

BUSINESS INFORMATION SYSTEMS FOR ACCOUNTING STUDENTS

Martin Quinn & Gerhard Kristandl



*BUSINESS INFORMATION SYSTEMS FOR
ACCOUNTING STUDENTS*

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Business Information Systems for Accounting Students

Martin Quinn
Gerhard Kristandl

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Dedication

For my son and daughter, who both mastered the use of a mouse on my laptop before their fourth birthday. My daughter is now surfing the web on a tablet without difficulty and she's just gone nine. She has taught her brother to do the same. These things, which they take in their stride, were beyond my imagination when I was that age.

Martin Quinn

To my wife, Lisa. To my parents, Heidi and Sepp, for their on-going and unfaltering support and belief in me. Thank you, guys!

Gerhard Kristandl

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Lecturer Resources

For password-protected online resources tailored to support the use of this textbook in teaching, please visit www.pearsoned.co.uk/quinnkristandl



About the authors

Martin Quinn

Martin Quinn is lecturer in accounting at Dublin City University and a Chartered Management Accountant with many years' experience in accounting practice and information systems.

Since 2004, Martin has been teaching the accountants of the future. In his teaching, he integrates information systems and accounting whenever possible and teaches a dedicated module which emphasises the practical knowledge accountants should have of information systems and technology. Prior to embarking on an academic career, Martin worked as a management accountant in indigenous and multinational firms, as well as working as an Information Systems Analyst and Information Systems Manager.

Martin is author of *Brilliant Accounting*, *Brilliant Book-keeping*, and *Book-keeping and Accounts for Entrepreneurs*, all from Pearson and has contributed to a number of academic textbooks. Martin has also co-authored *Management Accounting*. He regularly updates his blog at <http://martinquinns.com> with pieces on accounting, general business and how information systems and technology affects accounting.

Gerhard Kristandl

Gerhard Kristandl is a Senior Lecturer in Accounting at the University of Greenwich. He is an internationally published, award-winning author of several papers and a book on intellectual capital and intangibles. He has extensive management consulting experience in top client-facing roles and provides insights and experience from both the academic and corporate worlds. Before he joined the University of Greenwich, he worked for Accenture Germany in its Finance and Performance Management practice from 2007 to 2009. Prior to that, he was a researcher and teaching assistant in management accounting at the Vienna University of Economics and Business from 2002 to 2007.

In 2006, Gerhard was a visiting scholar at the DeGroot School of Business, McMaster University in Hamilton, Ontario, Canada.

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Martin

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Gerhard

I would like to extend my appreciation to my two former 'unofficial' master thesis supervisors at the University of Graz, Herbert Wechtitsch and Dietmar Teissl, and their company, SCC AG, in Austria. They showed me the potential of an ERP system and helped me to understand and appreciate the possibilities that are embodied in it; they also emphasised how important the people who work with the systems were. Today, we need to be aware that we are not working for the systems, but the systems need to work for us.

General

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Text

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Preface

Martin's first experience with a computer was sometime in the early 1980s. A good friend had an Amstrad computer, which was designed for gaming. The games back then came on audio cassettes and took quite a while to load up. In the thirty years or so since then, not only does Amstrad no longer exist, but cassettes are only likely to be found in the music collections of 'older' guys like us. Gerhard, on the other hand, started his lifelong fascination with his cousin's Nintendo Entertainment System, which led him to nag his parents into buying a Sega Mega Drive at Christmas 1990 – for both these systems, the games came on cartridges instead of CDs.

These years since the 1980s have seen the personal computer turn into a notebook, and in 2011, sales of tablet computers (like the iPad) have outstripped sales of desktops/notebooks for the first time. The internet also emerged during this time and we now take it for granted in both our personal and business lives. Certainly, if we think back to our first experiences of computers in both a business and personal sense, what technology can do now is light-years ahead of what we could have ever imagined – there is an 'app' for just about anything nowadays.

During this time we trained as management accountants and performance management consultants, respectively. From the mid-1990s, two major events were on the horizon: (1) the year 2000 and the potential date problem within program code (the notorious Y2K), and (2) the conversion to the euro currency. The former project affected every firm, and more so those that still had relatively old bespoke information systems. Keeping it short, what this implied for Martin was a sideways career move to an information systems role. After a number of years and lots of travel in this role, Martin took a position in academia. In his second year as a lecturer, he started to teach a module call 'IT and the Accountant', which he still teaches. He looked around for a text book which might be useful for students and quickly realised that the type of book he had in mind was not available. What he wanted was a text book that would marry together information systems basics and the role of accountants in a practical sense. Martin was lucky enough to do a Masters Degree in the application/management of information systems in accounting, and while this plus his experience were useful background for teaching, even this degree programme focussed too much on what we both call the 'techie side', i.e. too much about technical terms and how hardware and software actually worked. Gerhard, on the other hand, experienced the IT side of clients' business issues (especially in performance management) as a management consultant. On his return to higher education, he found that the – in practice – inseparable fields of business and IT are under-represented in business study syllabi – especially in accounting and finance. Therefore, Martin and Gerhard decided to write this book.

Why this book?

So what is this book about? It is easier to start with what it is not – it is not a regular accounting information systems (AIS) textbook. There will be, of course, some material in this book which you will find in any AIS text, such as learning some technical terms and how information systems are designed. However, where this book differs is in a greater emphasis on what technology can do for businesses, how information technology and systems affect the role of accountants, and what accountants may actually have to do in practice to deal with new information systems and information systems change. To put this another way, this book examines typical and topical information systems issues from the viewpoint of an accountant.

Much academic literature nowadays mentions the changing role of management accountants in particular, and how they have become more business analysts and service providers than the traditional bean-counter. Arguably, some of this changed role has been brought about through technological developments like Enterprise Systems (also commonly referred to as Enterprise Resource Planning) and cloud-computing (both of which are detailed in later chapters). Understanding the changed role of accountants and accounting in the current era of rapid technological change requires more than a textbook on the ‘techie side’ of business and accounting information systems. It requires us to teach more than this too, and to include an appreciation of the tasks accountants may face (or no longer do) as a result information systems developments in the past two decades or so. In summary, this book is a hybrid textbook, crossing both information systems and particularly management accounting disciplines in an effort to give accounting students a more practical view of what information systems mean for their future profession.

Organisation of the book

This book is divided in three parts. Part 1 aims to (re-)acquaint students with some background information as well as introduce some basic information systems concepts. Chapter 1 sets the context of how information systems have changed over the past few decades and what this has entailed for the accounting profession. Chapter 2 provides a brief outline of some basic information systems terms and concepts, as well as some examples of how technologies are currently used in a general business sense. Chapter 3 concentrates on how information systems and technologies have affected the role of accountants in business. This chapter sets the scene for following chapters, which will provide more specific detail on the changing roles and knowledge requirements of accountants in the business world. Finally in Part 1, Chapter 4 outlines the systems development life cycle and addresses some change management issues organisations may encounter. This chapter is important in that it provides a brief overview of many of the issues faced by information systems change and emphasises the need for a clear business focus of such projects.

Part 2 examines the information systems likely to be more relevant to larger organisations. Chapter 5 introduces Enterprise Systems (ES) and provides a brief overview of the functionality of these systems. How these large systems address business processes rather than functional areas is addressed, as well as the role of accountants in the implementation and on-going use of ES. Chapter 6 addresses how information systems spread outside the organisation. A brief outline of some common data integration concepts is given, and this is linked back to Chapter 5 on ES systems. Chapter 7 provides an overview of the XBRL language which is destined to become the standard electronic method of reporting financial

information. Although not exclusively the remit of larger organisations, XBRL is detailed in Part 2 as it is more likely to be of greater importance to such organisations.

Part 3 moves the focus more to smaller and medium-sized enterprises (SME). Chapter 8 examines the differing needs of SME and gives an overview of typical functionality of accounting software of suited for such organisations. Chapter 9 examines the more recent development of cloud software solutions for smaller organisations. While larger businesses also adopt cloud solutions, the use of such solutions in smaller businesses is a particularly promising development for owners and managers of small businesses. The capabilities available from cloud accounting software solutions is likely to have an impact on the role of accountants in such businesses, or even introduce regular accounting practices to such organisations for the first time. Finally, Chapter 10 introduces the usefulness of spreadsheet programmes such as Microsoft Excel to SME. Several financial modelling capabilities of spreadsheets are explored briefly, as these may be particularly useful to smaller organisations which do not have data analysis and query tools often available within software (such as ES) used by larger organisations.

Having covered each of the three parts of this book, students will have a good practical appreciation of what information systems can and will do within the accounting world. Some theoretical approaches are also advanced, but the primary emphasis of the book remains practical, with the overall objective of tuning the knowledge on accounting information systems more towards that which students will have to face on a daily basis in their careers.

Finally, it is assumed throughout this book that students have previously studied at least basic financial and management accounting modules. References will be made to some accounting concepts throughout the text, with knowledge of these concepts assumed. Students may find it useful on occasions to refresh their memory on some concepts, as it should be remembered that the main focus of this text is relevance of information systems to accountants and the role of accountants.

Pedagogical features

As already stated, one of the main aims of this book is to provide a more practical approach to the study of information systems in accounting. Therefore, while some theoretical knowledge is advanced in this text, the pedagogical features are more practically oriented. To this end, the following list summarises the main pedagogical features:

- real-life examples and mini-cases throughout the text;
- links to relevant websites, videos and blogs;
- each chapter has defined learning objectives, chapter summary, end of chapter review questions and discussion topics;
- additionally, chapters are kept as relevant as possible to accounting students and references regularly made to previous accounting studies. Additional reading references are provided at the end of each chapter should tutors/students require more detailed technical knowledge.

Additional resources

Alongside the above pedagogical features, this book is supported by the following additional resources:

- a dedicated, regularly updated blog provides current relevant news and research items (the blog can be found at www.pearsoned.co.uk/quinnkristandl);
- spreadsheet templates available online for teaching and student use;
- software screen dumps where possible in relevant chapters;
- QR codes linking examples and mini-cases to web sources.

Target audience

The target audience of this text is any undergraduate or postgraduate accounting student seeking a more practical and accounting-oriented study of information systems and technologies. In particular, this text may be suitable to accounting programmes which endeavour to promote the importance of information systems and technology to the practice of accounting. This may be delivered through a module which is less focused on the technical elements of information systems and more on how information systems affect accountants and accounting. Additionally, this text may also be useful as an additional resource for students studying information systems related modules for examinations of the main professional accounting bodies – for example, CIMA, ACCA and ICAEW.

How to use this book

CHAPTER 1

Introduction to information systems and accounting

Chapter outline

- Introduction and outline purpose of the text
- How the business landscape has changed in recent decades
- A brief review of key information systems and technology changes
- Outline of what these changes mean for accountants/accounting
- Chapter summary

Learning outcomes

After completing this chapter, you will be able to:

- identify how technological advances have changed business in general in the past few decades;
- recognise the role of information technology and systems in business change;
- describe some technological trends which have affected how business and accounting are done;
- generalise how this affects the role of accounting and accountants.

Introduction

An iPad, a phone, an internet mobile communicator, are you getting it? These are not three separate devices! And we are calling it iPhone! Today Apple is going to reinvent the phone. And here it is.

Steve Jobs, 2007 iPhone Launch
(see <http://www.youtube.com/watch?v=6W-E496Xg>)

The above quote from Steve Jobs, the now deceased co-founder, chairman and CEO of Apple Inc., captures the fast moving pace of technological change. The iPhone and similar Android devices are effectively hand-held computers, which can do quite a lot of what an individual or business might want in terms of technological needs. Five years after the iPhone launch,

¹ Android is an operating system run on many non-Apple devices.

The **Chapter outline** gives you a brief overview of the content and aims of each chapter, and how it links to the previous chapter.

Learning outcomes at the beginning of each chapter enable you to focus on what you should understand after using each section of the book.

Real-life examples provide a real-world context for key topics. **QR codes** link all examples and cases to web sources.

The role and development of information systems and technology in accounting • 45

Table 3.2 How technology may affect the role of accountants

Changed role	Enabling technology
<p><i>Changing role in smaller organisations</i></p> <ul style="list-style-type: none"> No need for accountants in small business – book-keeping done by software More time to provide value-added services to small business 	<ul style="list-style-type: none"> User-friendly accounting software, cloud-accounting software Accounting software with remote access
<p><i>Changing role in larger organisations</i></p> <ul style="list-style-type: none"> Less transaction processing work More analytical and advisory role More centralised accounting, less accounting staff Some devolved responsibilities, e.g. costs control to cost centre managers Some responsibility and reduction roles during system implementation 	<ul style="list-style-type: none"> Enterprise Systems Enterprise Systems Enterprise Systems Enterprise Systems Enterprise Systems

Chapter summary

This chapter reminds us of the place of accounting information in an organisation. There are many users of accounting information, both internal and external to an organisation. Historically, the rules of double entry accounting made it a suitable candidate for programming as software. As you have seen in this chapter, today accounting information systems are not only a key feature in gathering accounting data, but also a vast array of related organisational data to produce information for internal and external users.

The development of accounting software, through increased functionality and broader spread to other business processes, has also had an effect on the role of accountants. The mundane accounting tasks are likely to be performed by software in all but the smallest businesses, which frees up time for management accountants as particular to become more business advisors or information interpreters than the traditional bean counter. Indeed, more recent technological developments such as online accounting software, may potentially affect accountants in practice too as they also assume a business adviser type role. As mentioned in this chapter, as you progress through this book, try to keep in mind the underlying purpose of accounting information as reflected in the earlier part of this chapter. It is all too easy to forget this when examining the complexities of modern accounting information systems.

KEY TERMS

financial accounting The branch of accounting concerned primarily with the provision of financial information to external users.

integrated accounting system An accounting system which contains financial and costmanagement accounting data in a single system.

Introduction to information systems and accounting • 9

Spears *et al.* (2003, p. 6) noted that the previous decade or so had seen vast improvements in the availability of personal computing power, which had significant effects on the nature of the work [of management accountants], and on the information flows around the organisation¹. They also noted that such changes were not limited to large global corporations. The developments in technology in the decade or so since have perhaps been even more marked, but we could summarise the effects of technological change on accountants under the following general headings:

- skill requirements
- challenge or enable for accountants
- information summary
- devolution of accounting information
- new tools and techniques.

In terms of *skill requirements*, technological developments have implied that knowledge of the workings and capabilities of some technologies is now an essential part of the accountant's tool kit. For example, accountants may be involved in systems implementation and configuration (Grabab *et al.*, 2009), learn how to use Business Intelligence software tools (Simons, 2008a, 2008b), or learn how to configure and interpret automated auditing products (see Real-life example 1.3). Some of these skills may be acquired during university or professional studies (and hopefully, this book helps), while other skills are more likely to be acquired 'on the job'.

Real-life example 1.3
Audit in complex systems environments

As technology and information systems have become increasingly complex and spread across many aspects of organisations, the job of auditing has become more reliant on technology itself to spot fraud and ensure information systems security.

For example, **ACL Audit Analysis** is a suite of software products which can work directly with ES software like SAP. The Audit Analysis software can automatically run pre-configured audit checks and can be configured by managers/accountants rather than IT staff. The software can also help companies enable continuous controls monitoring, which means any transaction can be checked automatically for audit control and fraud risks. This can be valuable in ensuring compliance with regulations (such as the Sarbanes-Oxley Act of 2002 in the United States).

Technology has been both a *challenge and enabler* for accountants too. Referring to Real-life example 1.3, complex systems such as ES create challenges for audit and control (Chapter 5 will cover ES in more detail). However, rather than being a challenge, with the right software tools internal and external auditors may be able to conduct audit tests which are broader in scope than previously. Similarly, in Chapters 8 and 9 you will learn that accounting software in smaller business has potentially 'taken away' much of the daily record-keeping work which accounting practices may have traditionally done for clients. However, these small developments in technology have also freed up accountants' time, with the possibility that they can offer more advisory and analysis services to small business.

Technology has also permitted more and more *information summary*, by which we mean the ability to deliver high-level reporting direct to business managers on a frequent basis. As noted by Grabab *et al.* (2009, p. 115), for example, management accountants are no longer computing information for managers from disparate systems and delivering it three weeks

A **Chapter summary** features at the end of each chapter. This allows you to check that you understand all the main points covered before moving on to the next chapter.

Key terms alert you to the core concepts and techniques in each chapter.

Enterprise Systems • 97

materials requirements planning A system concept which assists managers in ensuring adequate materials are available to meet manufacturing needs.

organizational data A term used by SAP ERP software to describe an organization's structure as represented by the software.

plant code A term used by SAP ERP software to describe a significant operation within an organization, for example, produce products, supplies services or distributes products.

profit centre A unit, department or function within an organization for which costs and revenues (i.e. profits) can be identified and responsibility attributed.

record An entry in a database containing several values (or fields).

responsibility accounting A system of accountability for the monetary performance of an organization unit, function, department or some other defined area of the organization.

revenue centre A unit, department or function within an organization for which revenue can be identified and responsibility attributed.

transaction data A term used by SAP ERP to refer to the data collected when business process are executed.

DISCUSSION/GROUP TOPICS

- Choose two organisations that use an ES. One organisation should be a product/manufacturing company, the other a service/public/government organisation. For each chosen organisation, discuss, using any available evidence (websites internet site, quality press, trade press, academic journals), the motivations for each organisation adopting an ES. For both organisations discuss the main business processes (typically 4-5 business processes) and how they are linked to accounting/finance processes.
- Choose any large organisation you are familiar with – you could use one of the organisations from item 1 above. Discuss what responsibility centres (cost centres and revenues centres) it might ideally incorporate into its ES.
- Search the internet for examples where ES implementations were not as successful as planned. One story can be found at the link http://www.co.com/article/48628/0_1/finance ERP_Disasters,_Dislikes_and_Disappointments. Using this article and others you find, discuss if the lack of success can be attributed mainly to software problems or project/change management problems. (You might find it useful to refresh your knowledge from Chapter 4, in particular the section on the systems development life cycle).

REVIEW QUESTIONS

- Explain a business process.
- How does ES software differ from previous software such as TPFP and PPFP?
- List the key three business processes within a typical ES like SAP.
- Describe what are the general features of ES software.

Review questions assess your knowledge and application of the principles and techniques covered in each chapter. Outline answers to the questions are provided at the end of the book to allow you to self-assess your progress.

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The shortest time is the minimum, or most optimistic time required to achieve the project task. This would imply that better than normal conditions apply, and all moves faster than expected. The longest time is the opposite, as it would assume the time required to complete the task is the worst case scenario (barring a catastrophe). The most likely time is between these two extremes, assuming normal conditions apply. As you can see in the formula above, more weighting is given to normal conditions – the most likely time is weighted with a factor of 4. The resulting estimated times are then used within the Gantt charts and critical path analysis mentioned earlier.

Chapter summary

This chapter has introduced the complex nature of organisational change and explored some of the internal and external drivers of change. One certainty from the current fast-paced business and technological environment is that business change will be commonplace. Change to how business is done implies a strong likelihood that accounting and other information systems will also change.

As change to information systems is something that business managers and accountants face as part of their organisational life, this chapter has introduced some of the more common methods and tools used to manage changes. You have gained an overview of the systems development life cycle and the importance of each of its six steps. Following the cycle should ensure a good outcome in terms of information systems doing what is expected and supporting the organisation's future plans. You also gained some knowledge of techniques from project management which are quite useful and frequently used in information systems projects.

KEY TERMS

bottom-up development approach An approach to in-house software development which starts at the end-user level.

critical path analysis A technique which identifies a critical path of an implementation schedule in the light of sequence of dependent activities for the project.

function-oriented A systems design approach which views an information system as a set of modules with clearly defined interactions.

Gantt chart A chart which summarises the stages of a project using horizontal time lines or bars for each activity.

hard change An information systems change driven by new technologies.

milestones Significant project events.

object-oriented A systems design approach which views an information system as a set of objects (e.g. customers, products).

Project Evaluation and Review (PERT) A project management technique which includes a risk assessment of times for project activities.

Discussion/group topics include thought-provoking ideas and questions that encourage you to critically apply your understanding and/or further develop some of the topics introduced in each chapter, either individually or in group discussion.

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KEY TERMS

application service provision The provision of computer-based services such as software programmes to customers across an internet connection.

cloud computing The provision of information technology resources as a service through the internet or similar network.

hybrid cloud Cloud-based infrastructure which is offered as a public and private cloud service.

infrastructure-as-a-service Cloud-based services where the provider offers processing power, storage, networks and similar infrastructure.

platform-as-a-service Cloud-based services offering infrastructure to the customer where the customer does not manage the underlying infrastructure or operating system.

private cloud Cloud infrastructure which is exclusively used by a single organisation.

public cloud Cloud infrastructure available for use by any member of the public.

software-as-a-service A cloud-based service where a customer uses software applications offered by the cloud service provider.

DISCUSSION/GROUP TOPICS

- Earlier, in Mini-case 9.1, the features of SAP's Books cloud accounting software were highlighted. Based on Table 9.1 and/or an internet search, examine and discuss the features of other cloud accounting software products available to smaller business.
- Using a web search, seek out articles or features on how business or governmental organisations are saving money and other resources by using cloud services. Discuss what cloud service models they may be using.

REVIEW QUESTIONS

- What piece of technology/infrastructure is essential to allow the sharing of computer resources, e.g. data storage and processing capability?
- Define the term 'cloud computing'.
- What are the essential features of cloud computing?
- List and describe the three common cloud computing models.
- Distinguish a public cloud from a private cloud.
- Describe the benefits of cloud computing.
- What are the potential drawbacks of cloud computing?
- Which cloud computing model can offer some accounting advantages in particular to smaller business?
- What are the advantages of cloud accounting software over desktop software?
- In deciding between traditional desktop or cloud accounting software, what questions might a small business consider?

PART I

Introduction to information systems, design and implementation

CHAPTER I

Introduction to information systems and accounting

Chapter outline

- Introduction and outline purpose of the text
- How the business landscape has changed in recent decades
- A brief review of key information systems and technology changes
- Outline of what these changes mean for accountants/accounting
- Chapter summary

Learning outcomes

After completing this chapter, you will be able to:

- identify how technological advances have changed business in general in the past few decades;
- recognise the role of information technology and systems in business change;
- describe some technological trends which have affected how business and accounting are done;
- generalise how this affects the role of accounting and accountants.

Introduction

An iPod, a phone, an internet mobile communicator, are you getting it? These are *not* three separate devices! And we are calling it iPhone! Today Apple is going to reinvent the phone. And here it is.

Steve Jobs, 2007 iPhone Launch.
(see <http://www.youtube.com/watch?v=6uW-E496FXg>)

The above quote from Steve Jobs, the now deceased co-founder, chairman and CEO of Apple Inc., captures the fast moving pace of technological change. The iPhone and similar Android¹ devices are effectively hand-held computers, which can do quite a lot of what an individual or business might want in terms of technological needs. Five years after the iPhone launch,

¹ Android is an operating system run on many non-Apple devices.

more internet traffic is being generated by mobile devices on an annual basis. Predictions are that mobile device traffic will exceed wired device traffic in 2015 (Cisco, 2011).

The move to mobile devices is just one example of the fast-paced changes in information systems and technologies which we have seen since the advent of the Internet in the early 1990s. This book will examine some of these technological developments, with a view to interpreting what they mean for accounting and accountants. As noted in the preface, this book is presented in three parts. Part 1 (Chapters 1 to 4) are primarily focused on introducing technologies themselves and we begin to see how these have changed the role of accountants in business. Part 2 (Chapters 5 to 7) focuses on technologies which tend to affect larger organisations – ES and XBRL, for example. And finally, Part 3 (Chapters 8 to 10) focuses on software and technological developments more likely to affect or be utilised by smaller and medium-sized enterprises – cloud computing, spreadsheets, for example.

Arguably, how technology has changed business dramatically in recent times is in the availability of information. All organisations need information of a financial and non-financial nature to make business decisions – be they day-to-day decisions or more strategic decisions. With the advent of the internet, the amounts and type of information available to businesses is vast. For example, a person's browser or social media usage history can be easily used to deliver targeted advertising to that person. Such typically non-financial information, which may be in a detailed or aggregate form, can change how a business operates and respond to changing consumer needs. Of course, **accounting information systems** are part of this decision-making apparatus in most organisations too. An accounting information system could be something as simple as a manual notebook kept by a sole trader, or as complex as a global organisation-wide information system. As accountants, the technical medium through which data gets transformed to information is of less relevance. This does not mean that accountants do not need to know something about the abilities of technology – quite often accountants will be involved in decisions to select appropriate technological platforms to operate a business on. At the same time however, accountants do not need to be experts in understanding things like the programming of software nor the intricacies of a hard-drive. There is a balance somewhere in between these two, which this book will convey. This balance is about accountants having a more practical knowledge of what technology can do, how it can change business, and how it can change the role of accounting and accounting information within a business.

The changing business landscape

In a recent book by Bromwich and Bhimani (2010, p. 53), the authors note how some modern organisations can be 'free from most physical asset investments and manifest extreme fluidity and flexibility'. Service and internet-based businesses fall into this category. Particularly since the turn of the new millennium or so, organisations have been founded which are like nothing previous. Google, the internet search company, was founded in 1998 and generated almost \$38 billion revenue in 2011 (see investor.google.com). Amazon, the online retailer, generated revenues of \$48 billion in 2011. In 2012, Facebook, the social media company, floated on the stock exchange with a valuation around \$100 billion – although the company was less than a decade old. Such organisations do not have a traditional high-street operation, or in some cases do not deliver a product or service in the traditional sense of the word. Instead, the internet is a crucial part of how these organisations do business. The internet has also changed how business is done in some sectors – take how Apple's iTunes and similar music download sites have altered the music industry. For end consumers too, how products, services and information are obtained has changed through the use of mobile and internet technologies. Take, for example, the QR codes which are used throughout this

book – anyone with a smartphone or similar device does not even have to type the web address to go to the relevant web page.

Real-life example 1.1 Small business and technology

inc.com is a website dedicated to providing useful tips and hints to smaller US businesses. A post on its website (see: <http://www.inc.com/articles/2009/08/web-only.html>) asks the question 'should your company go online?'. Several small businesses in areas from organising babysitters, online media, wood flooring and mobile application development recount how going online for them means 24/7 service availability, lower overheads and ultimately increased growth. A look at inc.com's top companies list provides examples of small and medium businesses that have grown dramatically by conducting business online. The top company for 2011 was ideeli.com, which was founded in 2007 and had revenues of \$187,000 and employed 5 people. In 2011, it employed 145 staff and had revenues of \$78 million (for more detail see: <http://www.inc.com/inc5000/profile/ideeli>).

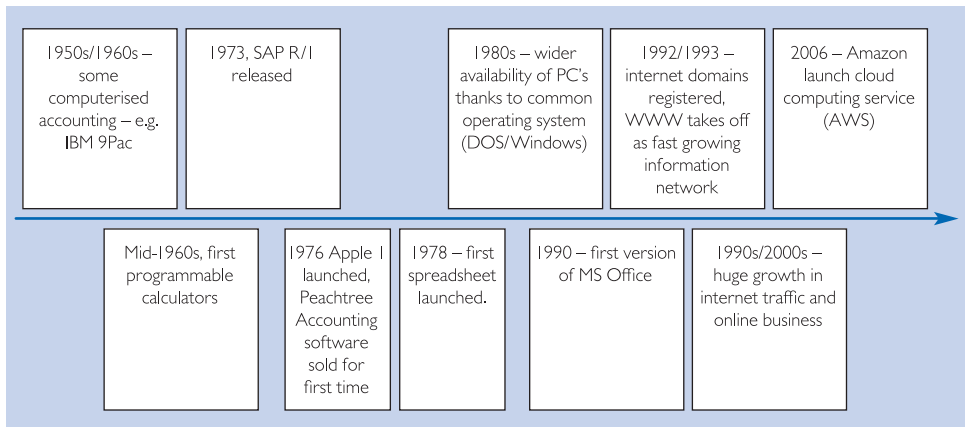


It is not only large and well-known organisations such as those mentioned above that have been affected by technologies such as the internet. Smaller businesses too have changed how they do business (see Real-life example 1.1). Put another way, what some have termed the 'Information Age' or 'Information Society' has seen the emergence of completely new businesses and changed how existing business operates, i.e. business models have changed. A business model is essentially the story of a business – what it does, how it does it, how money is made and who is the customer (see Magretta, 2002). Thus, a business model implies some deliverable product or service. Currently, however, traditional terms such as 'product' or 'service' as used in a general business and accounting context, may be difficult to readily apply to some organisation – for example, what product or service do companies like Facebook or Twitter actually offer to users? And how do they make money? What do they offer as a better alternative, or what old service do they replace? The answer in these two organisations may be that these companies utilise their large user/customer databases to leverage advertising or other income sources to at least answer the 'how do they make money?' question.

From an accounting view, such new business models can pose some stark questions. For example, if a service is offered free, then what other income sources need to be created and monitored? Other questions might be 'how can costs be classified?'; there may be no product or service (i.e. cost object) to allocate costs to. And, does the focus of internal control and decision-making move more towards revenues than costs? Such questions do not imply that management accountants in particular are lacking in skills to provide relevant decision-making information to such businesses. However, given that technologies like the internet have changed how business is done in many organisational forms, it seems prudent that a reasonable knowledge of technological developments be part of the accountant's knowledge stock. The next section briefly reviews the technological developments of recent times later chapters will provide more detail.

Changing technology

To have an appreciation of how technology has evolved over the years in business and accounting, the timeline below provides a brief summary of the more important technological developments since the 1960s from an accountant's view. Many of the technologies in this timeline will be elaborated on in later chapters.



The timeline provides a brief glimpse of the technological advances in computing since the idea of a computing machine was proposed by Alan Turing in 1950. Turing was one of the prominent figures in the birth of modern computer science. Turing's proposals described 'store', 'execute' and 'control' elements of what he called a digital computer. These elements still exist in all modern computing equipment. The remainder of this section briefly explains the key elements of the above timeline with reference to accounting in particular.

In the early 1950s, IBM 700 series computers were some of the first **mainframe** computers used by large organisations and government departments. By the late 1950s, computer programs such as IBM 9Pac could generate reports from business data, such as summaries of sales data or hours worked on projects (IBM, 1961). Such programs were among the first accounting-type programs. By the mid-1960s, some computing power was beginning to emerge on desktops too, with the introduction of the microprocessor into programmable calculators. In 1973, the now dominant player in the enterprise systems software market, SAP, released its first program, called R/1. This program was primarily a financial accounting system aimed mainly at larger organisations. As we will discover later in Chapters 5 and 6, ES software such as SAP has grown in functionality and organisational spread.

The release in 1976 of what most consider the first modern **desktop computer**, the Apple I, was the beginning of increased computing power being available to smaller organisations who could not afford mainframes. While we may take desktop and mobile computing power for granted now, the Apple I was an innovative product: its simple keyboard input was revolutionary. As the desktop computer emerged, programs to run on these machines were developed. One of the first programs to emerge from desktop computers that were particularly useful to accountants was a spreadsheet program. In 1978, Visicalc became the first spreadsheet software which could be loaded onto desktop computers – Apple computers in particular. While spreadsheets had been available previously for mainframes, anyone wanting to run some calculations had to book time on the mainframe machine and could not visualise the output. Visicalc changed this, with the ability to run on a desktop computer and present the user with the now familiar sequence of rows and columns (which we see in products such as Microsoft Excel).

The early 1980s saw the first IBM PC introduced to the market. These computers used Intel made processing chips and ran the MS-DOS **operating system**. This combination became the *de facto* industry standard, with other most software developers writing programs to run on this platform. The MS-DOS operating system was text-based, and while delivering computing power to the desktop, was not very user-friendly. It eventually evolved into the Windows operating system we know today, with the first significant success being Windows 3.0

in 1990. During this time too, Apple had developed a graphical-type operating system, but the IBM PC market was dominant and Windows became the dominant operating system.

The desktop computer was the vehicle accounting software developers needed. It was good for the computer manufacturers too, as the more software that was developed, the more users wanted computers. One of the earliest accounting software products sold was Peachtree, which was first sold in 1976. In 1981, Peachtree software was sold installed on some of the first IBM PC's, making it the first widely known accounting software for desktop computers. Shortly afterwards in 1983, Quicken software was released for the first time with the basic aim of 'balancing the family checkbook' (Intuit, 2012). Sage, one of the leading UK accounting software providers, was founded in 1981 and by 1984 had released its first software version. Thus, by the mid 1980s accounting software for small and medium-sized firms was readily available. While dedicated accounting software is useful for businesses, the launch of the first version of Microsoft Office in 1990 brings us into the computing world of the present-day accountant. While individual components of the Office suite were previously available, the combination of Microsoft Word, Excel and PowerPoint became the *de facto* software used in small and large organisations to do general everyday business tasks around accounting systems. The combination of products such as Microsoft Office with a friendlier graphical-user interface provided accountants with improved analytical capabilities, e.g. using spreadsheets to analyse data extracted from accounting software.

Although the technologies behind the Internet we use today can be traced back to earlier **networks**, the World Wide Web (WWW) emerged in early 1992 as a standardised set of network rules, protocols and display characteristics which allowed information exchange on a scale not previously witnessed. Tim Berners-Lee created the WWW at the European Organization for Nuclear Research (CERN) and it was incorporated into the first browser software, Mosaic (which became Netscape). Browser software allowed users to point and click at files and information available on the then infant Internet. By the mid-1990s there were millions of active internet users. Alongside browser software, email software also became widely available. As the Internet user numbers grew and telecommunications networks became faster, the commercial potential of the network became apparent. In 1995, for example, UK retailers such as Sainsbury, Tesco and Dixons began online retailing trials. The online bookstore amazon.com was also founded in 1995 (NY Times, 2005), which serves as a good example of how early internet-based business were able to offer more than traditional bricks-and-mortar operations – a traditional bookstore was restricted by factors such as space (to physically stock titles) and opening times, whereas no such restrictions were faced by an online store. By the year 2000, other sectors such as the airline and music industries were increasing their online presence. A decade or so later, we can buy almost anything, at any time, from anywhere using the internet.

As some online businesses grew, they began to realise that they could leverage their investment in computer equipment and disk storage. For example, companies like Google and Amazon needed powerful equipment to support their volume of searches and products respectively. In 2002, Amazon launched the first of its web services products. These services consist of remote computing services, which can be utilised by companies to do things like host websites, store data and process payments. Similarly, in 2005, Google launched a free web-based word processor, which was the first product in what we now term Google Docs – a free software-as-a-service model which provides users with office/personal productivity products which are remotely located and accessed through a web browser. These web-based services were the beginning of what is termed 'cloud-computing' or simply, 'the cloud'. Chapter 9 will provide more detail on the cloud, but briefly here, the availability of web services has enabled business to do things like reduce information technology costs and has also created a platform for many new business models. In turn, the cloud may have changed, for example, the nature of costs in a business which is of course relevant for accountants.

Having now had a brief overview of the developments in information technology over time, the next section begins to examine why changes in technology are relevant not only to how accounting tasks are done, but also to the role of an accountant. Later chapters will provide more detail.

And what does this mean for accountants?

As we have seen in the previous section, information technologies and systems have advanced dramatically since the 1970s. With the advent of cheap and portable computing power (i.e. personal computers, hand-held devices, tablets), integrated networks and the internet over the past three decades, not only have business models changed and emerged, but the nature of information technology-based tasks performed within the management accounting realm have changed dramatically (Scapens *et al.*, 2003), for example. According to the management accounting literature, drivers of change in management accounting include improved technologies (Burns *et al.*, 1999; Russel and Siegel, 1999; Scapens *et al.*, 2003). Technology seems to remain on the radar as a major factor in driving change in management accounting too. For example, an article in *Financial Management* in March 2012 entitled ‘The world in 2022’ suggests that technological developments will continue to be a main feature in the lives of management accountants (Doherty, 2012).

Whether we consider financial accounting, management accounting or related branches such as taxation and auditing, technology has had an effect on the life of accountants and business, and this is likely to continue as noted by Doherty 2012 (see also Real-life example 1.2). But what kinds of effects, you may ask? The following summarises some items mentioned in the professional and academic literature, many of which will be expanded on in later chapters.

Real-life example 1.2

Managers and accountants rate technological change as a future issue

Weber *et al.* (2012) report on a survey of managers and management accountants in German firms. The survey was conducted to ascertain how technology trends might affect the role of managers and accountants in firms. Their work centres around four key developments in information technology, namely: mobility, cloud computing, self-service analysis and real-time data analysis. Mobility entails the use of devices such as smartphones and tablets to deliver performance metrics to managers; cloud computing is the ability to avail of services on demand (see Chapter 9); self-service analysis refers to the ability of managers to obtain information from systems without the need for accountants; and finally, real-time data analysis refers to the ability to use and analyse up-to-the-minute data to assist in decision-making, planning and forecasting.

Their survey provides some interesting results – 90% of respondents suggest that information systems will automatically aggregate and summarise information in the near future (either fully or partially), with 83% of respondents suggesting a strong or moderate role of technology in filtering information for business. Two-thirds of the respondents believe future information technology developments will save time, while slightly over half (52%) believe technology will reduce costs. In contrast, 70% of respondents believe the role of information providers like management accountants will not be reduced by technology. Although technology may continue to reduce the role of accountants in terms of traditional data-processing and data analysis type roles, Weber *et al.* (2012) suggest accountants in businesses may have an increasing role in controlling and monitoring information systems.



Scapens *et al.* (2003, p. 6) noted that the previous decade or so had seen vast improvements in the availability of personal computing power, which had ‘significant effects on the nature of the work [of management accountants], and on the information flows around the organisation’. They also noted that such changes were not limited to large global corporations. The developments in technology in the decade or so since have perhaps been even more marked, but we could summarise the effects of technological change on accountants under the following general headings:

- skill requirements
- challenge or enabler for accountants
- information summary
- devolution of accounting information
- new tools and techniques.

In terms of *skill requirements*, technological developments have implied that knowledge of the workings and capabilities of some technologies is now an essential part of the accountant’s tool kit. For example, accountants may be involved in systems implementation and configuration (Grabski *et al.*, 2009), learn how to use Business Intelligence software tools (Simons, 2008a, 2008b), or learn how to configure and interpret automated auditing products (see Real-life example 1.3). Some of these skills may be acquired during university or professional studies (and hopefully this book helps), while other skills are more likely to be acquired ‘on the job’.

Real-life example 1.3

Audit in complex systems environments

As technology and information systems have become increasingly complex and spread across many aspects of organisations, the job of auditing has become more reliant on technology itself to spot fraud and ensure information systems security.

For example, ACL Audit Analytics is a suite of software products which can work directly with ES software like SAP. The Audit Analytics software can automatically run pre-configured audit checks and can be configured by managers/accountants rather than IT staff. The software can also help companies enable continuous controls monitoring, which means any transaction can be checked automatically for audit, control and fraud risks. This can be valuable in ensuring compliance with regulations (such as the Sarbanes-Oxley Act of 2002 in the United States).



Technology can be both a *challenge and enabler* for accountants too. Referring to Real-life example 1.3, complex systems such as ES create challenges for audit and control (Chapter 5 will cover ES in more detail). However, rather than being a challenge, with the right software tools internal and external auditors may be able to conduct audit tests which are broader in scope than previously. Similarly, in Chapters 8 and 9 you will learn that accounting software in smaller business has potentially taken away much of the daily record-keeping work which accounting practices may have traditionally done for clients. However, these small developments in technology have also freed up accountants’ time, with the possibility that they can offer more advisory and analysis services to small business.

Technology has also permitted more and more *information summary*, by which we mean the ability to deliver high-level reporting direct to business managers on a frequent basis. As noted by Grabski *et al.* (2009, p. 115), for example, management accountants are no longer compiling information for managers from disparate systems and delivering it three weeks