CHAPTER 4

ISSUES IN INFORMATION SYSTEMS

Key knowledge

After completing this chapter, you will be able to demonstrate knowledge of:

Interactions and impact

- applications of information systems in a range of settings
- a detailed study in a particular field such as entertainment, agriculture, finance, sport, health, that focuses on:
  - the nature of a contemporary issue associated with the use of information systems
  - legal, social, environmental or ethical reasons for a contentious issue
  - types and capabilities of digital systems associated with the field and issue
  - key stakeholders such as individuals, organisations and governments, and their responsibilities
  - positive and negative opinions of each stakeholder about the issue
- ways in which end-users can express opinions on websites about how information systems are used for particular purposes, such as writing a review in a textbox and a rating system

Data and information

- sources of, and methods and techniques for, acquiring and referencing primary data and secondary data and information
- factors affecting the integrity of data, such as correctness, reasonableness and accuracy

Digital systems

- advantages and disadvantages of using cloud solutions, and using cloud computing for storing, communicating and disposing of data and information
- impact of growth of mobile devices on website design

Approaches to problem solving

- Visualising thinking tools and techniques for supporting reasoning and decision making when analysing issues and ethical dilemmas

For the student

In this chapter, you will learn about a variety of contemporary issues associated with the use of information systems. Techniques and strategies that can be used to investigate information systems issues will also be explained. You are required to collect and analyse data from stakeholders and information from other sources about a specific issue related to the use of information systems. You will present the data you collect on a website you have designed and developed collaboratively. The website should outline the issue, reasons for the issue, key stakeholders involved and their opinions, including how information systems could be used to express opinions about the issue. You will also report your team's point of view on the issue. Both content from this chapter and Chapter 5 will be used to cover all the knowledge required for Unit 1, Outcome 3.

For the teacher

The focus for this chapter, together with Chapter 5, is on preparing students for Unit 1, Outcome 3, in which students design and develop a website, collaboratively. The website presents information related to a contemporary information systems issue in a specific context, which can cause conflict between stakeholders. Students are required to collect data from a variety of sources, then analyse the data to substantiate a point of view.

This chapter discusses a number of contemporary information systems issues, although for the purposes of the Outcome, the information systems issue selected is open ended.

Alamy/Art Directors & TRIP

FIGURE 4.1 Supermarket self-checkout information system

Information systems

There is a significant difference between a digital system and an **information system**. A digital system consists of hardware and software, but on its own a digital system cannot produce any information.

Thus, an information system consists of hardware and software (collectively referred to as a digital system) that also includes the additional components of data, processes and people.

To best illustrate an information system, we will look at the example of a supermarket self-checkout system. It is the additional components that allow the system to produce the output or information required.

TABLE 4.1 Supermarket self-checkout systems are a common sight in Australia today. The information system consists of the following.

Digital systems	Data	Processes	People
• Monitor • Barcode scanner • Weighing machine • Point-of-sale software • Operating system	• Product • Quantity • Price	• Scan item • Make payment • Receive change • Print receipt	• Customer

THINK ABOUT COMPUTING 4.1

An automatic teller machine (ATM) is also an information system. Try to identify digital systems, data, people and processes involved in an ATM system. Make a list of other information systems.

Information systems in action

Shutterstock.com/KPG Ivary

FIGURE 4.2 Conflict between stakeholders

Information systems have provided significant benefits to society over the last 50 years. Systems have been created that allow users to communicate, store and protect data and information and to automate processes that once had to completed manually; for example, writing a letter.

But along with the benefits associated with the use of information systems, issues can also arise from the use of technology that can cause tension conflict between different **stakeholders**.

The following are some examples of contemporary issues associated with the use of information systems.

Information systems and entertainment

The use of information systems for entertainment is widespread. Playing games, watching movies or listening to music are three popular reasons individuals use a digital system. As a result, many websites have been created that support entertainment. A large number of websites are dedicated to reviewing games, movies and music. Some sites allow individuals to play games online or offer online streaming for music and videos, while others facilitate the downloading of files.

For Unit 1, Outcome 3, you will be working collaboratively with other students to design and develop a website that analyses a contemporary issue and presents your team's point of view on that issue.

Issues in entertainment

Illegally downloading movies, music, software and other types of files is the source of much tension and conflict between stakeholders. Australia is at the forefront of this behaviour with sources claiming that more than 30 per cent of Australian adults routinely illegally downloading television shows and movies.

Pirate hunt: is this the end of Australia's love affair with illegal downloading?, Kelsey Munro, Sydney Morning Herald, April 11, 2015

Reasons for the issue

There are a number of reasons why users download content through file sharing and **streaming** websites. First, the cost of downloading a file can be less expensive than legally purchasing the same product. Convenience is also a large factor. Users do not need to leave their own home to access the content and can then enjoy the content whenever and wherever they like. Downloaded content often does not contain advertisements. Being able to access particular content that is not currently available through legal means (for example, a new series of a TV show not yet screening in Australia) is a further significant factor.

So why is downloading or streaming files from some sources illegal?

Downloading or streaming files over the internet is not necessary illegal. There are many websites that offer files to be downloaded or streamed legally. Download.com is an example of a website where users can legally download files for free. For subscribers who are prepared to pay a monthly subscription fee, Netflix provides a legal streaming service of TV shows and movies.

Whether a file is legal or illegal to download comes down to whether the **copyright** holder of the content has given their consent for a user to download their work. Users who download or stream content in Australia without the consent of the copyright holder, are in breach of the *Copyright Act 1968* (Cth) and may face sanctions if found guilty, including being fined or, in more serious cases, being sentenced to a jail term.

THINK ABOUT COMPUTING 4.2

Is watching a video on the streaming service YouTube legal? If someone posted a video that someone else created onto YouTube, would copyright be breached?

P2P is also discussed in Chapter 3.

A summary sheet outlining the *Copyright Act 1968* (Cth) can be found at the Creative Commons website.

Digital systems involved

A common method used, for both illegal and legal downloads, is **peer-to-peer (P2P) file sharing** technology. As discussed in Chapter 3, peer-to-peer file sharing starts with one user offering files they are willing to share. By using the correct software, other users can then download a copy of these files. Instead of downloading a file in one go, P2P software downloads packets of the software at a time. As soon as one packet of data is received, that user can then start offering that packet of data to others. As more users share the same file, it creates more sources from where packets of data can be received, speeding up the downloading process.

File streaming is a data transfer concept where, as a file is received, it can start to be processed or viewed before the entire file is downloaded, meaning the content can be accessed faster.

There are a number of people, or groups of people, who can be affected by illegal downloading and streaming.

In 2015, the company who owned the rights to the movie *Dallas Buyers Club* went to the Federal Court of Australia to demand that a number of internet service providers (ISPs) release the contact details of their customers who were linked, via their IP address, to downloading the movie without the consent of the company, through a file sharing network.

Key stakeholders

One group seriously affected by the illegal downloading or streaming of files are the creators, authors or artists of the original work. Historically, many artists in the music industry earned a large proportion of their income from the sale of their songs including albums and CDs. In many cases, the revenue made from selling music has completely dried up, because of illegal downloading.

Artists suffer as online piracy worsens, Australian Financial Review

On the other hand, some artists have reported an increase in people buying tickets for their live concerts. One reason given for this is that as more people have been able to access the artists' music online, this has helped to increase demand for concert tickets.

The Australian Federal Government is also a stakeholder in the issue. With illegal downloading and streaming becoming such a significant issue in Australia, the federal government may have to act to protect the interests of the creators, authors and artists.

There has been speculation that the government is considering a range of measures to help curb illegal downloading, including blocking websites related to illegal file sharing and streaming and forcing internet service providers to hand over the details of individuals suspected of illegally downloading files.

THINK ABOUT COMPUTING 4.3

Brainstorm some other measures that could put in place that could curb, or stop, the amount of illegal downloads occurring in Australia?

Visualising thinking tools for supporting reasoning and decision making

Lucidchart is a free online tool that allows users to create diagrams

Often, a better understanding of the issues, problems and solutions can be obtained if the process described is presented visually. Visualising thinking tools assist with thinking processes and reflect on the thinking strategies to support understanding. These tools assist with coding and classifying themes, identifying patterns and linking relationships. Tools such as concept maps, sequence charts, mind maps, Venn diagrams assist researchers to document their decisions and clarify their thoughts. In Figure 4.4, a visual analysis of a digital systems issue is presented using Inspiration, a visual mind-mapping software package.

An analysis of an issue can be answered using the following questions.

1 What information system is being used and how is it being used?
2 What is the reason for the use, development of or change in the information system that is causing the concern?
3 Who are the people (the stakeholders) involved? (They can be individuals, institutions, societies, locally or globally, who develop and implement, control and use the information system, or anyone who is affected directly or indirectly.)
4 What are the advantages and disadvantages for the various stakeholders from the use of information system?
5 What are the main issues for the stakeholders? How do the various advantages and disadvantages for the various stakeholders create the issue?
6 What are the ethical principles, laws, policies or rules that apply to the various issues?
7 What are the detailed ethical issues associated with the impact of the information system? Which principles, laws, policies or rules have been violated and how have they been violated?
8 What is the range of feasible solutions (decisions and/or actions) that can reduce or remove the negative impacts? How do they solve the problems?
9 What are the advantages and disadvantages of the various solutions?
10 Which solutions should be chosen? Why? Which solutions should be rejected? Why?
11 What action should be taken? Who should be responsible for performing and monitoring the action? What is the timeline? What resources need to be used?

At the end of the process, all the relevant information will have been presented, various solutions suggested, a solution justified and a plan of action outlined.

ETHICAL DILEMMAS

In Chapter 1 we looked at how competing principles (such as upholding freedom of expression versus protecting children from possible harm) may sometimes present us with a dilemma (for example, whether to permit or ban the sale of violent video games).

Recall the six-step framework presented in Chapter 1, to provide support and guidance for making an ethical decision.

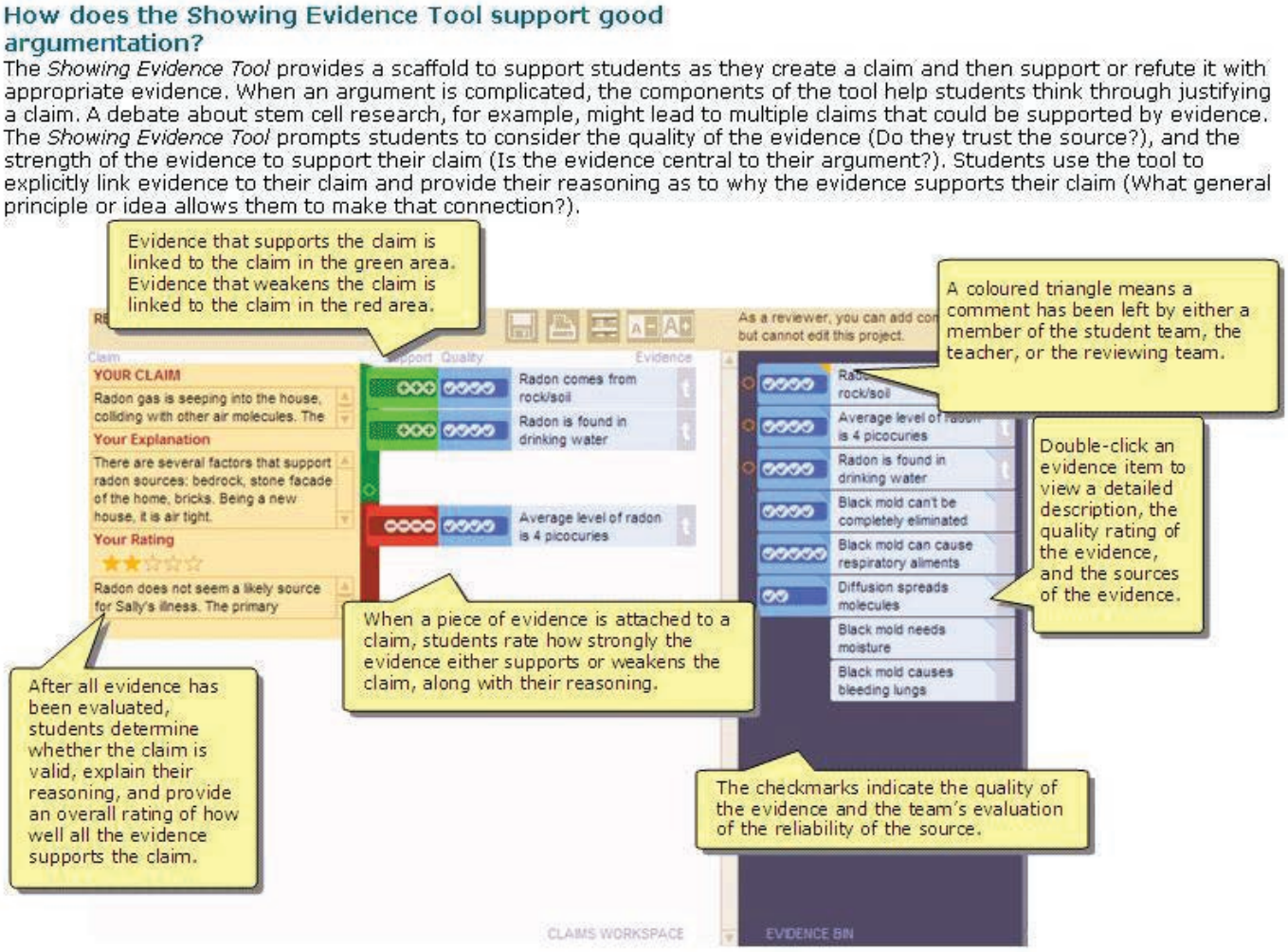
1 Identify the problem: What decision has to be made and what facts are required?
2 Identify the stakeholders: Who are they? What interests do they have? What power do they have? Who is vulnerable? How are the vulnerable to be protected?
3 Identify possible alternatives: What options are available? What are the likely consequences?

4 Identify ethical standards: Are there any applicable laws? Are there any morals or standards that could be applied? Is there a precedent?

5 Evaluate options: Identify strengths and weaknesses. Identify the option that causes least harm. Can the decision be reversed?

6 Make a decision: Select the preferred option. Justify the option. Inform all stakeholders of the decision.

Figures 4.3 and 4.4 provide some further tools for analysing problems and making decisions using visualisation to clarify issues and processes.



Intel Education

FIGURE 4.3 Intel Online Showing Evidence Thinking Tool helps students to construct well-reasoned arguments supported by evidence, using a visual framework

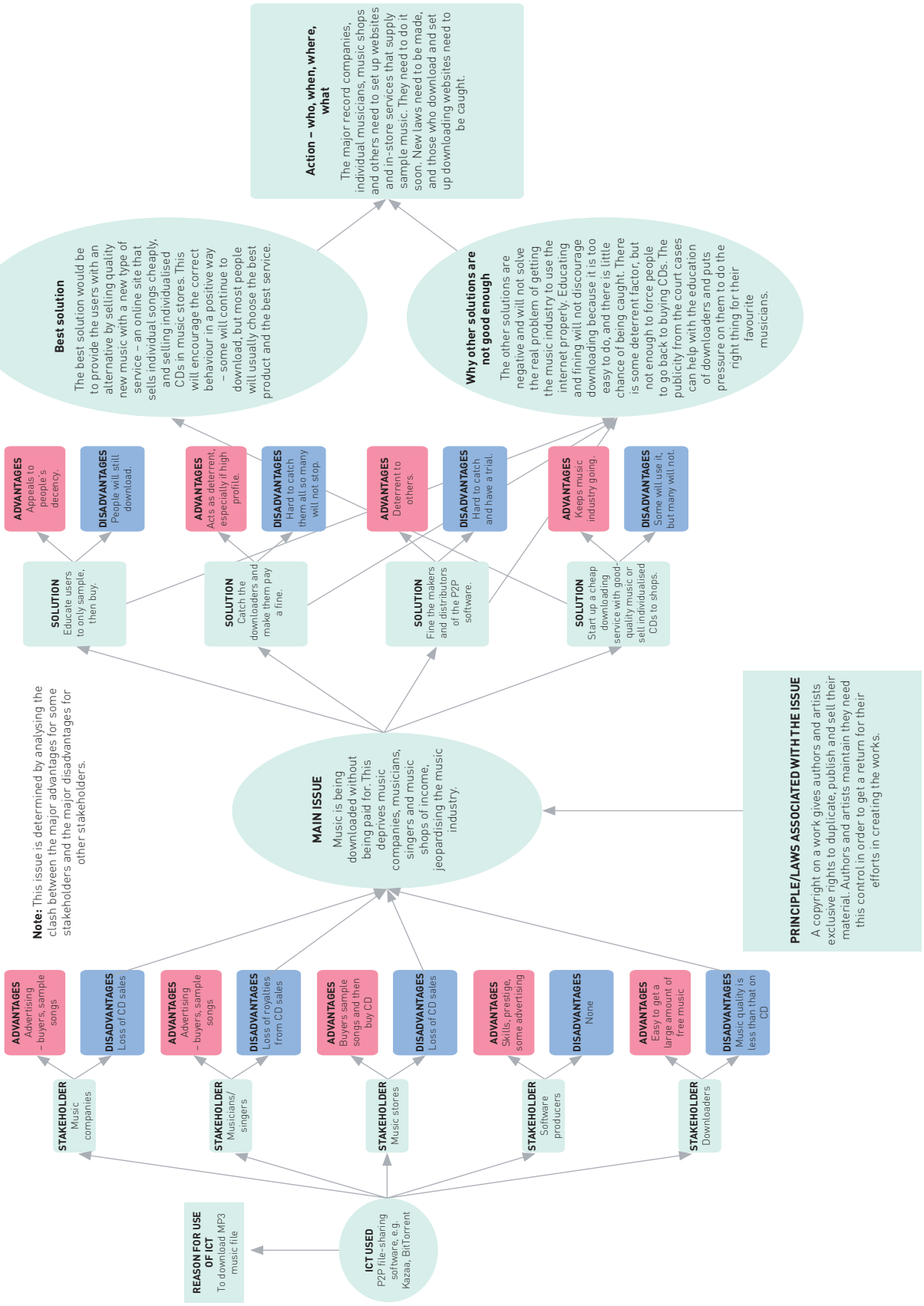


FIGURE 4.4 Visual analysis – the issues surrounding illegally downloading music

Information systems and sport

The growth in the number of people using social networking sites over the last 10 to 20 years has been amazing. One group that harnessed the power of social media are professional athletes.

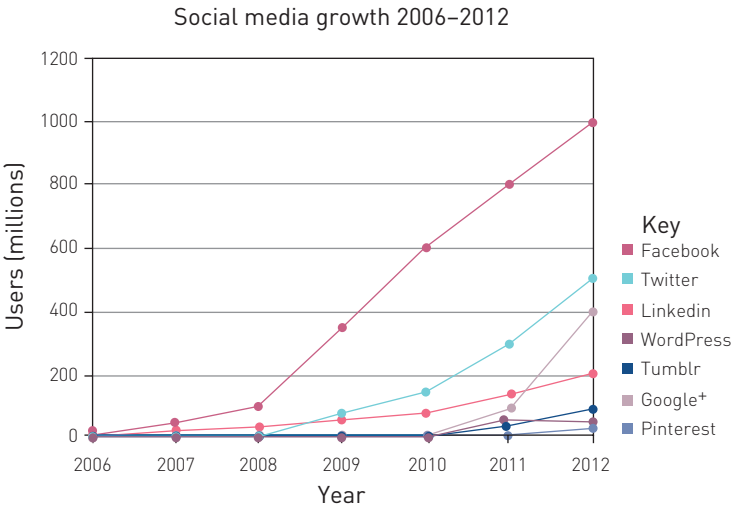


FIGURE 4.5 Growth in social media sites 2006–2012

There are many reasons why social networking sites have become so popular. Interacting with others online is one popular reason. Others reasons include seeking information and entertainment (for example, access to games or movies through social networking sites). Supporting a cause, expressing an opinion, or just for leisure are further reasons why social networking sites have become so popular. Organisations are trying to harness the power of social networking sites to help to promote and market their goods and services, while professional athletes use social media to connect and interact with their fans.

In addition to interacting with their fans, a number of sports stars have made considerable amounts of money by promoting particular products through their social networking accounts – for a fee.

But, along with the benefits that can be achieved through the use of social media, there are also many issues that athletes need to be careful of when broadcasting information to the public.

In June 2015, the account with the most followers on Twitter was Katy Perry with more than 70 million followers. The top sportsperson on the list was footballer Cristiano Ronaldo with more than 35 million followers.

Issues in sports

If a well-known athlete posted something with inappropriate language or information, it could quickly spread through cyberspace and come to the attention of the mainstream media. Not only can this reflect badly on the athlete, but also it may damage the reputation of any individuals or organisations connected with them. Consequently, the athlete may lose supporters and sponsorship deals.

Another issue facing athletes interacting with fans on social media is the potential for online abuse from strangers. Haters, trolls and even fans can leave abusive, racist or violent messages on social networking sites. In some cases, a professional athlete can be attacked relentlessly and consistently by trolls and these attacks can affect the performances of the athlete and even affect their personal or family lives.

Giving away strategic information or making opposition teams angry or upset is another area where athletes need to be careful when posting on social network sites. A seemingly harmless post about a team-mate's injury or clues to team selection may give opposition clubs an advantage.

An article appearing in the *Herald-Sun* newspaper in 2015 referred to the fact that social media was one of the biggest issues facing the AFL at present.

Collingwood star Dane Swan says he is fed up with 6 a.m. drug testing

Furthermore, athletes need to ensure that posts do not get them in trouble with either the sports authorities or the police. AFL footballer Dane Swan landed himself in trouble with the AFL in June 2011, after making a reference to drug testing procedures during the AFL season on Twitter. He later apologised for his outburst.

Reasons for the issues

One reason for the issues professional athletes encounter when they use social media is the instant nature of social media. If an athlete submits a post to a social networking site it will be instantly available for others to view. If the athlete has posted material they should not have, it is too late.

Another cause of athletes having problems when using social media arises from their rather sizeable following, whether friends on Facebook, or followers on Twitter or Instagram. Even if an athlete realises they have posted something they should not have, the chances are that a fan will see the post within minutes (if not seconds) of the post being displayed.

THINK ABOUT COMPUTING 4.4

Can you think of any other issues that sportspeople need to keep in mind when posting on social networking sites?

Digital systems involved

A particularly popular social networking site is Facebook, which allows users to create personal profiles, upload images and video, send messages and keep in touch with friends. There are a number of networking technologies that make up Facebook. One of the most popular components is the Wall, which acts as a bulletin board or forum where messages are left by other users and comments can be added. Status updates are a form of microblogging where a user can broadcast short announcements to their friends. The messaging service allows members to send short messages directly to one (or more) of their contacts without other friends seeing the message. Facebook contains a number of privacy options for its members. An individual can choose to allow anyone to see their information, choose if their information is searchable, keep parts of their profile private and restrict who can see their posts.

THINK ABOUT COMPUTING 4.5

What are your privacy settings on Facebook? Have you ever changed any of the privacy settings? Are you aware of all the privacy setting options?

Twitter is another popular social networking site used by athletes. It is similar in nature to the status update feature in Facebook, in that it is a microblogging site. Members post 'tweets' that other users can see. Unlike Facebook, the default setting for Twitter is public, meaning anyone can view the tweet – as long as the default settings have not been changed. Each tweet can be up to 140 characters and may include hyperlinks. Each tweet is sent to any user who has subscribed to the member's account, and a copy of the tweet will appear on the member's page on the Twitter website for public consumption. A feature of tweets is they can also include a hashtag (#), which acts like a metatag on a webpage to help categorise the tweet. Instagram is another popular social networking site. Like Facebook, it allows members to create a profile, but Instagram focuses on allowing members to upload and share images with others. Images can be posted to a number of social networking sites.

'Friends' in Facebook is a term to describe your user contacts. These contacts may or may not be actually known by the user, but once you add a 'friend' they usually have access to all the data you upload to the site.

Instagram also contains photo editing capabilities, allowing members to enhance the look of their images before posting online. Hashtags are also a feature of Instagram, which helps members to classify each image so others can search for a particular topic.

Details of a BBC study on social media abuse of premier league footballers during 2015

Key stakeholders

An athlete who uses social media appropriately may benefit from increased sponsorship and endorsement deals, just as an athlete that uses social media inappropriately may lose these types of commercial deals.

Fans benefit from being able to interact with their favourite sports stars, but many athletes have stopped using social media as a result of abuse on social media. Missing out on interacting with their favourite athletes means all fans are being punished because of the actions of a few.

A club or team may encourage team members to use social media because the publicity may help to increase membership or sponsorship. However, a decline in membership or sponsorship is also possible if an inappropriate or irresponsible post is made by someone within the organisation.

In addition, companies and organisations who invest significant amounts of money in both individual athletes and teams may quickly see their own brand damaged, as a result of an association that they have with an athlete.

FIGURE 4.6 A wide range of social networking sites

Information systems and agriculture

Agriculture involves crop cultivation, irrigation and harvesting; animal raising, reproducing and culling; as well as handling, transporting, packaging, preservation, processing, value-adding, quality management, storage and marketing, for both crops and animal products. Information systems and digital systems have been developed to assist with most, if not all, of these tasks.

Issues in agriculture

As new technology is being introduced, the amount of training required to be able to use and maintain the new technology is significant. This has caused problems when equipment breaks down and the farmer is not equipped with the skills (or equipment) to fix the problem, resulting in equipment sitting around for days or weeks waiting for a specialist to arrive to solve the problem.

Short- and long-range weather forecasts are another area that can lead to issues with the agricultural sector. Farming is considered one of the riskiest professions in Australia. The type and timing of each crop needs to be carefully planned. Weather forecasts are an important input to the decision-making process for farmers. In the long term, farmers want to know the weather conditions over the next few months to a year, because this will have an impact on their crops. On a daily basis, farmers need reliable information about daily weather conditions so they can make decisions regarding the tasks that will be completed on any given day. Spraying crops and controlled burning are example of jobs where the weather forecast plays a critical role. Getting the forecast wrong can have critical effects on farmers.

The New South Wales Department of Primary Industry publishes a periodical list of apps relevant to the agriculture sector.

Shutterstock.com/My Portfolio

FIGURE 4.7 Modern agricultural equipment – a combine harvester

Reasons for the issues

Many farmers are very skilled at manually fixing equipment but can be very inexperienced when dealing with modern technology and may need to be completely retrained. Also, farmers are often in isolated locations and it can take time for technicians and other professionals to visit farms to fix equipment.

Although technology has assisted in improving the accuracy of weather forecasts in recent years, forecasts, by their nature, are predictions and, like all predictions, there are times when unknown variables may come into effect.

New high-tech farming equipment can be a nightmare for farmers

Digital systems involved

The availability of technology that allows people in remote locations to communicate with others has significantly helped people working in the agriculture industry.

More specifically, global positioning systems are often used in farming, particularly to assist in surveying and fencing property boundaries. Global positioning systems are used to collect data about the topography and contours of properties, where this data is then used to determine the types and timing of crops for a particular property; weather forecasting systems also can be used as inputs to the crop planting process. Most modern farming equipment (for example, tractors and harvesters) come equipped with computing and sensor technology.

Bureau of Meteorology (BoM) forecasts under fire

Key stakeholders

All of these systems have been created to help workers or farmers complete tasks more efficiently, and effectively. This means that the task completed would be better than without technology. Although technology has helped the agriculture sector, there have been some problems along the way.

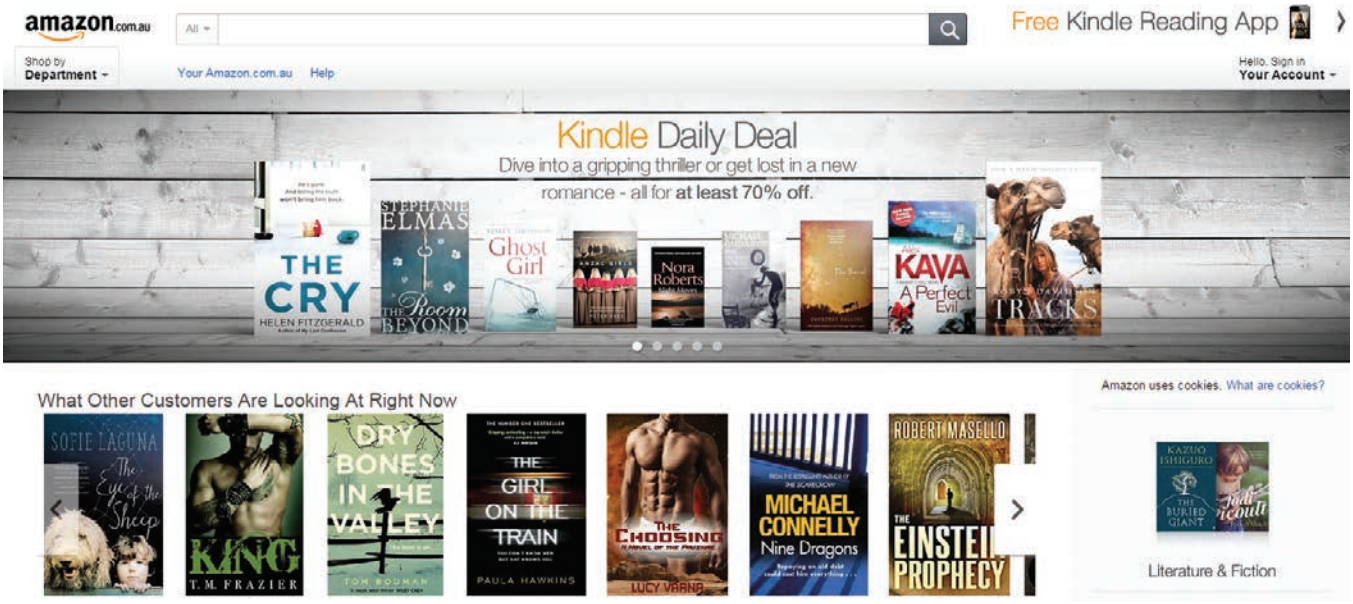
There are many people affected when things go wrong in the agricultural sector besides farmers. Staff, many who work on a casual basis, may have their hours reduced or lose their jobs. The general public can also be affected through the shortage of food or goods available to buy. During floods in Queensland in 2011, the price of bananas increased by more than 200 per cent of the normal selling price as a result of a shortage.

THINK ABOUT COMPUTING 4.6
Identify some other issues where information systems have created issues in the agricultural sector

Information systems and finance

With the advent of the internet during the 1980s and 90s, which helped to create a global computer network, individuals and organisations started to harness the power of the internet to conduct commerce or business transactions online. Many organisations started to set up e-commerce websites that allowed their customers to complete transactions online. Banks, florists, government departments, restaurants, shops and travel agents are all examples of businesses that embraced the chance to conduct business online.

By communicating electronically, it also allowed stores to start accepting payment by credit or debit card instead of cash only, banks introduced automatic teller machines and utility companies (for example, electricity, gas and water) started to accepted online payments of bills.



screen grab of Amazon.com.au at 4 July 2015

FIGURE 4.8 Online retailer Amazon.com was founded in 1994. Amazon.com.au launched in November 2013.

Issues related to e-commerce

With the popularity of conducting transactions electronically has come an enormous amount of issues regarding the security of the data and people involved in these transactions.

Many electronic transactions involve the use of a card, such as a debit or credit card, to complete the transaction. As a result of this, there is a possibility that the card data, including the card number, could fall into the wrong hands and the card could be used for additional transactions not made by the cardholder.

Card skimming often occurs when the customer's card is out of their sight; for example, at a bar or in a restaurant. Another common place for skimming to occur is at an ATM, where a skimming device is hidden behind the panel of the machine and skims the data as the customer inserts the card to complete a transaction. Often, a tiny camera will also be used in conjunction with the skimming device to capture the PIN that goes with the card.

Phishing is another method used to collect card data without the consent of the owner. As discussed in Chapter 3, phishing involves unauthorised people sending emails to individuals pretending to be; for example, a bank or some other type of financial institution, stating something along the lines that the person's account is locked and that to unlock their account the person needs email back their card details and PIN.

Another issue that has developed with the growth of e-commerce transactions is the issue of identity theft. **Identity theft** can be similar to card skimming in that hackers and other unauthorised people start to 'steal' data from individuals conducting e-commerce transactions. But, rather than just steal card details and PINs, they start to collect a wide range of personal and financial details about a person including their name, date of birth, address, work history, banking details and driver's licence number. Some of this data is easily accessible on social networking sites. Criminals have even been known to go through victims' rubbish bins to obtain one or two pieces of data they did not already have.

Once enough information is collected about a person, criminals then may be able to apply online for a credit card or loan, without the knowledge of the victim. Often they change the victim's postal address so no documentation is received and, in some cases, the first the victim hears about these credit cards or loans is when either debt collectors start chasing them for default repayments or they are refused a new credit card or loan.

THINK ABOUT COMPUTING 4.7
What year did the first online shop appear? Was Amazon the first online bookshop?

AAP Image/Queensland Police

FIGURE 4.9 False card reader containing card skimmer added to an ATM

ISSUE Identity theft hits one in five: study

July 5 2012, Alexandra Smith and Dominic Bossi

One in five Australians have had their identities stolen or had their personal or financial data illegally accessed, with credit card crime such as skimming one of the major problems plaguing consumers, a new study suggests.

The Australian Debt Study, released today, shows that Australians aged 35–49 are the most likely group to fall victim to identity fraud while 18–24 year olds are the least likely to report illegal access to their personal or financial data.

The data intelligence group Veda, which surveyed more than 1000 Australian adults, also found that people earning more than $70,000 are much more likely to be targeted for bank account and credit card crime than those earning $40,000 a year or less and cases of identity theft and financial fraud are highest in Western Australia and NSW.

Findings also show that almost one in three Australians suffered some form of credit crime and lost their wallet containing credit cards and identification.

Matthew Strassberg, a Veda senior advisor said: "Identity crime is a thriving industry in Australia, with the Australian Bureau of Statistics estimating the cost of personal fraud to consumers at $1.4 billion dollars a year.

"Whilst credit card fraud is a common form of identity crime, many people do not realise that with only a small amount of personal data, an identify thief could take out a second mortgage on a house, or open up a new line of personal credit and purchase items in their name or under a false identity."

The results of the study come as a 29-year-old Mascot man was yesterday charged with the alleged possession of ATM skimming devices, hundreds of bank cards and seven duplicating machines.

Police spoke to the man and searched his van after he had allegedly parked illegally on Darling Point Road, Darling Point at 12:30pm on Wednesday. He will appear at Downing Centre Local Court on July 25.

[July 5 2012, Alexandra Smith and Dominic Bossi] Sydney Morning Herald

Reasons for the issues

When financial and e-commerce transactions are conducted, sensitive data is transmitted. This attracts criminals who try to use this opportunity for their own personal gain. The techniques and practices that criminals used to try and capture financial data are always changing and being refined.

Another reason that these issues occur is that often the victim is unaware of the dangers that they are putting themselves in by conducting an e-commerce transaction, whether handing over their credit card in a restaurant, purchasing goods online or replying to an email or phone call from the 'bank'.

Digital systems involved

Card skimming involves stealing the data stored on a card's magnetic strip, using a card reading device. The card data is then copied onto a 'clone' card, which is then used for unauthorised transactions, or the card data is used in online transactions where the card does not need to be shown.

Another method used to capture card details is while they are been sent across the network from one location to another. The data is sent across the network in packets and it is possible that these packets can be intercepted by unauthorised people as they are travelling between devices. Once intercepted, the data within each packet can be read and, if useful, then used.

Phishing often involves sending emails pretending to be from a financial institution. The email may include the same font and logo of a real organisation, but often the email address itself may be a giveaway.

Identity theft involves the uses of a variety of digital and physical methods to collect data from the victim.

Key stakeholders

The issues around e-commerce can have far-reaching consequences. For a victim of either card or identity fraud, not only could he or she lose money initially, but any defaults regarding their repayments may be recorded on his or her credit report, which could result in credit applications being declined for years to come. Also, there is always the possibility that the criminals involved may try to use the data again.

Businesses are also affected by identity theft. Banks and financial institutions may cover some or all of the cost of money lost through card or identity theft. This in turn gets passed onto the other customers of the organisation through higher charges or interest rates.

There are a number of precautions individuals and organisations can take to reduce the chances of card or identity theft. Firstly, they can limit the amount of information provided on social networking sites. Many online accounts get users to create security questions – used to reset the password if forgotten. Often the answers to these questions can be found on personal profile sites like Facebook. Cover the keypad when using an ATM. This may not stop the card being skimmed, but may stop the scammers getting the PIN that goes with the card. Do not complete e-commerce transactions on public computers such as those in internet cafes or on

unsecured wi-fi networks, so data cannot be stolen using spyware or keylogging software. Only give personal and banking details on trusted websites and do not respond to emails or SMS messages asking you to give sensitive details such as the username and password of an account – phone the organisation directly if you are unsure. Only give sensitive information on sites that use a secure protocol, where encryption is used to encode the data, so if it is intercepted, it will not be understood.

THINK ABOUT COMPUTING 4.8
Create a list of other issues that may result from completing transactions online.

Shutterstock.com/ Jozsef Bagota

FIGURE 4.10 Secure protocols

Information systems and health

Electronic health records (EHR) are used to collect the medical history of a patient. An EHR holds personal details including age, height and weight, medical history, medications previously prescribed, allergies, blood-test results and more. The data is saved in a digital format that allows the history, or elements of the history, to be shared over a networked environment, the internet and shared between information systems. The system ensures that a complete patient's history is available, in the one location, when required. An EHR helps to reduce duplication of data as only one copy of the file exists. This also reduces the chance of input errors and helps to improve the **integrity of data**.

Dreamstime.com/Pandpstock001

FIGURE 4.11 Electronic health record (EHR)

Issues in health

With all the advantages that an EHR brings there are a number of problems associated with its use. Patient privacy is a large concern related to the growth of EHRs. A significant feature of the electronic records is that, because they are transferable between the multiple health professionals a patient may consult, the chances of the records being sent to the wrong location or accessed by unauthorised staff, either accidently or on purpose, is significantly increased.

The problem of user dependency has also arisen in the use of EHRs. A hospital in Western Australia faced a situation where, because of a network failure, the hospital was without access to any of its digital systems, including EHRs of its patients, for more than 14 hours. The problem was caused by a fault with the hospital's data centre, which was located in Spain.

A study into EHRs found that some medical professionals were reluctant to use a new type of information system.

> Emergency physicians noticed that Electronic Health Records disrupted workflow and was less desirable to use. The health information exchange systems need to adapt to the needs of the end user to be both useful and useable for emergency physicians.
>
> Emergency Physicians' Perspectives on Their Use of Health Information Exchange, Thorn, Shirley A. et al., *Annals of Emergency Medicine*, Volume 63, Issue 3, 329 – 337

Reasons for the issues

The ***Health Records Act 2001* (Vic)** is a set of laws that protect the rights of an individual's health records. The act outlines what data can be collected, how the data can be used, who has the right to access the files and even how the data must be stored. The *Health Records Act 2001* (Vic) applies to all medical records in Victoria, in both the public and private sectors. There are 11 Health Privacy Principles (HPPs) contained in the Act, which outline how medical data must be handled.

THINK ABOUT COMPUTING 4.9
Create a list of the 11 Health Privacy Principles contained in the *Health Records Act 2001* (Vic).

Digital systems involved

An EHR stores the data and information regarding an individual's health history on a server in the one location. As the record is stored in the one location, whenever the data in the record is updated or changed it will ensure that the record remains complete and up to date.

The EHR will be accessible via a network connection, so it allows the data and information to be portable. For example, if the patient needs to see a specialist for the first time, the specialist will be able to access the patient's full medical history via a network connection.

Key stakeholders

The patient involved will benefit from an EHR because whenever they need medical attention their full medical history will be available to the health professional they are visiting. Nonetheless because the health records will be stored on a network environment, there is a chance that the records may be accessed by unauthorised users.

Health professionals will also benefit from the use of EHRs as complete patient histories will be available, to assist in providing the best treatment possible. Yet health professionals still need training and support to be able to use the new information system as effectively as possible.

ISSUE Fiona Stanley Hospital systems crash

Daniel Emerson, 16 February, 2015, 5:51 a.m.

Doctors, nurses and administrators at Australia's most technologically advanced hospital were reduced to scribbling on paper when WA Health's computer systems crashed for more than 14 hours.

Fiona Stanley Hospital reverted to 'downtime procedures' during a Statewide outage after the department's main data centre in Malaga, run by Japanese technology giant Fujitsu, failed early this month.

It is understood lightning storms caused the problems on February 1.

A Health Department spokesman said the crash resulted in the loss of clinical and non-clinical computer applications and the IT network, including email, from 2.55pm until 5am the next day.

Staff had to use pens and paper and then enter patient data once the system came back online.

'The health information network staff, together with the vendor (Fujitsu), responded immediately to convene management, resolution and a review of the impact to health care services,' the spokesman said.

'Hospitals also enacted their downtime procedures and hospital business continuity plans to ensure patient safety was never compromised.'

Bankwest, which also uses the data centre, had crashes to its phone and online banking, ATM and EFTPOS services.

[Daniel Emerson, 16 February, 2015] The West Australian

AAP Image/Richard Wainwright

FIGURE 4.12 Fiona Stanley hospital had to respond to an information systems crash.

Expressing opinions

There are many ways a user of an information system can express their opinion about the system online.

THINK ABOUT COMPUTING 4.10

There are many more information systems used in the health sector besides EHR. Can you think of any? Can you think of any issues that may arise from their use?

Social media

Social media are common outlets where users can broadcast their opinions on information systems. Social media sites allow the user, with a few keystrokes, to express an opinion that potentially can spread quickly without much effort. They can then quickly interact with others with opinions on the same system.

There are many social networking sites with sites or topics devoted to the Myki ticketing system used for public transport in Melbourne and the surrounding areas.

When a group of users interact using social media, this may assist in promoting a cause or encouraging action.

Search #Myki to see the social media discussions around this topic.

Forums and bulletin boards

Forums and bulletin boards are also platforms that allow users to express their opinions about information systems.

Many organisations attach a forum page to their website to allow their visitors to share and discuss information and to offer their opinions, while some websites function solely as a forum or discussion board.

Whirlpool is a website created to cater to broadband internet users. It contains one of Australia's biggest internet forums that specialises in information and digital systems.

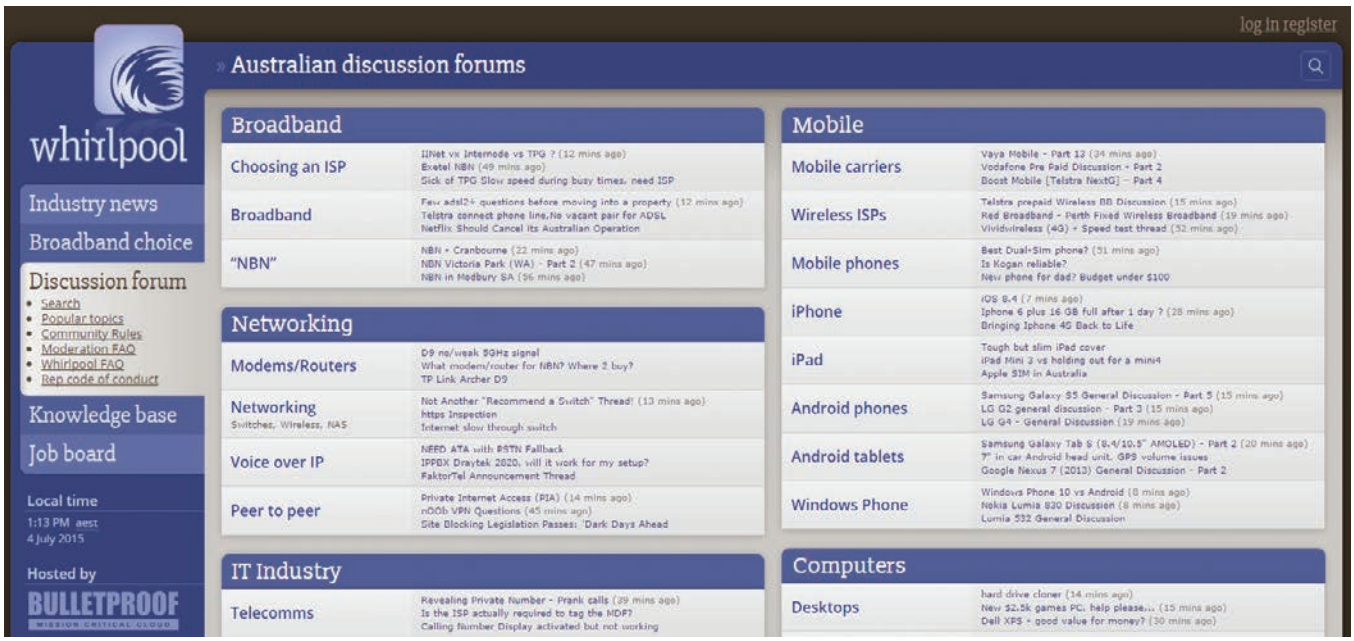


FIGURE 4.13 Whirlpool forum

Ratings systems

Some websites set up rating systems so that users can give feedback about information systems.

Rating system allow the user to give feedback about the information product in a quick and efficient manner. Many sites use a five-star rating system but many variations of rating systems are used on different sites

Also many sites allow a user to give feedback by leaving comments. This offers an advantage over a traditional rating system, because the user can be more specific about what they did or did not like about the system. The comment can be similar to a forum post in that other users can read the opinion and the comment might give more detail about how the system operates. Also, potential users tend to trust the opinions of their peers much more than any organisation-driven marketing or advertising campaign. Finally, online comments allow the organisation to get honest feedback regarding the strengths and weaknesses of their products or services.

CBS Interactive Inc.

FIGURE 4.14 Five-star rating system

CBS Interactive Inc.

FIGURE 4.15 Comment feedback

Methods and techniques to acquire data and information

When investigating issues associated with the use of information systems, you need to use a variety of primary and **secondary data**.

The best research uses both forms of data, as they can be used to explore issues more comprehensively. For example, secondary sources can provide questions to be used in primary research and, in return, primary research can provide ideas that need further secondary research. The good place to start is with a review of secondary sources related to the information system.

Primary data collection methods

Primary sources involve collecting data from the stakeholders involved in the information system issue directly. A number of methods can be used to collect data first-hand. Interviews, observations and surveys are all common methods of collecting **primary data**.

To collect data either by interviewing, observing or surveying can provide different insights and often more in-depth data than information from secondary sources. The data will often be more up to date and can provide unusual and important insights into issues, especially at the immediate local level, than secondary sources can, because secondary sources often present overall conclusions and general summaries.

Interview

An interview involves a conversation between two or more people where questions are asked and the interviewees give their answers to the question. Interviews are useful as the in-depth responses can be elicited from the people involved. A range of questions can be asked and the conversation can change focus at any stage depending on the nature of the responses.

An advantage of the face-to-face interview technique is that both non-verbal signals and emotions can also be picked up by the interviewer. A user's enthusiasm for an information system may not be totally captured by a phone interview technique alone, because body language and facial expression may also paint some of the picture. The same may apply to issues and areas of concern that the user may be reluctant to discuss or only want to give brief generic answers.

Disadvantages of interviews is they can be time consuming as the interviewer obviously needs to be present throughout the process, this, in turn, makes interviewing a relatively expensive data-collection method. As a result, this may limit the number of interviews that take place to only a handful of key stakeholders.

Observations

Observation involves watching users interact with an information system to collect data where and when the activity is taking place.

An advantage of observations is that the observer does not have to rely on other people's responses to or opinions about the system. The observer is seeing for themselves how the system is operating. Observation techniques include making mental and physical notes and taking photographs.

One disadvantages of collecting data through observations is that the people, knowing they are being observed, may act and behave differently to how they would normally. Also, observations may help identify issues with an information system but may not uncover the underlying reasons for them or effects the issues are having and, similar to interviews, observations can be very time consuming and expensive to conduct.

Surveys

Some online surveys, called 'dynamic surveys', are designed to show different questions based on the answers given to previous questions. This is known as question routing.

Surveys are a popular method of collecting primary data. A survey consists of a series of predetermined questions that can then be sent to a participant. The responses to each question might involve selecting from a list of alternatives, similar to a multiple-choice question, may involve writing a comment or a combination of these methods. Techniques for conducting surveys include in person, over the phone, through the post or online.

The biggest advantage of a survey is that it can collect opinions from a wide range of people in an inexpensive and timely manner. Surveys can be sent via email or conducted through a website to get the opinions of hundreds or thousands of users. Some people find completing a survey less intimidating than an interview, so therefore may be prepared to give more honest feedback, particularly if the survey is anonymous.

Shutterstock.com/Andrey_Popov

FIGURE 4.16 Online survey

Disadvantages of surveys include surveys not being completed or only partial completed. Some participants may not take much care or effort in the way they answer the questions on the survey. Another disadvantage is that data collected is based solely on the questions asked. Unlike an interview, in a survey it is difficult to change the course of the questions or ask for in-depth answers, as the structure of the survey is often fixed.

Qualitative and quantitative data

When collecting data, the data can often be grouped into one of two categories, **qualitative** or **quantitative data**.

Preferably, the primary data you collect would be quantitative data, because this is much easier to process into information.

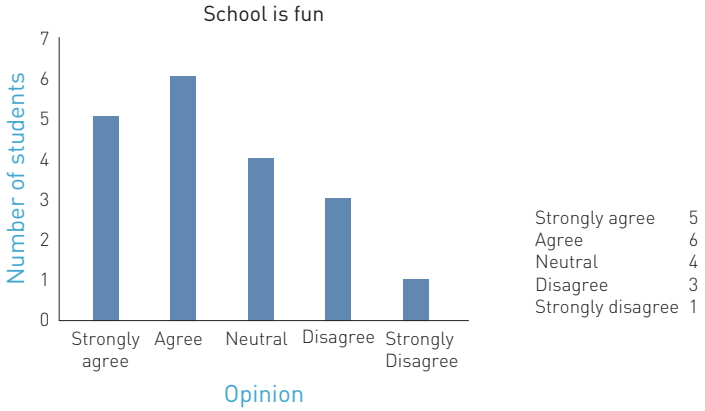


FIGURE 4.17 Example of quantitative data

Unfortunately, not all data required can be collected in this format. Qualitative data is also required, as personal opinions and ideas also make up part of the story. Qualitative data is harder to manipulate into information as the type and number of possible responses make this difficult. Methods are required to manipulate the data into useful information.

Wordclouds are one tool that may be useful in manipulating qualitative data. Each time a word appears in a block of text the font size of that word is increased in the word cloud.

FIGURE 4.18 A wordcloud created using the study design for VCE Computing

A **histogram** is another tool that may help to process qualitative data. Although histograms are used to represent graphically the distribution of numerical data, they can also be used to represent qualitative data. To do this, you first have to sort the data into groups or categories. The illustration below shows an example of a histogram being used to convert qualitative data into a quantitative format. After the opinions were collected about their favourite thing at school, these opinions were classified or grouped into broad categories. The frequency of each group was then converted to a graph.

What is your favourite thing about school?

RAW DATA

Teachers are nice	Home time
My friends	Physical education
French is fun	Range of subjects
Close to my house	Ms Neil my maths teacher
School canteen	English
My science teacher	Playing with friends
I feel safe	Mr Brown

FREQUENCY DATA DRAWN FROM RAW DATA

Subjects	4
Teachers	4
Friends	2
Safety	1
Other	3

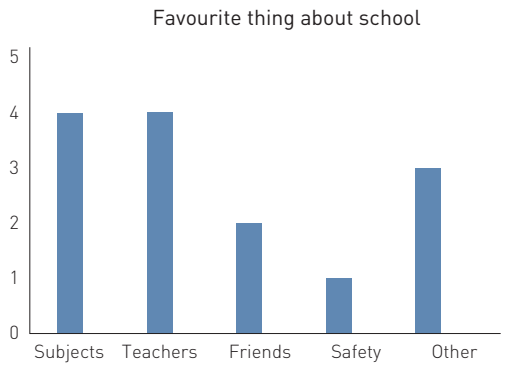


FIGURE 4.19 Example of qualitative data being converted to quantitative data

Secondary sources

Secondary sources were traditionally books, newspapers and journals, and they were often mainly accessed in libraries (Figure 4.20). Nowadays, many secondary sources can be found on the internet, and they come many formats, including text, audio and video. However, despite the easy access to information that the internet affords, do not discount libraries – the reference staff are often able to provide you with better quality, more relevant secondary data.

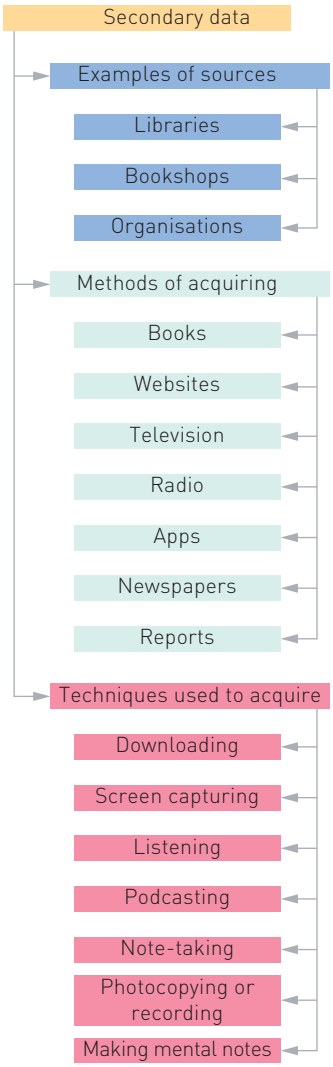


FIGURE 4.20 Secondary data: Sources, methods of acquiring, and techniques used to acquire

Although Wikipedia is a popular and convenient source of data and information, that does not mean the information on it is true.

No matter which secondary sources you use, the quality of the information needs to be evaluated carefully. A good technique when using data from secondary sources is to find two or more sources that confirm the same findings.

Referencing secondary sources of data

Referencing primary sources was discussed in Chapter 1.

There are a number of methods that can be used to reference both primary and secondary sources of data.

The **Harvard referencing style** is also referred to as an author–date style of referencing.

TABLE 4.2 The Harvard referencing system

In-text reference	Reference list
This book looks at how individuals and organisations use, and can be affected by, information systems in their daily lives. *Lawson et al* (2016, p. v)	Lawson, J., Keane, T., Kelly, M., Potts, C., & Sullivan, A., 2016, *Computing VCE Units 1 & 2* 6th edn, Cengage Learning Australia, South Melbourne.

Guide to Harvard referencing method, University of Sydney, 2010

TABLE 4.3 Referencing a website using the Harvard style

In-text reference	Reference list
Usually the author or creator of a work is the copyright owner (University of Sydney 2010, 'Who owns copyright?' para. 1). Note: The heading of the section was 'Who owns copyright?'	University of Sydney 2010, *Guide to copyright*, University of Sydney, viewed 24 January 2011, http://sydney.edu.au/copyright/students/coursework.shtml#who

Many universities publish guides to the Harvard referencing method.

Data integrity

Data integrity refers to the quality of the data held. There are a number of ways that can be used to measure the quality of data. This includes accuracy, correctness and reasonableness.

Accuracy

Measures should be put in place to help reduce the chances of incorrect data being entered. Validation techniques are often used on forms and surveys that may reduce the chances of incorrect data being entered, increasing the chances that the data is accurate. Many online forms include validation techniques such as radio buttons, dropdown lists, checkboxes, date time pickers and so on, to make it easier for the user to enter data and to give them less scope to make an mistake.

THINK ABOUT COMPUTING 4.11
Other referencing methods include the American Psychological Association (Latest Edition), Chicago, and Institute of Electrical and Electronics Engineers (IEEE). Explain any differences between the methods.

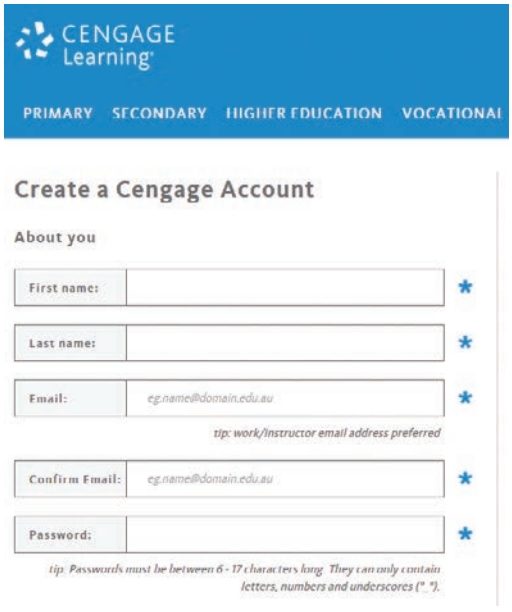


FIGURE 4.21 Input form with validation to reduce the chance of errors

Correctness

The data collected needs to be suitable for its purpose. Is the data collected relevant to the issue being investigated? Is the data collected in a suitable format? Can qualitative data be converted to quantitative data so it can be manipulated? Or is the data collected in a correct data type? Can an audio interview then be converted into text so a wordcloud of the conversation can be created?

THINK ABOUT COMPUTING 4.12
Think of other websites where you have been asked to enter data. What other types of validation techniques are used to help improve the reasonableness and accuracy of the data?

Reasonableness

Reasonableness is related to whether the data collected is normal or acceptable for that type of data item. If collecting data about a student's age, if the data entered were 'apples' this would not be reasonable for this data item (age). Validation techniques can again be used to help to ensure that the data is reasonable.

Storing shared files

In simple terms, **cloud computing** means storing data, information and software on a server located in remote location, rather than on your computer's hard drive. The data, information and software would be accessed via an internet connection.

The 'cloud' is a metaphor for the internet. Traditionally, network diagrams would represent an internet connection as a cloud symbol, so the practice of saving data and information to a remote location, using an Internet connection, was referred to as cloud computing.

The location of the remote servers will depend on the organisation hosting the data. Large organisations, such as Apple and Microsoft, will have numerous data centres set up in different locations around the world. Some smaller cloud providers may only have a data centre in one location.

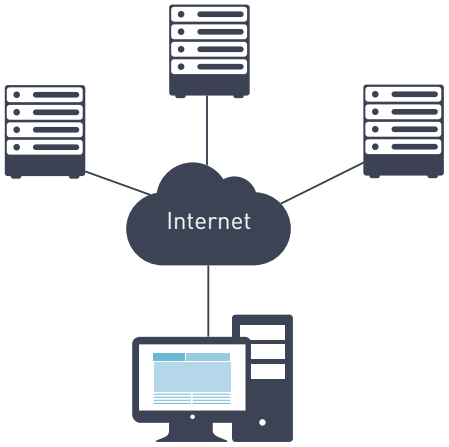
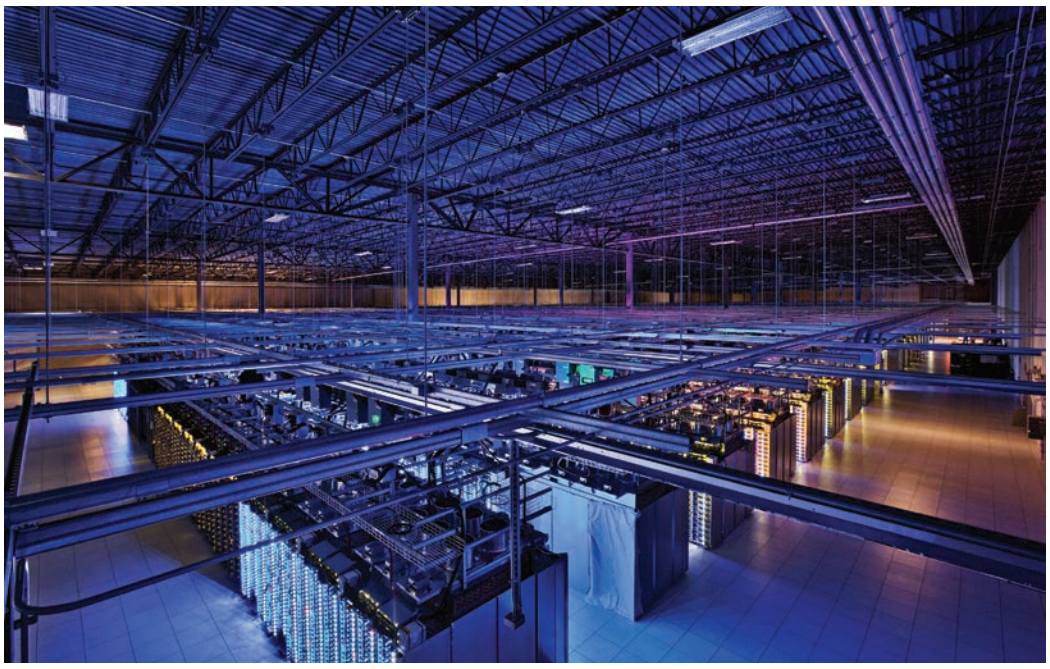


FIGURE 4.22 Network diagram representing the internet as a cloud symbol



Getty Images/Craig Mitchelldyer

FIGURE 4.23 Google's data centre in Council Bluffs, Iowa

Advantages

THINK ABOUT COMPUTING 4.13
Think of some organisations who offer cloud services for free. Why do you think they would be happy to provide this free service?

There are a number of advantages to using a cloud service for hosting or storage.

- Data and information can be accessed using any device.
- Data and information can be accessed from any location.
- It saves storage space and system resources on the user's computer.
- Data is stored in a remote location so in the event of a local disaster, the data will be safe.
- If a copy of the data is stored on the cloud, it automatically creates a backup of the data.
- It can save money as the user does not need to purchase any storage media, such as a file server.
- Data and information can be shared by nominated groups of people.

Disadvantages

There are also a number of disadvantages of using a cloud service for storage or hosting.

- Privacy of data is a concern.
- The level of security at the data centre is unknown.
- If a user's internet connection goes down, then the data cannot be accessed.
- Client data can be lost if the cloud service provider goes out of business.
- The location of the data centre storing the data is often unknown.
- Data could be stored in a country where different laws apply, which could compromise the safety of the data.

Mobile devices and web design

As the number of users using a mobile device to access webpages has rapidly increased, the importance of designing a website for use on a mobile device has become more important.

Many organisations have created separate sites linked to the one URL: One for desktops and notebooks and another site designed for use by mobile devices. When visiting the URL, the system will detect the type of device being used and show the site appropriate for that device.

FIGURE 4.24 Web design for mobile devices

Some of the factors to consider when designing a website for use on a mobile device include the following.

Screen size

The size of the screen will have a significant impact on the design of the webpage. Compared with a website created for use on a desktop or notebook computer, the amount of information that is visible at the one time is significantly reduced when the site is viewed on a mobile device.

Screen resolution

The resolution of the display also needs to be taken into consideration. Resolution is often measured in dots per inch (DPI). The higher the resolution, the higher the quality of the webpage. This may affect the amount of information that can displayed at once or influence the types of input methods used.

Input method

Desktops and notebooks are generally used with a keyboard and mouse. Mobile devices may not have the same options of input methods. Some devices have in-built keyboards, some touch screen capabilities, others use a stylus. The type of input method will need to be considered when designing the website. Should the site have a menu system? Is text entry required? Can all the functions of the site be operated by buttons?

Speed of data transmission

The speed of the internet connection also needs to be considered. With new cellular 4G connections, data download speeds have improved significantly. This has reduced the time taken to download and view larger file types such as audio and video files. But not all devices may be able to access a network with transmission speeds fast enough to download larger file types.

Cost of data transmission

The cost users pay to transfer data also needs to be considered when designing the functions to include in the website. Many mobile devices use plans with data limits or caps, so limiting the amount of data required to view the website would be optimal.

Device resources

Mobile devices may contain components with less capabilities than desktop and notebook devices. CPU, RAM capabilities may be significantly less powerful and the amount of hard disk space significantly less. This may affect the design by reducing the amount of data required or the processing needed to view the site.

Battery life

As mobile devices, due to their nature, generally use a portable power supply (battery) the website should be designed in a way that reduces the drain on the battery. High-resolution videos, animation and bright colours should be avoided.

CHAPTER SUMMARY

ESSENTIAL TERMS

card skimming a practice where the data from a card's magnetic strip is copied, using a card reader device; the card data is then copied onto a 'clone' card, which is then used for unauthorised transactions or the card data is used in online transactions where the card does not need to be shown

cloud computing storage of data at a remote location, rather than on the user's device

copyright a form of intellectual property, copyright states that the creator of the original work (e.g. song, movie or game is the legal owner of that work and has the exclusive rights on how that work can be used and distributed; in Australia, laws relating to copyright are contained in the *Copyright Act 1968* (Cth)

e-commerce the buying and selling of goods and services, or transferring funds over a computer network, commonly the internet

electronic health record (EHR) a digital copy of an individual's medical record

forum an online bulletin board where users can post, read messages, and leave replies; also known as a discussion board

Harvard referencing style a method of referencing primary and secondary data sources

***Health Records Act 2001* (Vic)** a set of laws that protect the rights of an individual's health records in Victoria

histogram a tool that may help to process qualitative data. Although histograms are used to represent graphically the distribution of numerical data; they can be used to represent qualitative data, if it is first sorted into groups or categories

identity theft stealing individual pieces of information about a person, until the thief has enough data to take out a loan or a credit card in the victim's name or otherwise impersonate the victim

information system a structure consisting of a combination of a digital system (hardware and software), data, processes and people that interact to create, control and communicate ideas and digital solutions

integrity of data relates to data quality's three characteristics: accuracy, correctness and reasonableness

peer-to-peer file sharing a method of transferring files often used to transfer files illegally

primary data data collected directly (first-hand) from the stakeholder involved in the issue

qualitative data subjective data about qualities – opinions, comments and personal experiences that are difficult to measure or manipulate

quantitative data objective data about quantities – it is numeric data that is easy to interpret

secondary data data from another source that has already collected the primary data; for example, a newspaper, or a website

stakeholders people affected by a given issue

streaming allows the users to start viewing a file before it is completely downloaded

wordclouds a tool that may be useful in manipulating qualitative data; each time a word appears in a block of text, the font size of that word is increased in the word cloud

CHAPTER SUMMARY

IMPORTANT FACTS

1 Issues arise when an information system causes tension and conflict between stakeholders.
2 The *Copyright Act 1968* (Cth) outlines the laws related to copyright.
3 A breach of the *Copyright Act 1968* (Cth) could result in fines or imprisonment.
4 Many artists are losing out financially as a result of illegal downloading.
5 Many sportspeople use social media to socialise with their fans.
6 Posting of inappropriate information has damaged the reputation of some sportspeople.
7 Online abuse has led some sports stars to stop using social media.
8 Opposition teams have been given an advantage through leaked information on social media.
9 Popular types of social media sites used include Facebook, Twitter and Instagram.
10 Information systems are heavily used in the agriculture sector.
11 Changing practices in the industry are causing conflict between the stakeholders.
12 Incorrect weather forecasts can have significant impact on the farming industry.
13 E-commerce has developed with the development of the internet.
14 Precautions to help avoid card and identity theft include limiting the amount and kind of information posted on social networking sites, covering your hand when entering a PIN at an ATM, and avoiding using e-commerce websites on free or open wi-fi networks.
15 The *Health Records Act* (Vic) includes 11 Health Privacy Principles.
16 Issues related to Electronic Health Records include medical staff resistance to change and user dependency.
17 Social media is a popular way for users to express their opinions of an information system.
18 Rating systems and comments are other ways in which opinions can be expressed.
19 Interviews, observations and surveys are methods of collecting primary data.
20 Word clouds are a method used to visualise qualitative data.
21 Histograms can also be used to visualise qualitative data, if the data can be grouped.
22 When using secondary data it is very important to check the quality of the data.
23 Advantages of cloud computing include accessibility, portability and reducing expenses.
24 Disadvantages of cloud computing include security, privacy and legal concerns
25 Factors to consider when designing a website for use with mobile devices includes screen size, screen resolution, input method, data transfer speed and cost of data transfer.

TEST YOUR KNOWLEDGE

Review quiz

INFORMATION SYSTEMS IN ACTION

1 List the four components of an information system.
2 Explain what the term 'digital system' means.
3 Describe how an issue can occur in relation to an information system.
4 Explain what the term 'stakeholder' means.
5 List three reasons why people illegally download files.
6 Identify a situation where downloading a file may be legal.
7 Define 'copyright'.
8 Explain how the concepts of copyright and intellectual property are related.
9 Name the Act outlining laws about copyright in Australia.
10 Explain how peer-to-peer (P2P) file sharing works.
11 Contrast downloading with streaming.
12 Outline how artists may be disadvantaged by illegal downloading and streaming.
13 Explain why sportspeople might use social media sites.
14 Discuss three ways that social media may become problematic for sportspeople.
15 List three social networking sites often used by sportspeople.
16 Explain the purpose of a hashtag.
17 List some uses of GPS in the agricultural sector.
18 Discuss some of the negatives around the introduction of new technology in the agricultural sector.
19 Explain how incorrect weather forecasts can cause issues for farmers.
20 Explain why e-commerce has become so popular.
21 Define 'card skimming'. List two places card skimming may occur.
22 Explain what 'phishing' means.
23 Explain how identity theft is different to card detail theft.
24 Discuss three precautions people can take to reduce their chances of both card and identity theft.
25 Explain the type of data held in an Electronic Health Record (EHR).
26 Outline two issues arising from the use of an Electronic Health Record (EHR).
27 Name the Act that outlines the laws relating to the use of medical records in Victoria.

EXPRESSING OPINIONS

28 Discuss why social media sites are a popular outlet to express opinions about information systems.
29 Explain an advantage of using a five-star rating system as a method of collecting opinions.
30 Describe the advantages of written comments over a rating system for opinions.
31 Explain how a forum operates.

METHODS AND TECHNIQUES TO ACQUIRE DATA AND INFORMATION

32 Explain the difference between primary and secondary data sources.
33 Discuss when an interview would be preferable to a survey when collecting data.
34 Discuss when a survey would be preferable to an interview when collecting data.
35 Outline one method to assess the reliability of data from a secondary source.
36 Explain how qualitative data differs from quantitative data.
37 Describe how a wordcloud works.
38 Explain how a histogram can be used to process qualitative data.
39 Name two methods used to reference primary and secondary sources.

DATA INTEGRITY

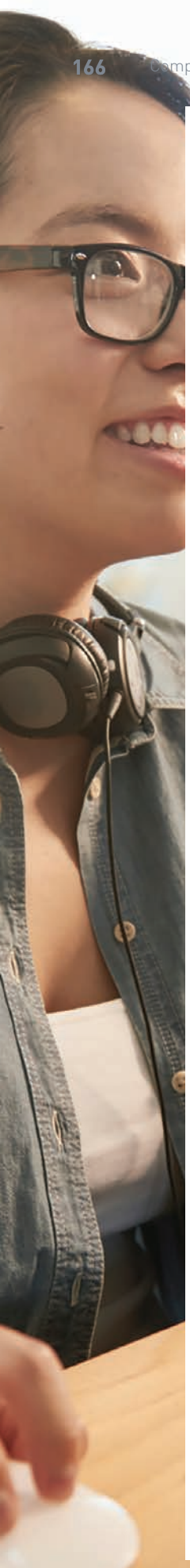
40 List the three characteristics of quality data.

STORING SHARED FILES

41 Define 'cloud computing'.
42 List three advantages of cloud computing.
43 List three disadvantages of cloud computing.

MOBILE DEVICES AND WEB DESIGN

44 Explain why websites used in mobile devices need to be designed differently to websites used on notebooks or desktops.
45 Distinguish between screen size and screen resolution.
46 List three ways that data may be entered into a mobile device.
47 Explain how the speed of transmission differs to the cost of transmission.



APPLY YOUR KNOWLEDGE

Practise analysing information systems issues and problems before attempting Unit 1, Outcome 3.

For each of the following situations:

- outline the nature of the issue
- identify any legal, social, environmental or ethical factors related to the issue
- describe the information system being used
- identify the stakeholders involved
- explain how each stakeholder identified is affected by the issue.

ISSUES

1. An employee uses her computer at work to make comments about the workplace, her employer, her supervisor, fellow workers and customers on her Facebook page. Some of these people have noticed the comments and are not happy about them. They have asked that she be sacked.
2. A family has noticed their son spending a lot of time playing an online computer game with his friends, and it seems to be affecting his school work and his relationships with his family. His parents want to take his computer away from him.
3. The board of a company that wants to save money has decided that most of its hardware and software will be transferred to a cloud-computing company. Many of the digital systems staff do not think it will benefit the company.
4. A country hospital has decided to buy an expert system to help diagnose patient illnesses because it is having problems finding enough medical staff who want to live in a country town. Some of the townspeople are concerned that it might be used by inexperienced doctors and the nurses to diagnose illnesses when the main doctor is too busy or is away.
5. A university student who is short of money has found a website that is selling musical instruments much cheaper than the prices in the local shops. Her friends are not enthusiastic about her using the website, but she insists on going ahead with the purchase using her father's credit card.