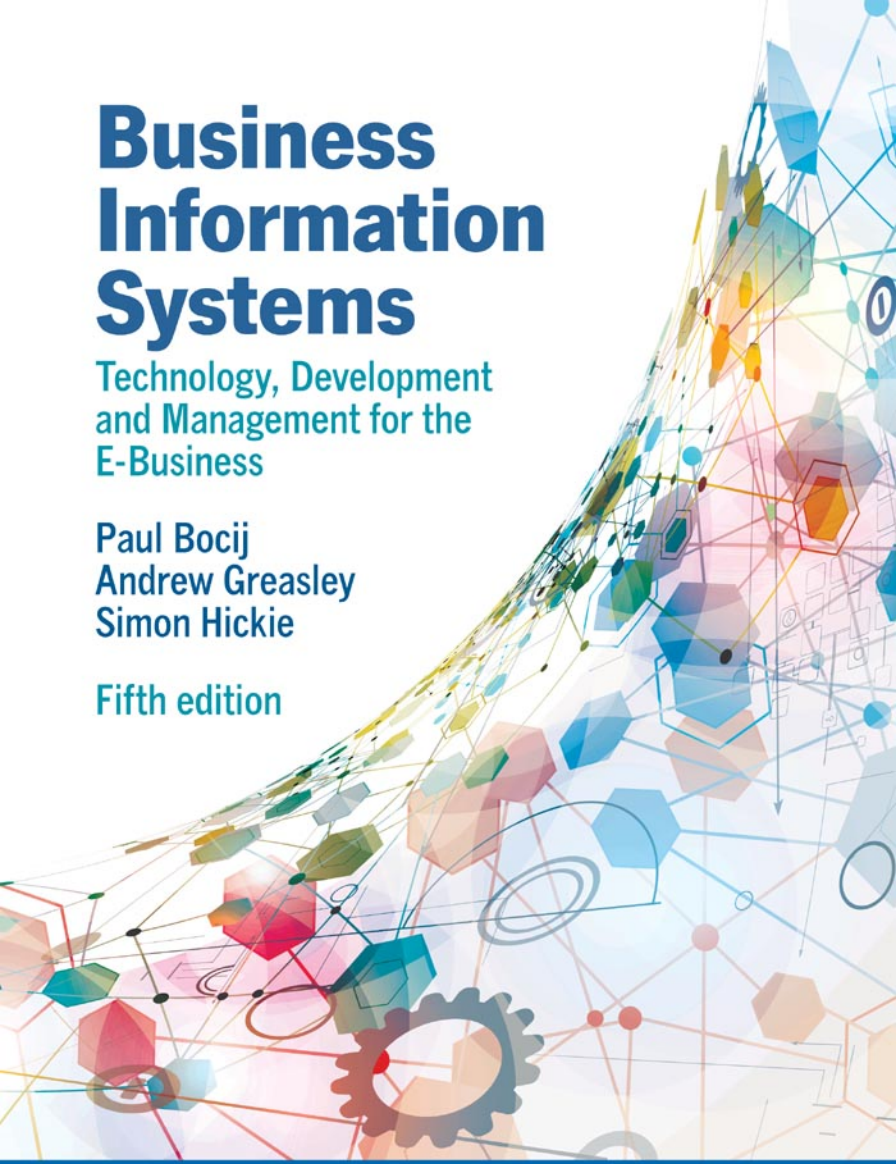
Business Information Systems

Technology, Development and Management for the E-Business

Paul Bocij
Andrew Greasley
Simon Hickie

Fifth edition



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Fifth edition

PAUL BOCIJ, ANDREW GREASLEY AND SIMON HICKIE

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The authors would like to dedicate this book to Lin Mellor, teacher, mentor and colleague. A consummate professional and example to educators everywhere.

To Clare, without whom my contribution would never have happened.
From Simon

To my wife, Mik.
From Paul

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Supporting resources

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Preface

Introduction

With the prominence of the concept of e-business and the increased use of business information systems (BIS) within organisations, the need for all working professionals to have a good knowledge of ICT and IS has also increased. With the vast, rapidly changing choice of IS available, important business skills are understanding and assessing the range of options available, and then choosing the solution best suited to the business problem or opportunity. This is, essentially, our aim in writing this book: to provide a source of knowledge that will explain how the right systems can be chosen by a business, then developed appropriately and managed effectively.

Despite the rising expenditure on IS, surveys also show that the potential of IS is often not delivered, often due to problems in the management, analysis, design or implementation of the system. The intention in this book is to acknowledge that there are great difficulties with developing and using IS and to explain the measures that can be taken to try to minimise these difficulties in order to make the systems successful.

Why study business information systems?

Information systems form an integral part of modern organisations and businesses. Computer-based IS are now used to support all aspects of an organisation's normal functions and activities.

New technology creates new opportunities for forward-thinking companies. Higher levels of automation, high-speed communications and improved access to information can all provide significant benefits to a modern business organisation. However, the benefits of new and emerging technologies can only be realised once they have been harnessed and directed towards an organisation's goals.

The hybrid manager

The traditional view of managers is as functional specialists having specialised knowledge and expertise in a particular area, such as finance. The modern business environment requires a new kind of manager, often called a *hybrid manager*. The hybrid manager combines management and business skills with expertise in the areas of ICT and IS. This type of manager is able to undertake a wide variety of roles and can operate across functional areas. The study of IS plays an important part in the development of an individual so that they may become a competent and effective manager as well as providing prospective managers with important problem-solving skills that can be applied to a range of situations and problems. Specifically, the hybrid manager will need to:

- define the IS strategy for their workgroup, department or company;
- identify potential uses of IS to improve company performance;
- select and then acquire new IS from appropriate suppliers;
- oversee the development and implementation of these new systems;
- manage the IS to ensure they are effective in delivering information of the appropriate quality to users.

Aims

This book is intended to provide a comprehensive, yet accessible, guide to choosing the right systems for an organisation, developing them appropriately and managing them effectively. The book was conceived as a single source book that undergraduate business students would refer to throughout their course, without the need to purchase a separate book for different topics such as ICT; information management; systems analysis and design; and strategy development. It covers, in detail, the software and hardware technologies which form IS, the activities involved in acquiring and building new IS, and the elements of strategy required to manage IS effectively.

Key skills necessary to participate in the implementation of ICT in businesses are developed, and these skills, which form the main themes of the book, are:

- understanding of the terms used to describe the components of BIS to assist in selection of systems and suppliers;
- assessing how BIS applications can support different areas of an organisation;
- managing IS development projects;
- systems analysis and design;
- developing an IS or e-business strategy and managing its implementation.

The book assumes no prior knowledge of IS or ICT. New concepts and terms are defined as simply as possible, with clear definitions given in the margins of the book. It explains the importance of information in developing a company business strategy and assisting decision making. The use of relevant hardware and software components of computer systems are defined and explained in the context of a range of business applications. The book also explains the benefit of specialised innovative applications such as data warehouses and geographical information systems. The application of IS to business process re-engineering and initiatives is also described.

After using the book as part of IS modules on their course, students will be able to:

- evaluate and select ICT solutions for deployment within different functional parts of a business to achieve benefits for the business;
- actively participate in ICT projects, applying skills such as selection of suppliers, procurement of hardware and software, systems analysis and design, and project management;
- communicate effectively with ICT specialists when collaborating on a task or project;
- use ICT to access a wide range of information sources for research and acquisition of knowledge.

Changes for the fifth edition

The logical structure of the fourth edition has been retained, but many changes have been incorporated based on lecturer and student feedback. The main changes are as follows:

- Chapter 3 and Chapter 4 from the fourth edition have been combined to make a new chapter 3.
- A new chapter 4 titled Databases and Business Intelligence has been incorporated.
- Numerous new case studies with questions have been included in the fifth edition.

The structure of this book

The book is divided into three parts, each covering a different aspect of how BIS are used within organisations to help achieve competitive advantage:

- *Part 1* focuses on the hardware and software technologies, known collectively as ICT, which make up IS. It is intended for introductory courses in ICT and BIS.

- *Part 2* explains how IS are acquired and developed by considering the activities involved with each of the stages of developing an IS. This part is intended for more advanced courses in systems analysis and design.
- *Part 3* describes how IS need to be managed, and a strategy developed, to ensure they effectively support the mission of the business. This part is appropriate for courses which consider the strategic management of IS.

Each part is self-contained and is the equivalent of what might be covered in a single module, or course, in a programme of study.

Part 1: Introduction to business information systems

Part 1 introduces the basic concepts of BIS. Its main focus is the technology that forms BIS, but it starts by reviewing the importance of information and what makes good-quality information. Many people who work in the ICT industry tend to believe it is the technology part of ICT that is important, whereas most business people will tell you it is the information part of ICT that is crucial to business performance. To enable a business user to communicate effectively with their suppliers of ICT, a knowledge of the often bewildering terminology used to describe the components of IS, and a basic idea of how these components interact is important. To aid understanding, basic concepts and characteristics of IS are reviewed in Chapter 2. Hardware, software, communications and networking technologies are then described in subsequent chapters.

The different aspects of ICT are introduced as follows:

- *Chapter 1: Basic concepts – understanding information* provides an introduction to how information is used within a business.
- *Chapter 2: Basic concepts – an introduction to business information systems* introduces the different types of BIS, including the concept of e-business, and how they can be used to gain strategic advantage.
- *Chapter 3: Hardware and software* describes the issues in the selection of different hardware components of IS which are used to capture, process, store and output information. It also reviews the selection and use of general-purpose applications software such as word processors, spreadsheets and databases, which are often referred to as 'productivity software'. Internet software is also covered.
- *Chapter 4: Databases and business intelligence* explains the role of databases in storage and sharing of information and the use of Business Intelligence systems to provide information for decision making.
- *Chapter 5: Networks, telecommunications and the Internet* explains how BIS are linked using telecommunications links which form networks within and between businesses.
- *Chapter 6: Enterprise and functional BIS* considers how BIS can be implemented as enterprise or functional business systems. The chapter also covers departmental applications of BIS.

Part 2: Business information systems development

Part 2 focuses on how BIS are acquired and built. A basic understanding of this is necessary to every business user of BIS so that they can appreciate the context of their use of the system and this can be of particular importance when they are involved in testing or using a new system since they will need to understand the reason for introducing new systems as well as their limitations. A more detailed understanding of building BIS is important to users and managers who are responsible for, or are involved in a systems development project. In this case they will need to know the different stages of systems development to help plan the project or work with the developers of the system. They will also need to be aware of the different alternatives for sourcing IS, such as buying pre-written 'off-the-shelf' systems or specially written 'bespoke' systems, to decide which is best for their company or department.

This book provides a reference framework known as the 'systems development lifecycle' which puts all the activities involved with building a system into a business context. Chapters give guidelines

on how best to approach system development, giving examples of activities that need to occur in order to avoid any pitfalls and enabling a quality system to be produced which meets the needs of the users and the business. The chapters in Part 2 are sequenced in the order in which activities occur in the systems development lifecycle:

- *Chapter 7: An introduction to acquiring and developing BIS* gives an introduction to alternatives for acquiring new systems. It also introduces the software development lifecycle which acts as a framework for the next chapters.
- *Chapter 8: Initiating systems development* covers the initiation phase of system development when the need for the new system and the feasibility of different development methods are assessed.
- *Chapter 9: BIS project management* describes how project management can be used to ensure the new system is built within the time and budget constraints, while also providing the features and quality required by the business and end-users.
- *Chapter 10: Systems analysis* details system analysis techniques including methods of capturing the requirements for the system and summarising them. Different diagramming techniques are also covered.
- *Chapter 11: Systems design* reviews different aspects of the design of IS from overall architectural or system design to aspects of detailed design, such as data-base and user interface design.
- *Chapter 12: System build, implementation and maintenance: change management* describes the final stages of a systems development project when the system is released to end-users, following programming, testing and installation, and is then maintained. The area of change management at the levels of software, IS and the organisation is also considered.

Part 3: Business information systems management

Part 3 considers issues involved with the management of IS within an organisation. Of these, probably the most important is ensuring that the strategy defined is consistent with the mission and objectives of the business. Techniques for achieving this are reviewed, together with trends in IS strategy, such as location of IS within a large company and outsourcing IS management to third-party companies. Key issues in implementing the strategy are detailed in the areas of ensuring IS are secure; managing end-user facilities such as desktop PCs, development tools and the help desk; and ensuring the company is acting within moral, ethical and legal guidelines.

The chapters are structured as follows:

- *Chapter 13: Information systems strategy* considers tools for developing IS strategy, including the integration of the IS and business strategy.
- *Chapter 14: Information systems management* explores the management of IS investments and the location of IS resources.
- *Chapter 15: Managing information security* describes how information and systems can be protected through controls from threats such as destruction, failure or loss as part of business continuity planning.
- *Chapter 16: End-user computing – providing end-user services* explains why managing use of systems and, in particular, development by end-users is a significant trend in IS.
- *Chapter 17: Ethical, legal and moral constraints on information systems* discusses the importance of protecting personal data and other ethical, moral and legal requirements which must be met by the IS manager.

Who should use this book?

The book discusses key aspects of BIS development and management for students who need to understand the application of ICT to assist businesses. It is designed for college students, undergraduate degree and postgraduate students taking courses with modules giving a grounding in the practical

ICT skills of selection, implementation, management and use of business information systems (BIS). The main types of reader will be:

- *Undergraduates taking general business courses* such as Business Administration and Business Studies or *specialised business courses* such as Accounting, Marketing, Tourism and Human Resources Management.
- *Undergraduates on computer science courses* in Business Information Systems or e-commerce which involve the study of business applications of information technology and the management of the development of IS.
- *Students at college aiming for vocational qualifications* such as the HNC/HND in Business Management or Computer Studies.
- *Postgraduate students on MBA, Certificate in Management, Diploma in Management Studies or specialist masters degrees* which involve courses on information management or IS strategy or electives in e-business and e-commerce.

Managers in industry involved in the development and use of IS who will also find the practical sections in this book of use are:

- *Business analysts* working with customers to identify business problems and propose solutions.
- *Systems analysts and software designers* specifying how the solution will be implemented.
- *'Hands-on' managers* responsible for implementing ICT solutions as either a supplier or a client.

What does it offer to lecturers teaching these courses?

The book is intended to be a comprehensive guide to the business applications, development and management of BIS. As such, it can be used across several modules to help integrate different modules. Lecturers will find the book has a good range of excellent case studies to support their teaching. These include industry case studies of the applications of BIS together with problems encountered and simplified practical exercises for systems analysis and design. Web references are given in the text to important information sources for particular topics.

Student learning features

A range of features have been incorporated into this book to help the reader get the most out of it. They have been designed to assist understanding, reinforce learning and help readers find information easily. The features are described in the order you will encounter them.

At the start of each chapter:

- *Chapter introductions*: succinct summaries of why the topic is relevant to the management of IS and its content and structure.
- *Learning outcomes*: lists describing what readers should learn through reading the chapters and completing the exercises.
- *Links to other chapters*: a summary of related information in other chapters.

In each chapter:

- *Definitions*: when significant terms are first introduced the main text contains explanations and succinct definitions in the margin for easy reference.
- *Web links*: where appropriate, web addresses are given as reference sources to provide further information on a particular topic. They are provided in the main text where they are directly relevant as well as at the end of the chapter.
- *Case studies*: real-world examples of how technologies are used to support businesses. Case studies are taken from around the world but there is a particular emphasis on the UK and Europe. They

are referred to from related material within the text they support. Questions at the end of the case study are intended to highlight the main learning points from each case study.

- *Mini case studies*: short examples which give a more detailed example, or explanation, than is practical in the main text. They do not contain supplementary questions.
- *Activities*: exercises in the main text which give the opportunity to practise and apply the concepts and techniques described in the text.
- *'Focus on' sections*: used to consider topical issues of IS in more detail. Such sections may be used to support the essay or discussion-style questions, or may provide areas for further student research, perhaps giving ideas for student dissertations and projects.
- *Chapter summaries*: intended as revision aids which summarise the main learning points from chapters.

At the end of each chapter:

- *Self-assessment exercises*: short questions which will test understanding of terms and concepts described in the chapters.
- *Discussion questions*: require longer essay-style answers discussing themes from the chapters, and can be used for essays or as debate questions in seminars.
- *Essay questions*: conventional essay questions.
- *Examination questions*: typical short-answer questions which would be encountered in an exam and can also be used for revision.
- *References*: these give details of books, articles or papers referred to within the chapter.
- *Further reading*: supplementary text or papers on the main themes of the chapter. Where appropriate a brief commentary is provided on recommended supplementary reading on the main themes of the chapters.
- *Web links*: extensive lists of relevant web sites and particular articles together with a brief description of what information is available.

At the end of the book:

- *Glossary*: a list of all definitions of key terms and phrases used within the main text.
- *Index*: all key words, abbreviations and authors referred to in the main text.

Support material

An Instructor Manual for this book is available for download from **www.pearsoned.co.uk/bis**

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Guided tour

CHAPTER 2

Basic concepts: an introduction to business information systems

LINKS TO OTHER CHAPTERS

Chapter 1 provides an introduction to concepts related to data, information and managerial decision making.

Chapter 6 describes how BIS support the functional areas of business.

Chapter 13 looks in more detail at developing a company strategy for introducing and using information systems effectively.

CHAPTER AT A GLANCE

MAIN TOPICS

CASE STUDIES

LEARNING OUTCOMES

After reading this chapter, you will be able to:

- identify systems and their components;
- identify and describe the behaviour of systems;
- identify types of BIS, distinguishing them by category and the organisational level at which they are used;
- describe e-business, e-commerce and ERP and evaluate their relevance to the organisation;
- identify basic strategies and methods used to gain competitive advantage through the use of BIS.

MANAGEMENT ISSUES

Systems theory is a powerful tool that can be used to analyse systems at a high level of detail. It can be applied to a range of situations, from examining an organisation as a whole to analysing a specific task carried out by an individual employee. From a managerial perspective, this chapter addresses the following areas:

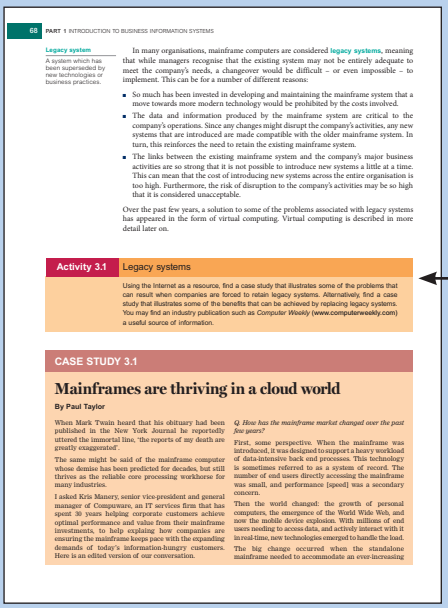
- how systems theory is used as a means of defining problems and situations so that they can be understood more easily and BIS can be developed to support them;
- how managers can maximise an organisation's use of technology by understanding BIS;
- how BIS can help achieve competitive advantage.

Learning outcomes highlight the key things you should gain from reading this chapter and completing the exercises.

Management issues enable you to focus on how the issues discussed in the chapter affect managers in the real world.

Links to other chapters show how topics are inter-related and help you to find your way around.

Chapter at a glance allows you to find what you're looking for, quickly and easily.



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Legacy system
A system which has been superseded by new technologies or business practices.

In many organisations, mainframe computers are considered **legacy systems**, meaning that while managers recognise that the existing system may not be entirely adequate to meet the company's needs, a changeover would be difficult – or even impossible – to implement. This can be for a number of different reasons:

- So much has been invested in developing and maintaining the mainframe system that a move towards more modern technology would be prohibited by the costs involved.
- The data and information produced by the mainframe system are critical to the company's operations. Since any changes might disrupt the company's activities, any new systems that are introduced are made compatible with the older mainframe system. In turn, this reinforces the need to retain the existing mainframe system.
- The links between the existing mainframe system and the company's major business activities are so strong that it is not possible to introduce new systems a little at a time. This can mean that the cost of introducing new systems across the entire organisation is too high. Furthermore, the risk of disruption to the company's activities may be so high that it is considered unacceptable.

Over the past few years, a solution to some of the problems associated with legacy systems has appeared in the form of virtual computing. Virtual computing is described in more detail later on.

Activity 3.1 Legacy systems

Using the Internet as a resource, find a case study that illustrates some of the problems that can result when companies are forced to retain legacy systems. Alternatively, find a case study that illustrates some of the benefits that can be achieved by replacing legacy systems. You may find an industry publication such as *Computer Weekly* (**www.computerweekly.com**) a useful source of information.

CASE STUDY 3.1

Mainframes are thriving in a cloud world

By Paul Taylor

When Mark Twain heard that his obituary had been published in the New York Journal he reportedly uttered the immortal line, 'the reports of my death are greatly exaggerated'.

The same might be said of the mainframe computer whose demise has been predicted for decades, but still thrives as the reliable core processing workhorse for many industries.

I asked Kris Manery, senior vice-president and general manager of Compuware, an IT services firm that has spent 30 years helping corporate customers achieve optimal performance and value from their mainframe investments, to help explain how companies are ensuring the mainframe keeps pace with the expanding demands of today's information-hungry customers. Here is an edited version of our conversation.

Q. How has the mainframe market changed over the past few years?

First, some perspective. When the mainframe was introduced, it was designed to support a heavy workload of data-intensive back end processes. This technology is sometimes referred to as a system of record. The number of end users directly accessing the mainframe was small, and performance [speed] was a secondary concern.

Then the world changed: the growth of personal computers, the emergence of the World Wide Web, and now the mobile device explosion. With millions of end users needing to access data, and actively interact with it in real-time, new technologies emerged to handle the load.

The big change occurred when the standalone mainframe needed to accommodate an ever-increasing

Activities give you the opportunity to practise and apply the concepts and techniques described in the text.

Focus on sections consider topical issues in more detail and can be used to support your answers to the essay or discussion questions in the book.

CHAPTER 3 HARDWARE AND SOFTWARE 97

desktop infrastructure, improve Payment Card Industry (PCI) compliance and security systems, reduce power consumption and improve user experience.

After reviewing its options, Hertz decided to use EMC's VMware software to virtualise its servers and replace its legacy desktop devices with 'zero-client' terminals supplied by Dell's Wyse Technology unit.

'By virtualising our server and desktop estate with VMware, we were able to cut costs and free up resources to focus innovation and customer service, while dramatically simplifying our IT infrastructure and transforming how we support over 1,000 desktops in our service centre in Dublin,' says Mr Bermingham.

By simplifying its IT infrastructure, Hertz was able to cut help-desk calls by a third (giving the IT team more time to work on new services) and cut power costs by 10 per cent. But one of the greatest benefits is that Hertz can now scale its computing requirements up and down according to demand. For example, its main office in Scotland experiences a rapid increase in demand during the British Open and Ryder Cup tournaments, while holiday destinations such as Italy and France see peaks in demand across the summer.

Using the virtualisation software, IT can anticipate and meet demand using virtual desktops instead of having to set up new physical PCs. Feedback from employees has been highly positive, with many describing it as a 'quantum leap' in technology for the company.

Upgrading and rolling out software packages has also become far simpler because the IT team no longer has to visit every PC and laptop individually. So far, Hertz has virtualised over 300 desktop applications through VMware ThinApp, which has helped the company standardise applications across devices and improve application speeds.

Compliance (with PCI) has also increased; (antivirus) patch management – a key factor in keeping corporate IT systems secure – is now done through servers rather than PCs, meaning that software is always up to date.

New uses can also be added quickly and, once plugged in, they will have instant access to the latest software and applications without needing support from an engineer. In addition, since everything is held centrally in the European Shared Services data centre in Dublin, security risks are considerably reduced.

'While this started off as a European project, the wider international Hertz network and franchisees have become interested in rolling out VDI as well and we are currently looking into how we can extend it to countries including China, Australia and New Zealand,' says Mr Bermingham. 'It is great to see something we developed in our Dublin Innovation Centre recognised as having the potential to be rolled out across the globe.'

Hertz is also considering extending virtualisation to encompass voice and video services. 'VMware has enabled us to build extremely strong foundations to realise even greater benefits, as we add more and more services and extend the research of the programme internationally,' says Mr Bermingham. 'This is only the start for us.'

FT Source: Taylor, P. (2013) Hertz reaps virtualisation rewards, *Financial Times*, 1 June.

QUESTION

Discuss the advantages of virtual computing.

Activity 3.7 Selecting processors

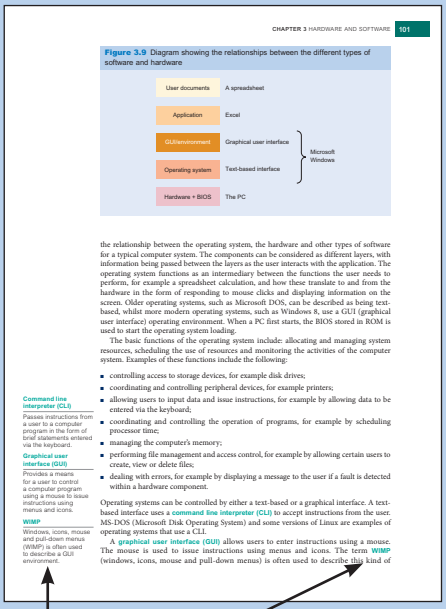
Since this book was published, the clock speed of processors will have increased significantly. Using a site that reviews hardware such as CNet (**www.cnet.com**) or ZDNet (**www.zdnet.com**) select the best processor specifications for:

- an entry-level 'cheap and cheerful' basic PC;
- a high-end PC for a graphics designer;
- a web server.

FOCUS ON... MANAGING TECHNOLOGICAL CHANGE

A major difficulty for companies wishing to apply information systems to help their businesses is how often technology changes. The speed of this change occurs through the competitiveness of the IT industry. If the leading vendors do not introduce new products,

Case studies and **mini case studies** show real-world examples of how technologies are used to support businesses.



CHAPTER 3 HARDWARE AND SOFTWARE 101

Figure 3.9 Diagram showing the relationships between the different types of software and hardware

the relationship between the operating system, the hardware and other types of software for a typical computer system. The components can be considered as different layers, with information being passed between the layers as the user interacts with the application. The operating system functions as an intermediary between the functions the user needs to perform, for example a spreadsheet calculation, and how these translate to and from the hardware in the form of responding to mouse clicks and displaying information on the screen. Older operating systems, such as Microsoft DOS, can be described as being text-based, whilst more modern operating systems, such as Windows 8, use a GUI (graphical user interface) operating environment. When a PC first starts, the BIOS stored in ROM is used to start the operating system loading.

The basic functions of the operating system include: allocating and managing system resources, scheduling the use of resources and monitoring the activities of the computer system. Examples of these functions include the following:

- controlling access to storage devices, for example disk drives;
- coordinating and controlling peripheral devices, for example printers;
- allowing users to input data and issue instructions, for example by allowing data to be entered via the keyboard;
- coordinating and controlling the operation of programs, for example by scheduling processor time;
- managing the computer's memory;
- performing file management and access control, for example by allowing certain users to create, view or delete files;
- dealing with errors, for example by displaying a message to the user if a fault is detected within a hardware component.

Operating systems can be controlled by either a text-based or a graphical interface. A text-based interface uses a **command line interpreter (CLI)** to accept instructions from the user. MS-DOS (Microsoft Disk Operating System) and some versions of Linux are examples of operating systems that use a CLI.

A **graphical user interface (GUI)** allows users to enter instructions using a mouse. The mouse is used to issue instructions using menus and icons. The term **WIMP** (windows, icons, mouse and pull-down menus) is often used to describe this kind of

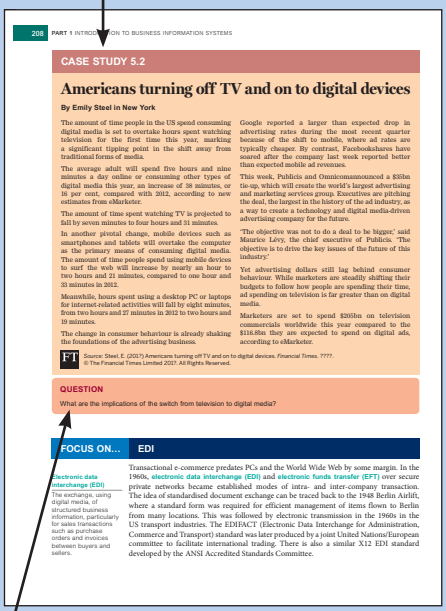
Command line interpreter (CLI) Passes instructions from a user to a computer program in the form of brief statements entered via the keyboard.

Graphical user interface (GUI) Provides a means for a user to control a computer program using a mouse to issue instructions using menus and icons.

WIMP Windows, icons, mouse and pull-down menus (WIMP) is often used to describe a GUI environment.

Definitions – key terms are highlighted in the text and explained in the margin for easy reference.

These are also available in the glossary.



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CASE STUDY 5.2

Americans turning off TV and on to digital devices

By Emily Steel in New York

The amount of time people in the US spend consuming digital media is set to overtake hours spent watching television for the first time this year, marking a significant tipping point in the shift away from traditional forms of media.

The average adult will spend five hours and nine minutes a day online or consuming other types of digital media this year, an increase of 38 minutes, or 16 per cent, compared with 2012, according to new estimates from eMarketer.

The amount of time spent watching TV is projected to fall by seven minutes to four hours and 31 minutes.

In another pivotal change, mobile devices such as smartphones and tablets will overtake the computer as the primary means of consuming digital media. The amount of time people spend using mobile devices to surf the web will increase by nearly an hour to two hours and 21 minutes, compared to one hour and 33 minutes in 2012.

Meanwhile, hours spent using a desktop PC or laptops for internet-related activities will fall by eight minutes, from two hours and 27 minutes in 2012 to two hours and 19 minutes.

The change in consumer behaviour is already shaking the foundations of the advertising business.

Google reported a larger than expected drop in advertising rates during the most recent quarter because of the shift to mobile, where ad rates are typically cheaper. By contrast, Facebookshares have soared after the company last week reported better than expected mobile ad revenues.

This week, Publicis and Omnicomannounced a $35bn tie-up, which will create the world's largest advertising and marketing services group. Executives are pitching the deal, the largest in the history of the ad industry, as a way to create a technology and digital media-driven advertising company for the future.

'The objective was not to do a deal to be bigger,' said Maurice Lévy, the chief executive of Publicis. 'The objective is to drive the key issues of the future of this industry.'

Yet advertising dollars still lag behind consumer behaviour. While marketers are steadily shifting their budgets to follow how people are spending their time, ad spending on television is far greater than on digital media.

Marketers are set to spend $205bn on television commercials worldwide this year compared to the $116.8bn they are expected to spend on digital ads, according to eMarketer.

FT Source: Steel, E. (2017) Americans turning off TV and on to digital devices. *Financial Times*, ????. © The Financial Times Limited 2017. All Rights Reserved.

QUESTION

What are the implications of the switch from television to digital media?

FOCUS ON… EDI

Electronic data interchange (EDI) The exchange, using digital media, of structured business information, particularly for sales transactions such as purchase orders and invoices between buyers and sellers.

Transactional e-commerce predates PCs and the World Wide Web by some margin. In the 1960s, **electronic data interchange (EDI)** and **electronic funds transfer (EFT)** over secure private networks became established modes of intra- and inter-company transaction. The idea of standardised document exchange can be traced back to the 1948 Berlin Airlift, where a standard form was required for efficient management of items flown to Berlin from many locations. This was followed by electronic transmission in the 1960s in the US transport industries. The EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) standard was later produced by a joint United Nations/European committee to facilitate international trading. There is also a similar X12 EDI standard developed by the ANSI Accredited Standards Committee.

Questions at the end of each case study highlight the main learning points.

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- The sales department often accepts priority orders for products which are not in stock.
- Manufacturing bypasses the normal requisition procedures and simply takes raw materials as required – it also often fails to return unused materials to warehousing.

Finance

- The sales returns from the account handlers are often incomplete.
- There are several bad debts which cannot be recovered – this is attributed to poor credit control procedures.
- Management accounting is very difficult due to a general lack of accurate information from other departments.
- Financial accounts are often published late due to lack of accurate information.

Manufacturing

- Warehousing is slow to respond to requests for raw materials, thus necessitating correct procedures being bypassed (especially when the sales department is applying pressure).
- Lack of accurate forecasting makes it difficult for production to be planned ahead and adequate supplies of raw materials to be secured.

General

- There is a rapid turnover of staff, especially in the sales area where the pressure from customers can be in-tense. In addition, field sales personnel are apt to make promises which cannot be kept and new sales personnel are often thrown in at the deep end with little formal training for their jobs.
- There is a high level of sickness in the warehousing and distribution area, due mainly to inadequate provision of lifting equipment.
- There is a perceived lack of management and technical support which has resulted in a general lowering of morale.

Future plans

The managing director, Clive Moor, has indicated that he would like to replace the existing paper-based systems with 'computers of some kind'. With such a move, he is hoping to improve on the communication of information at all levels in the organisation. However, Mr Moor knows little about computer hardware or applications software except that it seems to cost rather a lot.

In order to proceed with the computerisation programme, Mr Moor has asked the following senior managers to produce a plan:

- Paula Barlow – finance director;
- Terry Watson – sales and marketing director;
- Peter Jackson – manufacturing operations director;
- Frances Clarke – warehousing and distribution director.

However, these directors have varying degrees of enthusiasm for the project, together with a desire to minimise the risk of damage or exposure within their own departments. One of the key decisions which must be made will be how LFFL acquires the necessary applications software. One option will be to hire relevant IT staff and build bespoke applications, while another will be to purchase off-the-shelf packages. Yet another option will be for end-users to develop their own applications. This last option may prove awkward, since there is very little IT expertise among the end-users.

QUESTIONS

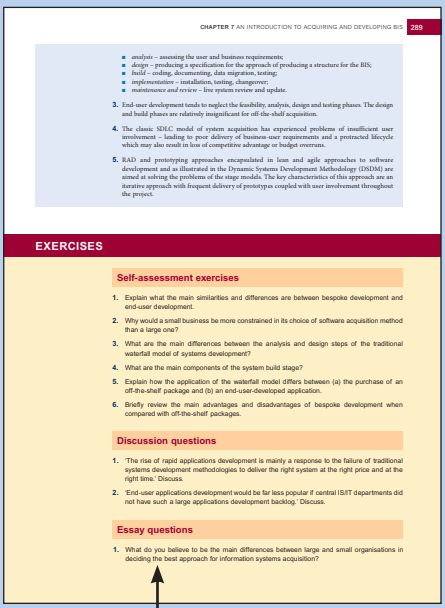
1. Which method(s) of business systems software acquisition would you recommend to LFFL? Explain and justify your answer.
2. Assuming that LFFL decides to go down the route of purchasing off-the-shelf packages, what steps do you recommend it takes to ensure that the applications which are selected meet their requirements?

SUMMARY

1. Acquisition refers to the approach for sourcing BIS. Alternative acquisition methods include:
   - *off-the-shelf* – purchased from a software vendor;
   - *bespoke* – 'built from scratch';
   - *end-user-developed* – self-explanatory.

   Complex and organisation-wide BIS such as e-business systems often require hybrid sourcing approaches and enterprise applications integration of different components from different vendors.
2. A useful model for the stages of a BIS acquisition project is the systems development lifecycle model (SDLC). The stages described in later sections of Part 2 are:
   - *initiation* – identification of opportunity or problem to be solved by BIS;
   - *feasibility* – assessing cost–benefit and acquisition alternatives;

Chapter summaries appear at the end of every chapter summarising the main learning points.



CHAPTER 7 AN INTRODUCTION TO ACQUIRING AND DEVELOPING BIS 289

- *analysis* – assessing the user and business requirements;
- *design* – producing a specification for the approach of producing a structure for the BIS;
- *build* – coding, documenting, data migration, testing;
- *implementation* – installation, testing, changeover;
- *maintenance and review* – live system review and update.

3. End-user development tends to neglect the feasibility, analysis, design and testing phases. The design and build phases are relatively insignificant for off-the-shelf acquisition.
4. The classic SDLC model of system acquisition has experienced problems of insufficient user involvement – leading to poor delivery of business-user requirements and a protracted lifecycle which may also result in loss of competitive advantage or budget overruns.
5. RAD and prototyping approaches encapsulated in lean and agile approaches to software development and as illustrated in the Dynamic Systems Development Methodology (DSDM) are aimed at solving the problems of the stage models. The key characteristics of this approach are an iterative approach with frequent delivery of prototypes coupled with user involvement throughout the project.

EXERCISES

Self-assessment exercises

1. Explain what the main similarities and differences are between bespoke development and end-user development.
2. Why would a small business be more constrained in its choice of software acquisition method than a large one?
3. What are the main differences between the analysis and design steps of the traditional waterfall model of systems development?
4. What are the main components of the system build stage?
5. Explain how the application of the waterfall model differs between (a) the purchase of an off-the-shelf package and (b) an end-user-developed application.
6. Briefly review the main advantages and disadvantages of bespoke development when compared with off-the-shelf packages.

Discussion questions

1. 'The rise of rapid applications development is mainly a response to the failure of traditional systems development methodologies to deliver the right system at the right price and at the right time.' Discuss.
2. 'End-user applications development would be far less popular if central IS/IT departments did not have such a large applications development backlog.' Discuss.

Essay questions

1. What do you believe to be the main differences between large and small organisations in deciding the best approach for information systems acquisition?

A variety of **Exercises** and **Questions** test your understanding of the key concepts described in each chapter. Exercises require short answers, discussion and essay questions require longer answers and exam questions can be used for revision.

Plan of the book

PART 1 INTRODUCTION TO BUSINESS INFORMATION SYSTEMS

FUNDAMENTALS OF BUSINESS INFORMATION SYSTEMS	CHAPTER 1 INFORMATION	CHAPTER 2 SYSTEMS	
BUSINESS INFORMATION SYSTEMS TECHNOLOGIES	CHAPTER 3 HARDWARE AND SOFTWARE	CHAPTER 4 DATABASES AND BUSINESS INTELLIGENCE	CHAPTER 5 NETWORKS
BUSINESS APPLICATIONS	CHAPTER 6 ENTERPRISE AND FUNCTIONAL BIS	EXAMPLES THROUGHOUT CHAPTERS 1 TO 5	

PART 2 BUSINESS INFORMATION SYSTEMS DEVELOPMENT

FUNDAMENTALS OF BIS DEVELOPMENT	CHAPTER 7 ACQUIRING AND DEVELOPING	CHAPTER 9 PROJECT MANAGEMENT		
BIS DEVELOPMENT LIFECYCLE	CHAPTER 8 INITIATION	CHAPTER 10 SYSTEMS ANALYSIS	CHAPTER 11 SYSTEMS DESIGN	CHAPTER 12 SYSTEM BUILD, IMPLEMENTATION AND MAINTENANCE

PART 3 BUSINESS INFORMATION SYSTEMS MANAGEMENT

FUNDAMENTALS OF BIS STRATEGY	CHAPTER 13 INFORMATION SYSTEMS STRATEGY	CHAPTER 14 INFORMATION SYSTEMS MANAGEMENT	
ELEMENTS OF BIS STRATEGY AND DEVELOPMENT	CHAPTER 15 PROTECTING BIS	CHAPTER 16 END-USER SERVICES	CHAPTER 17 LEGAL AND ETHICAL ISSUES

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Paul Bocij is a Senior Teaching Fellow at Aston Business School. An experienced educator, he has worked for a wide variety of institutions, including universities, colleges and numerous commercial organisations. His commercial experience includes time spent in the fields of programming, management, training and consultancy. Previous clients for consultancy services include Cashco, British Red Cross, Barclaycard, Ministry of Defence, WROX Press, Bank of Ireland, JCB, Cardiff NHS Trust, Youth Hostels Association. Paul is a Member of the British Computer Society and is a Chartered IT Practitioner. He is also a Senior Fellow of the Higher Education Academy, a Fellow of the Institute for Learning, a member of the Society of Authors and a member of the British Association of Journalists. As a professional writer, he has produced or contributed to more than 20 books, including several best-selling titles and a number of academic texts. In addition, he is also the author of numerous articles, magazine columns, academic papers, training guides and other materials related to information systems and information technology. He is an active researcher and his research interests are largely concerned with the impact of technology on society, with a particular emphasis on deviant forms of behaviour, such as harassment. He is also interested in the use of educational technology in higher education, especially in areas such as the use of computer-based assessment systems.

Andrew Greasley MBA, PhD, FHEA is a lecturer in the Operations and Information Management Group at Aston Business School, Aston University. He has over 80 publications and has published in journals such as the *International Journal of Operations and Production Management*, *Journal of the Operational Research Society*, *Technovation and SIMULATION*. He is the sole author of the texts *Operations Management* published by John Wiley & Sons, *Operations Management: Short Cuts* published by Sage Publications Ltd, *Enabling a Simulation Capability in the Organisation* published by Springer Verlag and *Simulation Modelling for Business* published by Ashgate Publishing Ltd.

Simon Hickie has worked for some 20 years as a senior lecturer in business information systems, having previously worked for 10 years in the management information systems field in a variety of roles including programmer, project manager and trainer. His particular interests lie in the areas of information systems in SMEs, change management and strategic information systems management. He retired recently from the University of Derby to pursue his interests in photography which include lecturing, training and competition judging. He is married with three adult children.

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