. An understanding of the nature of information is fundamental to the study of information systems. Using specific examples, you are required to:**

**(a) define information;**

**(b) describe the characteristics that will be present in information of high quality;**

**(c) describe how the value of information can be determined.**

(a) Students should supply one or more of the following definitions:

*Data that have been processed so that they are meaningful.*

*Data that have been processed for a purpose.*

*Data that have been interpreted and understood by the recipient.*

*Information acts to reduce uncertainty about a situation or event.*

However, a more complete answer should be expected, where students attempt to make some or all of the following points. 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.

(b) Students should provide a list of information characteristics, ideally grouping them by category (time, form, content). Each of the characteristics listed should be accompanied by a brief description. Extra credit should be awarded if students provide relevant examples of each characteristic.

(c) Students should distinguish between tangible and intangible value, ideally providing a relevant example of each. Although the formulae shown below need not be reproduced, students should still demonstrate an understanding of the two concepts they illustrate: (i) information may have a value that can be directly measured (in financial terms); (ii) information can have value if it helps to improve decision making.

*Value of information minus cost of gathering information.*

*Improvements in decision behaviour minus cost of gathering information.*

**3. Information can be transmitted via formal and informal means. Using specific examples, you are required to:**

**(a) describe the advantages and disadvantages of each method;**

**(b) discuss each method in terms of the attributes of information quality that are likely to be present.**

(a) Students are encouraged to provide a relatively general description of formal and informal communication. A good response will link to managerial decision making, covering areas such as cognitive style and type of decision (structured, unstructured, semi-structured). It may be appropriate for students to describe the advantages and disadvantages of each type of communication by using tables or brief lists.

(b) Students should provide a brief description of the characteristics of information and then apply this to formal and informal communication. Extra credit may be given if the student makes several direct comparisons; for example, information provided via formal communication is likely to be highly accurate, while information provided via informal communication may not be accurate.

**4. In relation to the concept of knowledge management:**

**(a) explain how knowledge differs from information;**

**(b) describe two ways of classifying knowledge;**

**(c) give an example of a business application for each of your answers in (b).**

(a) The answer should highlight that knowledge is about how information is applied by managers as part of running a business.

(b) For instance, two of

- explicit vs. tacit;
- by management need e.g. strategy, finance, marketing decisions;
- level (strategic, tactical, operational);
- by information type: customers, competitors, etc.

(c) Marks should be awarded for general technologies, e.g. expert systems, knowledge bases and intranets, but also for demonstrating how they can be applied.

CHAPTER 2

# Basic concepts: an introduction to business information systems

## Activities

### *Activity 2.1 Example of information systems*

**What information systems might be found in your newsagent's? For each system identified, list the people, hardware, communications, software and data resources involved.**

Examples of the kinds of systems that might be found include those indicated in the table below. Note that the lists given contain a limited number of examples and are not intended to provide a comprehensive solution.

Resource requirements needed for different systems in a newsagent:

| **Resources** | **Billing system for newspaper deliveries** | **Stock control system for other items sold in store** | **National Lottery (Lotto) ticket sales system** |
|---|---|---|---|
| **Hardware Resources** | Personal computer, printer | Personal computer, printer | Specialised terminal with integral printer, communications equipment (e.g. modem and leased telephone line) |
| **Software Resources** | Billing software (will include facilities for data entry and a variety of reports, e.g. account details for individual customers, summary reports, etc.)<br>Backup software | Stock control software with facilities for recording sales and deliveries. Software may also account for invoices paid and received. Package will also produce a variety of reports, e.g. stock for reorder, summary of sales, etc. | National Lottery terminals use specialised software that produces tickets, records sales and carries out other functions, e.g. 'lucky dip' tickets, where numbers are selected at random |
| **Data Resources** | Supplier data, e.g. newspapers and magazines delivered each week. Customer information, e.g. new orders and cancellations. Data from delivery people, e.g. customers who have or have not paid | Supplier details, e.g. contact information, price lists, stock availability, etc. Records of sales. Records of current stock held. Financial data, e.g. whether or not the newsagent can afford to buy given items of stock | Time and date (restricts times when tickets can be sold). Customers' selections (of numbers). Records of previous draws (for awarding prizes, etc.) |

| | | | |
|---|---|---|---|
| **People Resources** | Newsagent, customers, delivery people, suppliers (i.e. distribution company) Sales staff, Suppliers of equipment (for support, etc.) | Suppliers, Sales staff, Suppliers of equipment (for support, etc.) | Sales staff Suppliers of terminal equipment (for support, etc.) |

## *Activity 2.2 Online processing systems*

**Using the Internet as a resource, locate at least two examples of the use of online processing systems in business. As an example, both Sainsbury's and Boots use incentive programmes based around loyalty cards, where customers can redeem points against purchases using interactive kiosks.**

This is a relatively simple task that is intended to make students appreciate the extent to which such systems are used. Some examples that students might identify include:

- The ATMs provided by banks and other financial institutions.
- The electronic tills used by supermarkets that can accept payment by credit card or Switch.
- Many retailers use inventory control systems that monitor stocks across a number of stores. These systems are capable of automatically reordering items when stocks fall below certain levels.

## *Activity 2.3 The Internet economy*

**Consider the framework of the Internet economy developed by the CREC (Center for Research and Electronic Commerce) at the University of Texas. Give at least three examples of companies for each layer in the framework.**

There are four layers in the framework. CREC describes these layers like this (see http://www.infotoday.com/searcher/sep00/friedman.htm):

- Internet infrastructure: including telecommunications companies, Internet backbone providers, Internet service providers (ISPs) and other last-mile access providers.
- Internet applications infrastructure: principally, software required for Internet services, but also consulting and service companies hired to build websites.
- Internet intermediary: economic activity at the intermediary level includes service provided by auction and aggregation providers – companies that package or provide a forum for economic activity, though they may not be involved in the activity itself.
- Internet commerce: finally, the commerce layer includes companies that are engaged in sales and transactions over the Internet.

Typical examples of internet infrastructure companies include: British Telecom (ISP and telecommunications), AT&T (Internet backbone providers), AOL (ISP and backbone provider) and Cisco Systems Inc. (hardware manufacturer).

Typical examples of applications infrastructure companies include: Microsoft (producers of operating systems and web server, Internet Information Services [IIS]), Apache Software Foundation (producers of Apache web server) and Sun Microsystems (developers of Java and other critical hardware/software).

Typical examples of Internet intermediaries include eBay (auction site), Expedia (online travel), CNET (content aggregators) and Google (portal and content aggregators).

Typical examples of Internet commerce include Amazon (e-tailer), Dell (hardware manufacturer selling online) and iTunes (online entertainment).

### *Activity 2.4 E-commerce types*

**How many new or emerging types of e-commerce can you locate using the Internet? Which of these do you think will become most significant in the future?**

### *Activity 2.5 Benefits of e-business*

**The approaches used by companies such as Argos, Dell and eBay restructure the relationship between manufacturer, retailer and customer to the benefit of all involved. Discuss this statement with reference to the e-business and e-commerce concepts described in this section.**

This activity asks students to identify some of the key benefits of e-business. Some typical benefits students might be expected to identify are given below.

| **Manufacturer** | **Retailer** | **Customer** |
|---|---|---|
| Can achieve economy of scale even with niche products because more retailers to work with | Larger range of products to offer customers | Larger range of products to choose from |
| Reduced production costs through better access to raw materials, larger choice of suppliers, etc. | Can reach customers almost anywhere; no physical restrictions | Can access products and services from almost anywhere, e.g. UK buyer can buy from USA |
| Can reach customers directly; quick feedback on products, easier to provide support, etc. | Can provide customers with improved customer support through website, e-mail, etc. | Competition acts to reduce prices |
| Can sell directly to customers | Reduced costs through improved processes, e.g. online payment systems | Easier to reach manufacturer for information and support |

## Case studies

### *Case study 2.1: PayPal eyes in-store retail customers*

**How are PayPal assisting bricks and mortar stores to compete against online based retailers such as Amazon?**

This question can be used to initiate a discussion regarding the extent to which traditional bricks and mortar stores will be made obsolete by online retailers.

Online retailers such as Amazon have obvious advantages such as economies of scale and lower rental and inventory costs than retailers. One advantage they also offer is speed of transaction when customer credit card details are held by the company allowing fast payment.

PayPal already has a large base of customer payment card details and so can offer a way for retailers to provide quicker transactions. There is also scope to increase customer loyalty to a retailer by offering discounts and mobile payment apps as discussed in the case study.

### *Case study 2.2: Corporate IT falling short of potential*

**Explain why organisations are only realising less than half of information technology's potential.**

This question can provide the basis for a discussion of the changing nature of IT over the past decades.

The case study explains the need for a change in focus from an internal perspective of IT use to minimise both organisational and IT costs to one of embracing new initiatives in an external perspective of interfacing with the customer. These commerce-based applications include areas such as analytics and mobile computing.

## Exercises

### *Self-assessment exercises*

**1. Answer the following questions in relation to your college or university:**

**(a) What are the institution's objectives?**

**(b) Identify a range of typical inputs, processes and outputs.**

**(c) What feedback mechanisms are in place and what kinds of information do they produce?**

**(d) What control mechanisms exist?**

(a) The institution's mission statement provides a summary of aims and objectives. As an example, the following statement – or one very much like it – is likely to be found in many college and university literature:

*The University of XXX exists to provide equal access to quality education for all students.*

Such a statement can be broken down as follows:

- Although this may seem obvious, as a whole, the statement suggests that the primary purpose of the institution is to deliver education and training. However, this statement also suggests activities that the college or university will *not* undertake. In an established college or university, for example, such a statement would imply that research is considered secondary to teaching.
- The term 'equal access' implies that one objective of the institution is to cater to the needs of all students, irrespective of gender, ethnicity, religious beliefs or age. Furthermore, the use of the word 'access' suggests a proactive approach towards

recruiting students. In other words, the institution aims to *create* opportunities for students to study.

- The term 'quality education' implies that the institution will seek to ensure that the highest standards of teaching and learning are maintained. Obviously, such a statement is made within certain constraints, such as budget.

(b) Students should be encouraged to take a methodical approach to the task and should attempt to link items together. Although the table below contains only a small set of examples, it illustrates the approach that should be taken.

Inputs and outputs for the different processes in a college or university

| **Process** | **Inputs** | **Outputs** |
|---|---|---|
| Enrol students | Student information (e.g. individual names, choice of course)<br>Course information (e.g. places available) | Record of all students enrolled on course<br>Statistics for internal use<br>Statistics for government use |
| Student induction | Timetable for course<br>Availability of facilities (e.g. rooms)<br>Questionnaires, etc. for gathering information on students | Programme of induction events<br>Feedback on induction programme |
| Join library | Student enrolment details<br>Student course details | Student's library account |

A college or university will have a large range of feedback mechanisms relevant to the wide variety of processes that take place in a typical institution. Some examples are listed:

- Enrolment data will be processed so that managers can carry out tasks such as identifying courses for which the recruitment has not been good.
- Student representatives will provide feedback information concerning individual modules and courses.
- The National Union of students (NUS) will regularly provide feedback information to the institution concerning the welfare of students; for example, the NUS represents students with grievances against the institution.
- All institutions will have internal quality committees that deal with issues ranging from the quality of teaching to the condition of the institution's buildings.

There will also be a wide variety of different control mechanisms in place. Some examples include the following:

- Poor recruitment figures might be rectified by spending more on advertising, or altering the hours of the course (so that it becomes more accessible to certain groups).
- Complaints concerning student grades might be dealt with via a course committee meeting, where a new marking scheme might be introduced, or additional cross-marking is recommended.
- A need to repair buildings or acquire new equipment might be met by adjusting budgets.

(c) and (d) Ideally, students will come to link the answers to (b), (c) and (d) as shown in the example in the table below.

Inputs and outputs for the recruit-students process related to feedback and control components

| **Process** | **Inputs** | **Outputs** | **Feedback** | **Control** |
|---|---|---|---|---|
| Recruit students | Students (and student data)<br>Finance (for advertising, etc.)<br>Staff (for student guidance, etc.)<br>Rooms (for enrolment, etc.) | Advertising<br>Enrolment figures | Enrolment statistics<br>Market research | Increase advertising<br>Alter course times |

**2. In what ways can information systems support a manager's activities?**

At the simplest level, students should recognise that information systems help managers to make better decisions by providing information of high quality.

A more comprehensive answer might link the functions of management with managerial decision making and the attributes of information quality. An example is given below:

| | | | | |
|---|---|---|---|---|
| Planning | >> | Information systems can be used to plan projects by providing information for forecasts, etc. However, the information will only be useful if it is relevant, accurate, timely, etc. | >> | Managers can make more effective decisions regarding how the project is structured, with the result that the project is more likely to succeed. |

**3. How can computer-based information systems help an organisation to achieve a strategic advantage over its competitors?**

Students are asked to recall the basic competitive strategies of cost, leadership, product differentiation and innovation. However, a more thorough response will include this list:

- improving operational efficiency;
- raising barriers to entry;
- locking in customers and suppliers;
- promoting business innovation;
- increasing switching costs;
- leverage.

**4. Match each term to the correct statement.**

Solution:

feedback – provides information concerning the performance of a system

interface – describes exchanges between the system and its environment

process – converts raw materials into a finished product

environment – contains everything outside of the system

boundary – defines the scope of the system

input – examples include raw materials, energy or labour power

output – examples include information, a product or service

control – adjusts the performance of the system

**5. What is the virtual value chain?**

The VVC extends Porter's concept of value chain analysis to the Internet. Where Porter's value chain generally deals with the production, marketing and supply of physical products, the VVC is concerned with producing and marketing non-physical products, such as subscription-based services.

Key concepts associated with the VVC are:

- The *marketspace*, the virtual equivalent of the marketplace
- The argument that information can create new value for customers (i.e. it has more value/benefit than simply supporting primary/secondary activities)
- A process whereby companies move through three phases when adopting the VVC, ultimately transforming them in fundamental ways. The phases are visibility, mirroring capability and new customer relationships. In brief, companies begin by examining and altering physical processes (visibility) before replacing them with virtual processes (mirroring capability) with a view towards using information to deliver value in new ways (new customer relationships).

**6. What are transaction costs?**

Transaction costs describe all of the costs associated with carrying out business transactions. As an example, choosing and then paying for an item by debit card incurs a number of costs for the retailer. These might include the cost of maintaining a showroom, staffing, advertising, bank charges imposed for processing payments and so on. A typical transaction cost for making or receiving a payment via a debit card might be as much as 3% of the value of the transaction.

One of the key business benefits of the Internet is that it acts to reduce transaction costs. It is also possible to pass some transaction costs onto customers. As an example, a retailer like Amazon has low transaction costs because it has no physical sales branches, no salespeople and so on. This allows the company to pass discounts on to customers.

**7. Explain the reasons for the adoption of enterprise resource planning systems by organisations.**

ERP provides a single package that replaces a number of separate packages. This allows better integration between modules and simplified support and maintenance. The ERP system typically supports several functional areas or different parts of the value chain such as inbound logistics, manufacturing, distribution, sales and finance.

## Discussion questions

**1. Can each of the following be described as a system? For each item, try to identify at least two inputs, processes and outputs. In addition, what feedback and control mechanisms exist?**

- **a human being;**
- **a plant;**
- **a house;**
- **a country;**
- **a computer.**

The table below summarises the inputs, processes and outputs for the items listed in this question. The list is intentionally contentious – a great deal depends on how students interpret each item. Some examples of the points students might make are given in the accompanying table. Brief notes concerning each item are also given.

Inputs, processes and outputs for different systems

| Item | Inputs | Outputs | Processes | Feedback | Control |
|---|---|---|---|---|---|
| **Human being** | Food Water Oxygen | Carbon dioxide Waste products | Respiration Nourishment | Autonomic (body recognises need for more oxygen) Hunger pains | Increase breathing rate Ingest food |
| **Plant** | Water Minerals Sunlight | Oxygen Fruit/seeds | Photosynthesis Hibernation | Autonomic (plant recognises need for nutrients) Autonomic (plant recognises changes in climate and temperature) | Plant orientates towards sunlight Plant varies intake of nutrients (for storage, etc.), leaves shed (not required) |
| **House** | Utilities (gas, electricity, etc.) People | Heat and light | Heating and lighting | Lighting manual, heating by thermostat | Thermostat |

| | | | | | |
|---|---|---|---|---|---|
| **Country** | People<br>Money<br>Labour<br>Produce | Money Foods | Directing resources, etc.<br>Controlling population | Voting<br>Opinion polls | Elections<br>Legislation |
| **Computer** | Electricity<br>Software<br>Data | Screen displays<br>Printed documents | Running a program<br>Controlling performance | Messages from operating system<br>Commands from user | Operating system User |

- *Human being*. Generally recognisable as a series of interconnected systems. The digestive system, for example, takes in food (input) in response to a sense of hunger (feedback). The food is digested (process), resulting in energy and waste products (output). The time when a person eats and the amount eaten (control) depend on the sense of hunger.

- *Plant*. Generally recognisable as a series of interconnected systems. Some plants, for example, reproduce (process) by creating seeds (output) by making use of stored energy and minerals (input). The plant recognises the time to reproduce by changes in the weather (feedback) and other factors. The number of seeds produced (control) will vary according to the plant's health and the availability of nutrients.

- *House*. It is difficult to consider a house in terms of a system since feedback and control mechanisms cannot be easily identified. One would need to stretch several points in order to form an argument. For example, one could argue that an output might be 'shelter' and a process could be 'provide shelter'. However, such an argument would be tenuous at best.

- *Country*. Whether or not one considers a country to form a system depends heavily on how the task is interpreted. If a country is considered in terms of a society, then it is possible to form a convincing argument by considering processes such as managing the behaviour of the population.

- *Computer*. A computer clearly possesses all of the components of a system. Students often find it difficult to identify feedback and control elements and may need additional guidance. The examples given in the table may need a little more explanation in order for students to understand them fully.

- Users form part of a feedback mechanism where they issue commands. As an example, when word processing, using a menu command or typing text represents feedback since the user is responding to one or more outputs from the word-processing software (and vice versa).

- The operating system constantly provides feedback information to the computer; for example, messages will be sent each time a disk drive is accessed to inform hardware (and software) that data is about to be written or read.

- Hardware devices also provide feedback. Modern computers often feature temperature control systems, where sensors constantly monitor the temperature of the microprocessor.

It may also be appropriate to provide students with several examples of control mechanisms:

- In the case of temperature control systems, control activities can take several forms: a fan might be switched on automatically to reduce the temperature; the microprocessor may be set to 'idle' (slowing down the microprocessor acts to reduce its temperature) or the entire machine may be turned off automatically.

- Users can also exert control over a computer system. Cancelling a task such as writing a file to a floppy disk, for example, is a method of control.

- Operating systems perform a number of control activities. For example, all operating systems manage the computer's resources, such as deciding how memory is allocated to a given task.

**2. A small company is considering the purchase of a computer and accounting software to help it keep track of its finances. In general, what are the benefits of processing by computer? What other benefits might the company gain by taking this step?**

Students should recall these major benefits. In brief, these are:

- *Speed*. Computers can process millions of instructions each second, allowing the students to complete a given task in a very short time.

- *Accuracy*. The result of a calculation carried out by a computer is likely to be completely accurate. In addition, errors that a human being might make, such as a typing error, can be reduced or eliminated entirely.

- *Reliability*. In many organisations, computer-based information systems operate for 24 hours a day and are only ever halted for repairs or routine maintenance.

- *Programmability*. Although most computer-based information systems are created to fulfil a particular function, the ability to modify the software that controls them provides a high degree of flexibility. Even the simplest personal computer, for example, can be used to create letters, produce cash-flow forecasts or manipulate databases.

In addition, a more comprehensive response will highlight some of the disadvantages of processing by computer.

Students should also refer to material on competitive advantage. Although this material should indicate how the company can gain a competitive edge, it should also indicate additional benefits to the company. For example, the material on cost leadership should suggest cost reduction as another benefit of computerisation.

**3. Locate an annual report or article that describes a large organisation, such as a supermarket chain. From the information contained in the annual report, identify and describe the information systems that the company might use.**

For this type of question, the aim is for students to carry out a detailed and methodical analysis of a major organisation.

Students should be able to identify specific kinds of information systems throughout the entire organisation. Example: In a supermarket chain, the analysis might begin with the electronic tills used in individual stores, moving through areas such as logistics (systems for stock control, deliveries, etc.), and ending with a discussion of the decision support systems used by top managers (e.g. modelling, simulation, etc.).

Ideally, students should highlight and describe key areas of technology in order to demonstrate their understanding. Example: While considering a supermarket chain, one would expect a student to pay a great deal of attention to EPOS (electronic point of sale) technology.

Perhaps the most important areas for students to consider are the complex relationships and interdependencies between the information systems used. Example: in the supermarket chain,

the implementation of EPOS (in the form of electronic tills) is of major importance to areas such as stock control, the management of cash flow and the selection of product lines. In more formal terms, the student should recognise that the outputs produced by the systems used on the shop floor (that is, the operational level) form the inputs for systems used in other parts of the organisation (the tactical and strategic levels).

A good response might also consider the attributes of information quality relevant to each of the systems examined. In the case of a supermarket chain, it should be obvious that the accuracy of information produced at the operational level has a major impact at the tactical and strategic levels of the organisation. If the information produced is inaccurate, this will influence the quality of any decisions taken at these levels.

**4. Discuss the following statement with reference to how an organisation should react to the Internet. 'Is the Internet a typhoon force, a ten times force, or is it a bit of wind? Or is it a force that fundamentally alters our business?' (Andy Grove, Chairman of Intel).**

Suggested approach:

This statement is useful in that it indicates that the impact of the Internet will vary according to the type of business that an organisation is in. Students should look at a range of industries from those where the impact is high, e.g. media and information services to those where the impact is low, e.g. retailer. The ES test can be used for consumer industries. Examples can be taken from those that have reacted, e.g. easyJet or General Electric in comparison to those that haven't. The analogy may also be apt, since the Internet phenomenon may be transitory. This can also be considered.

**5. 'Enterprise resource planning software is likely to replace packages used in a single area of the organisation, such as accounting, logistics, production and marketing.' Discuss.**

ERP is likely to be restricted to larger organisations due to the cost of customisation of the software for the client. Mass-produced and, thus, cheaper, off-the-shelf packages are likely to be the most suitable option for the small organisation. Enterprise resource planning (ERP) software is a single system that gives applications for all the major business functions discussed in this chapter such as production, distribution, marketing and sales, finance and human resources management. It is normally purchased as an off-the-shelf package, with modules for each major business process or business function that are tailored by a consultant. A single package typically replaces many different previous packages. The benefits of this approach include:

- Reduced cost of buying from a single supplier
- Better transfer of information within the organisation since all the modules of the system are compatible
- Simplified support and maintenance through a single supplier
- Use of 'best of breed solutions' employed by other companies.

The main disadvantage of the use of ERP systems seems to be the high costs charged by suppliers due to the demand for this type of system. This high demand has also given rise to skills shortages. The other disadvantage of ERP systems is shared with all off-the-shelf systems, namely, that the business often has to change its processes or way of working in order to fit the way the software works. This may not present a problem if a company is looking to re-engineer its processes since, then, the ERP software can provide a framework.

Owing to the high cost of ERP solutions, only large companies can afford the cost of the software and the consultants, which will often be measured in millions of pounds. Smaller companies can take advantage of the features of integrated accounting packages that now provide modules beyond those of the basic accounting package.

In summary, there is overwhelming evidence that ERP will replace functional applications in large organisations. In smaller organisations, the role of ERP applications is likely to be assumed by integrated accounting packages with similar functions.

## Essay questions

**1. Use the Internet to research the SABRE system produced by American Airlines. This system demonstrates how BIS can be used to gain strategic advantage. Provide an analysis of this system. Your response should include discussion of the following areas:**

**(a) Describe how the overall approach adopted by American Airlines incorporated the basic competitive strategies of cost leadership, innovation and product differentiation.**

**(b) In what ways did SABRE provide American Airlines with a competitive advantage? Your analysis should refer to concepts related to the strategic use of information systems, for example, entry barriers.**

**(c) Although SABRE was undoubtedly successful, American Airlines was not able to maintain its competitive advantage beyond the late 1980s. What factors played a part in the erosion of the company's lead over its competitors and how did the company react?**

(a) Some points that might be made include:

- *Cost leadership.* The use of an electronic booking system provides highly detailed and accurate information related to a wide variety of areas. For example, information concerning reservations can help the company to make the most efficient use of resources. The use of an electronic system also helped reduce transaction costs. For example, by allowing travel agents to deal with bookings, the company reduced costs related to activities such as issuing tickets and managing the number of available seats on each flight. The material given for Essay Question 2 in Chapter 1 is also of relevance here.
- *Innovation.* It is clear that SABRE itself was an innovation in terms of handling airline reservations. In addition, providing the system free of charge was a bold step in terms of the established business practices used at the time.
- *Differentiation.* The wide adoption of SABRE helped to differentiate the company's products (flights) from those of its competitors. One can see that a travel agent's use of SABRE implied endorsement for the company's flights. In addition, since the company's flights were always displayed first, this would tend to enhance its reputation.

(b) Some areas that might be considered include:

- *Entry barriers.* Few competitors would be able to afford the cost of developing a system to rival SABRE. Fewer still would have the resources needed to supply and install the system free of charge across the entire country. In addition, since many travel agents had already adopted SABRE, competitors would face the daunting task of convincing them to change to a new system.

- *Switching costs.* As SABRE established a *de facto* standard for airline reservation systems, competing airlines would need to bear the cost of ensuring that their information systems were compatible. Similarly, travel agents would be reluctant to turn to a competing system since this would involve a great deal of expense. For example, in addition to expenses such as staff training, a travel company might suffer costs from reduced efficiency while the changeover took place.
- *Operational efficiency.* As mentioned in a previous section, the detailed information available via SABRE could be used to reduce costs and improve operational efficiency in a variety of ways. The example was given earlier of reducing transaction costs by allowing travel agents to deal with the bulk of each business transaction.
- *Lock in customers and suppliers.* Again, as mentioned in a previous section, the expense involved in adopting a new system acted to lock in the company's customers (travel agents).

(c) This is a broad topic where students might propose a wide variety of possible explanations. Although it is difficult to pinpoint a specific cause, a fairly coherent argument can be made by considering a number of related points:

- It might be argued that American Airlines failed to invest sufficiently in the further development of SABRE and the systems produced afterwards. This allowed competitors to put forward alternatives to SABRE that seemed more attractive to travel agents.
- Reduced hardware and software costs enabled other companies to develop competing systems relatively quickly and cheaply.
- As more and more competitors adopted sophisticated information systems, they were able to realise many of the benefits enjoyed by American Airlines, such as increased operational efficiency. This served to diminish the company's competitive advantage.
- It might be argued that the company focused efforts on its core business activities, failing to diversify enough to offset losses when the demand for flights diminished. In terms of competitive strategy, it can be suggested that the company was unable to maintain an advantage because of a reduced emphasis on business innovation.

In terms of how the company reacted to the changes it experienced, the following points are worth considering:

- Initially, it appeared that the company did very little to re-establish its competitive edge. It can be argued that the company became somewhat complacent and failed to react in time to the actions of competitors and changes in the market.
- Although an improved bookings system was eventually developed, this did not have the same impact as the launch of SABRE. It can be argued that a number of factors, including those outlined earlier in this section, were responsible for this.
- In the early to mid-1990s, American Airlines no longer held the competitive position it had enjoyed for almost a decade. Although still basically profitable, the company had a reduced size and no longer dominated the market.
- Students should be encouraged to undertake a little research so that they can report the current position of American Airlines.

**2. Select an organisation you are familiar with. You may choose a department within a large organisation, if you wish. Analyse the structure and behaviour of the organisation using systems concepts. Your response should include the following elements:**

**(a) Identify and describe at least two examples of the following: inputs, processes, outputs, feedback and control.**

**(b) Identify and describe two decisions that will be taken at the strategic, tactical and operational levels of the organisation.**

**(c) For each of the decisions described, identify at least two items of information that may be required. Describe some of the characteristics that each item of information will have.**

(a) This question is quite similar to Question 3 in the Discussion questions section. It may be worth using both questions together in order to reinforce understanding of the topics covered. The discussion question, for example, might be used in a tutorial session as a preparatory exercise prior to students tackling the essay.

For the purposes of this section, we will use a supermarket chain to provide suitable examples.

The examples chosen should be clear and unambiguous (see table below). At this level, some fairly simplistic responses would be acceptable, providing they were logical and consistent.

| | **Example 1** | **Example 2** |
|---|---|---|
| **Inputs** | • Products<br>• Pricing information | • Demand for products<br>• Stock levels |
| **Process** | • Selling goods to customers | • Managing stock held at branch |
| **Outputs** | • Information on sales, e.g. weekly totals<br>• Profit realised after expenses | • Orders for products with low stock<br>• Details of products that are overstocked |
| **Feedback** | • Returns of faulty or inappropriate products<br>• Customer demand for certain products | • Demand for products<br>• Stock checks<br>• |
| **Control** | • Increased quality checks<br>• Sales and special offers to reduce stocks | • Adjusting reorder levels<br>• Using alternative suppliers for certain products |

(b) The examples chosen should be clear and unambiguous (see table below).

| | **Decision 1** | **Decision 2** |
|---|---|---|
| **Operational** | Daily staff levels for an individual branch | Price reductions for products that must be sold by a certain date |
| **Tactical** | Selection of suppliers for given products | Advertising (could also be operational or strategic, depending on scale) |
| **Strategic** | Whether to open one or more new branches in a given area | Diversification, e.g. providing additional services such as banking facilities |

Some responses may need to be clarified, and students should attempt to do this whenever required. As an example, the scale of the activity would need to be made clear in the 'Advertising' decision given in the table above.

(c) Using the examples given for (b), any of the following items in the table would form an acceptable response:

| | **Decision 1** | **Decision 2** |
|---|---|---|
| **Operational** | • Staff absences for the day<br>• Availability of staff to cover for absence<br>• Minimum staffing levels needed for efficient operation | • Quantity of item in stock<br>• Price of item<br>• Profit margin (to determine lowest possible selling price) |
| **Tactical** | • Reputation of supplier<br>• Location of supplier<br>• Supplier's prices | • Cost of advertising<br>• Most effective medium for advertising<br>• Details of offers, etc. to include in material |
| **Strategic** | • Location of competitors' braches<br>• Availability of land<br>• Availability of local employees<br>• Size of potential local market | • Competitors' plans<br>• Market research information, e.g. if customers likely to take up service<br>• Set-up costs |

**3. Draw a diagram illustrating the subsystems occurring in a hospital. Label the inputs and outputs of each subsystem. Which subsystems are most closely coupled?**

A hospital is similar to any other kind of organisation in that many of the same functions are performed. For instance, a hospital will recruit and train personnel, issue payments, order goods and so on. The diagram produced can take any form, providing that it is clear and easy to understand.

For the purposes of this question, students should be directed to focus on areas such as patient care. When identifying the subsystems that are likely to be most closely coupled, students might consider some of the following activities:

- *Inventory control*. As medical supplies are used up, new stocks must be ordered. As many medicines are perishable, care must be taken to order medicines and other supplies only when they are needed.

- *Blood bank*. Similar to the previous point.

- *Staffing levels*. The personnel department (or 'function') must ensure that adequate numbers of appropriately trained staff are available at all times.

- *Admissions*. Medical staff may need to keep track of when patients are discharged or admitted so that they can admit new patients when necessary, making sure that enough beds are available at all times.

**4. Do you believe that the advantages of enterprise resource planning applications outweigh their disadvantages? Illustrate your answer with reference to company examples.**

The benefits of ERP include:

- Reduced cost of buying from a single supplier
- Better transfer of information within the organisation since all modules of the system are compatible
- Simplified support and maintenance through a single supplier
- Use of 'best-of-breed solutions' employed by other companies.

The main disadvantage of the use of ERP systems seems to be the high costs charged by suppliers due to the demand for this type of system. This high demand has also given rise to skills shortages. The other disadvantage of ERP systems are shared with all off-the-shelf systems, namely, that the business often has to change its processes or way of working in order to fit the way the software works. This may not present a problem if a company is looking to re-engineer its processes since, then, the ERP software can provide a framework.

Owing to the high cost of ERP solutions, only large companies can afford the cost of the software and the consultants that will often cost millions of pounds. Smaller companies can take advantage of the features of integrated accounting packages that now provide modules beyond those of the basic accounting package.

In summary, for large companies, the advantages of ERP systems would appear to outweigh the disadvantages, but they are too costly for smaller companies.

## Examination questions

**1. Information systems play a critical part in supporting a company's activities. Using specific examples, you are required to:**

**(a) define an information system;**

**(b) describe the categories of computer-based information systems, providing relevant business examples for each category identified;**

**(c) explain how computer-based information systems can support managers at each level of an organisation.**

(a) The definition given in the text (p. 42) is as follows:

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.

Students need not duplicate this definition, provided an acceptable alternative is offered. In addition, extra credit might be given if the student discusses aspects of the definition.

(b) Here, students are expected to recall the two broad categories of information systems (Operations information systems and management information systems) before describing the more specific sub-categories. The categories are given in the text and the appropriate table is reproduced here:

Typical operations and management information systems

| **Operations information systems** | **Management information systems** |
|---|---|
| Transaction processing systems | Decision support systems |
| Process control systems | Information reporting systems |
| Office automation systems | Executive information systems |

The table below offers a brief description of each category and provides a suitable example. Note that this material is derived directly from the text.

Descriptions and examples of the different categories of BIS:

| **Category** | **Description** | **Example** |
|---|---|---|
| Transaction processing systems | Involves recording and processing the data that results from an organisation's business transactions. | The production of bills for utilities and other services. |
| Process control systems | Used to support and control manufacturing processes. | The use of sensors for real-time monitoring of production processes. |
| Office automation systems | The application of information technology to many of the common tasks carried out in a typical office. | Using a word processor to produce business correspondence. |
| Decision support systems | Provide managers with information needed to support semi-structured or unstructured decisions. | The use of spreadsheet software to carry out *what if?* questioning. |
| Information reporting systems | Produce reports containing the information required to support a manager's day-to-day decision-making activities. | Production of on demand reports, such as current stock levels for a particular item. |
| Executive information systems | Used by senior management to select, retrieve and manage information that can be used to support the achievement of an organisation's business objectives. | Personal information managers (PIMS) can be used to schedule meetings, make notes, store information on contacts and organise other items of information, such as personal expenses. |

(c) Students should describe the kinds of information systems used at each level of the organisation. Extra credit should be awarded if Figure 2.7 (p. 45) is reproduced.

This is a fairly broad area to cover within the confines of an examination, but a good response would make the following points:

At the bottom level of the organisation, information systems are often concerned with the automation of routine tasks. Transaction processing systems are commonly used to increase the speed and efficiency of tasks such as processing payments and invoices. In manufacturing organisations, process control systems help to increase efficiency by

automating much of the production process and by helping to maintain quality and consistency of output. The information systems used support managers by helping them organise, manage and process large volumes of data. As an example, a manager overseeing a production process might examine quality control information in order to ensure the smooth running of the process. In some cases, many millions of precise measurements might be reduced to several relatively simple charts so that the manager can observe trends and make decisions accordingly.

Managers at the middle level of the organisation carry out many of the tasks performed by operational and strategic managers. For this reason, they will use many of the information systems found throughout the organisation.

At the topmost level of the organisation, information systems are commonly used to help determine the organisation's overall strategy. Here, information systems support decision-making activities by gathering together a body of information often drawn from a wide variety of sources. This information is then summarised and presented in a form appropriate to the task being undertaken. As an example, consider formulating a long-term pricing policy. Information might be drawn from a number of sources: production costs, competitor pricing, predicted demand for product (via market research), predicted costs of raw materials and so on. A number of different information systems might be used to gather all the information needed. For example, a database might be used to retrieve information held by the organisation itself, such as production costs, while Internet software might be used to retrieve information held externally, such as competitor prices. Once gathered together, the information might be entered into a spreadsheet package so that a model or simulation could be constructed.

At the strategic level, information systems are also commonly used to improve personal efficiency. The personal information manager (PIM), for example, can be used to help managers schedule meetings, manage personal expenses and produce prioritised lists of tasks.

**2. Computer-based information systems are critical to an organisation's survival in the modern competitive environment. Discuss this statement with reference to the following:**

**(a) Porter's competitive forces model and the basic competitive strategies that can be used to gain advantage;**

**(b) how computer-based information systems can support these strategies;**

**(c) how an organisation's information resources can be used to create information leadership.**

(a) Students should list Porter's five forces and describe each in turn. The 'five forces' are as follows:

- The threat of new entrants
- The bargaining power of suppliers
- The bargaining power of customers
- The threat of substitute products or services
- Rivalry among existing competitors.

Having provided a description of these forces, the student should then describe the major competitive strategies that can be used to gain competitive advantage. Where possible, this material should refer back to Porter's model. Some of the points that might appear include the following:

- As new companies enter a particular market, an organisation's share of that market is likely to be reduced. In order to prevent this, organisations attempt to create *entry barriers* that limit the number of new entrants to the market.
- By attempting to reduce costs as far as possible, an organisation can attempt to gain *cost leadership*. This provides two major benefits. First, the organisation can choose to lower prices in an attempt to force competitors from the market. Second, more of the organisation's resources are freed up, allowing it to pursue other strategies, such as investing in research and development as a means of stimulating *business innovation*.
- The organisation may focus on a particular segment of the available market by differentiating its products from those of its competitors. For example, a car manufacturer may emphasise the quality of its vehicles so that it can focus on the luxury car segment of the market. Many organisations use *product differentiation* as a means of consolidating their positions in the market.

(b) Students should describe common methods of using information systems to gain competitive advantage. Such methods include:

- Improving operational efficiency
- Raising barriers to entry
- Locking in customers and suppliers
- Promoting business innovation
- Increasing switching costs
- Leverage.

(c) A good answer might include the following points:

- A common way of *locking in customers and suppliers* is by establishing standards for computer-based information systems. The example of SABRE (American Airlines) might be referred to here. This approach also has the benefit of increasing *switching costs*.
- High levels of automation tend to raise *entry barriers,* since new entrants to a given market must invest heavily in computer-based information systems if they wish to compete effectively.
- High levels of automation also provide the possibility of gaining *information leadership*, since the organisation is in a good position to exploit fully the data it already owns. Data mining might be given as an example in support of this point. In addition, the ability to exploit the organisation's information resources can help to promote *business innovation*.
- As organisations automate more and more of their routine tasks, they may be able to adopt a strategy based on *cost reduction*. The sharp growth in telephone banking services provides a good example of this. Many such organisations have been able to automate a large proportion of the services offered to customers with the result that only a relatively small number of staff based in a call centre are required to handle an organisation's workload. In turn, this has allowed these organisations to reduce the number of branches they operate, leading to further reductions in costs. In addition, students might make the point that *transaction costs* are lowered significantly by allowing customers to handle the majority of business transactions by themselves.

**3. Large retail organisations employ a wide variety of computer-based information systems in order to support their activities. Considering a large supermarket chain, such as Sainsbury's, you are required to:**

**(a) define the term 'computer-based information system';**

**(b) identify the types of computer-based information systems that are likely to be found within a typical branch. Your response should describe the function of each system identified and the category to which it belongs;**

**(c) selecting one of the systems identified in (a), describe the system in more detail, identifying the hardware, software, data and people resources it employs.**

(a) This task might be attempted in two ways. First, students might offer a general definition of an information system and suggest that a computer-based information system is a form of information system that makes extensive use of ICT (information and communications technology). The preferred definition for an information system (as given on p.42) is:

*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.*

Alternatively, students can suggest that computer-based information systems make use of people resources, hardware resources, software resources and data resources in order to create information products. Each resource should be described briefly and students should provide examples where relevant.

(b) The material dealing with Question 3 of the Discussion questions section for Chapter 2 contains information concerning the computer-based information systems that might be found in a typical supermarket. Students should attempt to place each system identified within one of the categories described in the text. A summary of these categories is given in Question 1(b) of this section.

(c) Students should provide a relatively structured response to this task. The example in the table below uses a typical stock control system that one might expect to find in a supermarket branch.

Resources needed for a stock control system

| **Resources** | **Examples** |
|---|---|
| People resources | • Stock control staff<br>• IT staff<br>• Sales assistants (using electronic tills) |
| Hardware resources | • Bar-code readers (for checking stock on shelves)<br>• Electronic tills<br>• Terminals (for checking stock levels, etc.)<br>• Printers (for reports, etc.) |
| Software resources | • Stock control software<br>• Database (holding supplier details, etc.)<br>• Company documents (e.g. policy on setting reorder levels) |
| Data resources | • Supplier details<br>• Pricing information<br>• Stock levels<br>• Sales data |

**4. Draw a diagram illustrating the main components of a generic system.**

Students should reproduce Figure 2.2 from the text (p.37). Additional credit should be given if the student discusses each of the components drawn.

**5. Explain why feedback and control are important in business information systems.**

The response should recognise two important points:

- Feedback is used to monitor the overall performance of the system.
- Control is used to adjust the performance of the system.

Both elements are required in order for the system to adjust its performance/behaviour so that it can continue to meet its purpose (objective). It is rare to find a system that does not provide feedback and control mechanisms since this assumes that the system will always function at optimum performance.

**6. Define an enterprise resource planning application. Name two main disadvantages of this type of approach.**

Enterprise resource planning software provides integrated applications for major business functions such as production, distribution, sales, finance and human resources management. It is normally purchased as an off-the-shelf package that is tailored by a consultant. A single package typically replaces many different previous packages.

The main disadvantage of the use of ERP systems seems to be the high costs charged by suppliers due to the demand for this type of system. This high demand has also given rise to skills shortages. The other disadvantage of ERP systems is shared with all off-the-shelf systems, namely, that the business often has to change its processes or way of working in order to fit the way the software works. This may not present a problem if a company is looking to re-engineer its processes since, then, the ERP software can provide a framework.