UNIT 3
OPERATING ONLINE

Assessment Objective 1

Demonstrate knowledge and understanding of Information and Communication Technology (ICT)

Assessment Objective 2

Apply knowledge, understanding and skills to produce ICT based solutions

Assessment Objective 3

Analyse, evaluate, make reasoned judgments and present conclusions

In this unit, you will learn about the impact of the use of digital devices on individuals, organisations and society, as well as the risks of operating online to individuals and organisations. The digital world offers great opportunities to those who can access it. However, it is important to appreciate that not everyone has access to it and that those people who do have access must manage the risks of using powerful and developing technologies.

6 RISKS TO DATA AND PERSONAL INFORMATION

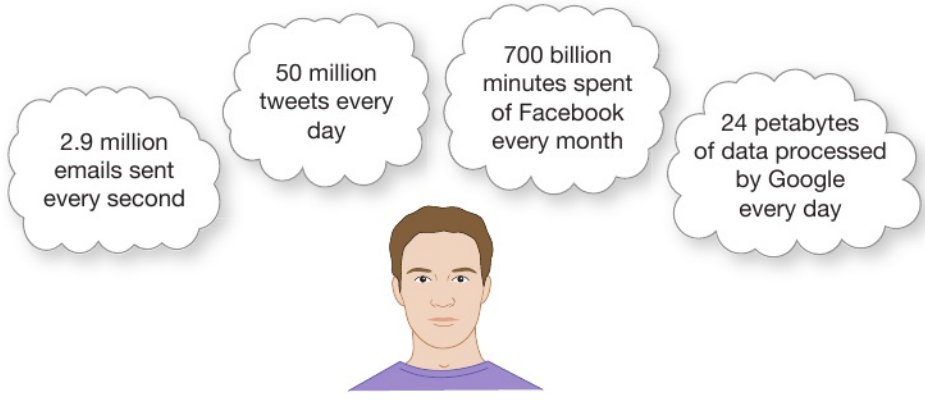
Huge amounts of data are transmitted and stored digitally, and a lot of this data contains personal or financial information. Because of this, digital systems are targeted by criminals who try to access data so that they can use it to commit fraud or identity theft.

You need to be aware of the risks to your data when operating online. You also need to know about the methods that are used to secure data in order to prevent unauthorised access and use.

LEARNING OBJECTIVES

- Be aware of risks to data and information:
  - unauthorised access
  - deliberate damage by malware
  - accidental deletion
  - theft of personal data: phishing, pharming
- Know about methods available to secure data and personal information online:
  - firewalls
  - encryption
  - passwords, PIN, biometrics, CAPTCHA tests, security questions
  - anti-malware, anti-virus, anti-adware, anti-spyware
  - access rights, file permissions
  - secure websites
  - not opening email attachments or following web links
  - backup procedures
- Know about online payment systems: third party payment systems such as PayPal, bank cards, contactless cards using NFC – and how payments are protected: VeriSign, HTTPS

RISKS TO DATA AND INFORMATION



▲ **Figure 6.1** The amount of data communicated online in order to carry personal and financial information is almost unimaginable

UNAUTHORISED ACCESS

Access to networks by users who are not permitted to access them is called unauthorised access.

Unauthorised users can attempt to gain access to networks directly by themselves. Alternatively, they may create software that runs thousands of times per second on devices, inputting multiple login details in order to attempt to gain access to networks with poor security.

DID YOU KNOW?

In 2012, a survey showed that 31% of people store financial data on their PC.

SUBJECT VOCABULARY

malware (**mal**icious soft**ware**) software that is created with the intention to do harm

Sometimes, devices on a network can be targeted by unauthorised users in order to be used as botnets. Botnets are groups of computers that have their resources used for harmful purposes, such as running and spreading **malware**.

DELIBERATE DAMAGE BY MALWARE

Malware can show messages, play sounds, delete files or reprogram systems to perform tasks that will harm the system and the connected hardware.

SKILLS
- INTELLECTUAL INTEREST AND CURIOSITY
- PERSONAL AND SOCIAL RESPONSIBILITY
- SELF-DIRECTION
- CRITICAL THINKING
- COMMUNICATION
- INTERPERSONAL SKILLS

ACTIVITY

▼ THE IMPACT OF MALWARE

Research Stuxnet malware and the damage that it caused to nuclear facilities in Iran. Discuss your findings with your class.

Some malware (known as **ransomware**) threatens to delete a user's files or places restrictions on a user's access to software or resources until money is paid, usually to an anonymous account. These messages are usually very threatening and distressing for users. They are often written in a way that makes the user believe that they must pay quickly. This puts pressure on the user to act before they have time to think clearly about the threat and how to manage it.

▲ **Figure 6.2** Ransomware

ACCIDENTAL DELETION

Users can sometimes delete files or even the entire contents of a drive by mistake. This can happen if:

- they press a key on a keyboard by accident
- they format media on the wrong storage device
- their device loses power unexpectedly.

THEFT OF PERSONAL DATA

Criminals use a number of methods to steal personal data.

SUBJECT VOCABULARY

phishing the criminal activity of sending emails or having a website that is intended to trick someone into giving away personal information such as their bank account number or their computer password; this information is then used to get money or goods

PHISHING

Phishing is a technique used by criminals to get personal information and payment details from users. It involves sending large numbers of messages that appear to be from real organisations, such as shops, banks or charities. Phishing messages are often sent as emails. These emails ask the user to provide their information by replying to the message or following a hyperlink that opens a webpage into which the user is asked to type their personal details.

Compliments of the season

I am the Head of Corporate Investment at Investments and Securities Dubai.

I do have an authorisation of a client who is an African leader with difficult political position to seek for individuals with financial management understanding to handle his wealth devoid of his name.

If you have experiences or projects in need of funding do let us have a description of your experiences alongside your address and business name so we can discuss a lot more.

Sincerely

Mukhtar Hassan

▲ **Figure 6.3** Some phishing emails are less believable than others; the email address can be a giveaway as to the authenticity of the sender

Sometimes, phishing messages are highly customised or personalised and are targeted at a smaller number of particular users. This technique has become known as spear phishing.

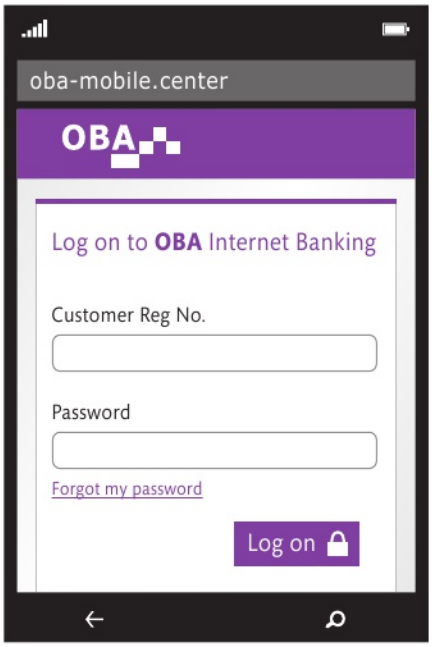
DID YOU KNOW?

The threat from spear phishing grew by 55% between 2014 and 2015.

Phishing messages can also be sent via SMS or instant message apps so that users open the fake webpage in a mobile browser. Users may not realise that the webpage is fake, particularly if they have never seen the company's real webpage in a mobile browser. As a result, they might type in their username and password details and reveal this personal data to the criminals.

DID YOU KNOW?

SMS phishing is sometimes referred to as smishing.



▲ **Figure 6.4** A fake **webform**, linked from an SMS message and opened in a mobile browser

SUBJECT VOCABULARY

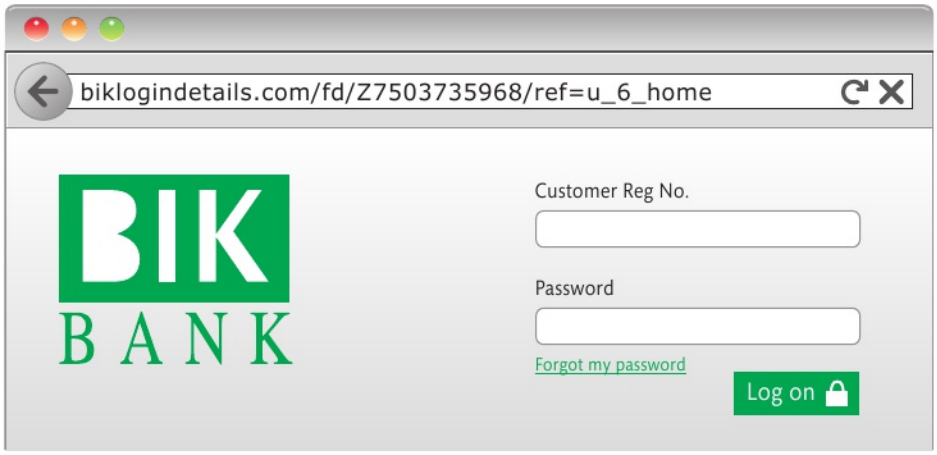
webform a data entry form on a web page
internet traffic data transferred between computers connected to the internet
domain name server a computer connected to the internet that translates domain names, such as pearson.com, into IP addresses

PHARMING

Like phishing, pharming is a technique used by criminals to gain personal information and payment details from users. Criminals create fake versions of trusted websites to trick users into entering their login details, which are then used by the criminals to access users' accounts.

There are two main methods by which users are directed to a pharming site.

- **Internet traffic** going to the real website is redirected to the fake website, so that users think they are visiting the real thing. Criminals do this by altering the **domain name servers** to make internet traffic go to their fake site. They can also use malware to redirect web requests.
- Often, the URL of a pharming website is designed to be very similar to the URL of the real website. This means that if a user misspells the URL when typing it into the address bar of their web browser, they could go to the pharming site by mistake. For example, if the URL of a real bank is http://moneybank.lk and the criminals create a website with the URL http://moneybamk.lk, it could be easy for the user to make a mistake and arrive at the fake website.



▲ **Figure 6.5** Users should always check the URL of websites that they visit to make sure that they are not fake websites

METHODS TO SECURE DATA AND PERSONAL INFORMATION ONLINE

Much of the data transmitted online is sensitive and valuable, and it is important to protect that data from unauthorised access. There are several different methods used to secure data and personal information.

FIREWALLS

Firewalls control the data travelling into and out of a network. They examine the network addresses and ports of the data. They then compare those details to a list of rules that can be changed by network administrators. The list of rules determines what traffic should be allowed to travel into and out of the network. In this way, firewalls can prevent unauthorised access to a network and protect the network from malware. See *Unit 2 Connectivity* (page 90) for more information about firewalls.

ENCRYPTION

Encryption uses a key to scramble data into an unreadable form. If encrypted data is intercepted on the network, it is useless unless the interceptor has or can identify the key. See *Unit 2 Connectivity* (page 90) for more information about encryption.

PASSWORDS, PINS AND BIOMETRICS

Passwords, PINs and biometrics are used online to authenticate a user so that they can access an online system, such as webmail or an online bank account. See *Unit 1 Digital devices* (pages 20–21 and 27–28) for more information about passwords, PINs and biometrics.

DID YOU KNOW?

'123456', '12345678', and 'password' were the three most commonly used passwords in the USA and Western Europe in 2015.

Users should make sure that their password is:

- more than eight characters long
- a mix of letters, numbers and symbols
- a mix of uppercase and lowercase letters
- made up of random characters (that is, not common words, names or dates)
- changed frequently
- something that they have not used before.

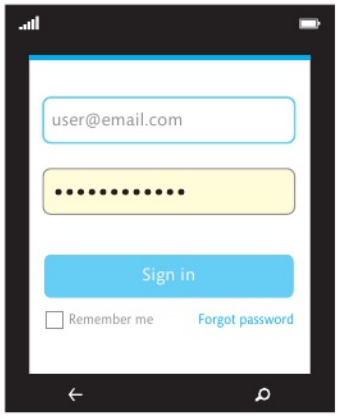
SUBJECT VOCABULARY

masked hidden

When entering a password or a PIN, the characters are often **masked** so that anyone watching the screen cannot see what is typed.

Some services allow the password to be remembered. This is not recommended for multiple users of computers with stand-alone operating systems, as it may mean that another user can access someone else's accounts. Network operating systems are more secure and will not allow different users to see each other's stored passwords.

SKILLS CRITICAL THINKING CONTINUOUS LEARNING



▲ **Figure 6.6** Passwords can be masked

ACTIVITY

▼ YOUR ONLINE SECURITY

Make a list of the websites that you use that require a password. List up to 10 websites, then answer the following questions.

- Do you use the same password for each website?
- Do any of those sites contain sensitive data?
- Have you changed your password recently? If not, do it as soon as possible.

CAPTCHA TESTS AND SECURITY QUESTIONS

When users create an online account, they may be given a test called a **CAPTCHA** test. CAPTCHA tests are used to make sure that data is entered by a human and not by an automatic software program known as a bot or web robot.

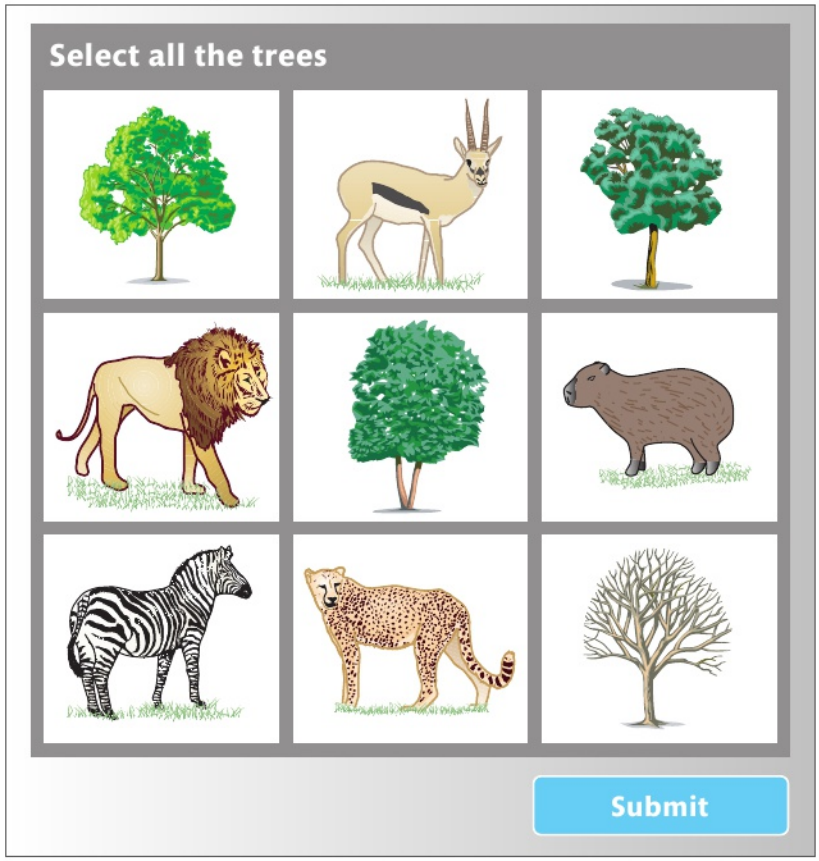
SUBJECT VOCABULARY

CAPTCHA a computer program or system that can identify whether a user is a human or a computer
bot a computer program that can interact with systems or users

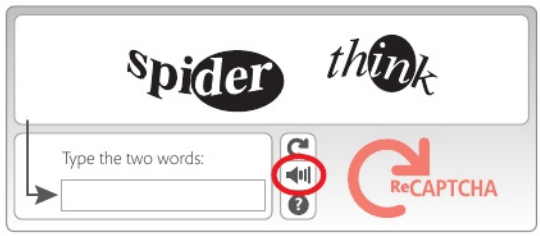
DID YOU KNOW?

CAPTCHA stands for Completely Automated Public Turing Test To Tell Computers and Humans Apart.

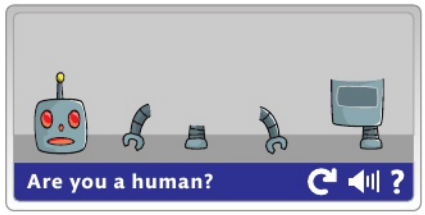
Some CAPTCHA tests work by asking users to enter a randomly generated series of letters and numbers that are displayed on the screen. Automatic software cannot read the letters displayed, or enter them into the required field, so this is used to distinguish human users from bots.



▲ **Figure 6.7** Image identification CAPTCHA tests are another way of checking that users are human



▲ **Figure 6.8** CAPTCHA tests can play audio versions for users who cannot read the text



▲ **Figure 6.9** CAPTCHA tests can ask users to complete more challenging tasks

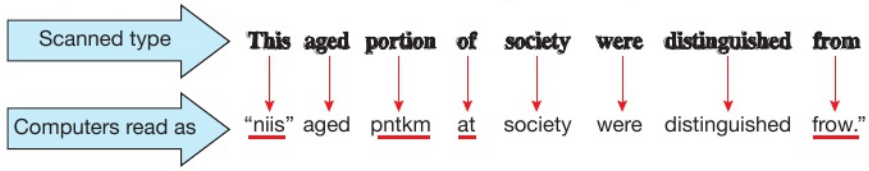
reCAPTCHA tests work in the same way as CAPTCHA tests, but they use extracts of text from scanned books or a selection of images that share common features. When a user solves a reCAPTCHA test, their solution is used to help digitise books and annotate images. This helps to make more books available online and improves the information provided in online maps and other services.

SKILLS ADAPTABILITY

ACTIVITY

▼ HUMAN VERSUS COMPUTER

Can you read the text better than the computer in Figure 6.10?



▲ **Figure 6.10** Computers find it difficult to interpret scanned text from books but humans can read the text much more easily, which means that using humans to interpret scanned text produces more accurate outcomes

SKILLS INTELLECTUAL INTEREST AND CURIOSITY
CRITICAL THINKING
PERSONAL AND SOCIAL RESPONSIBILITY

ACTIVITY

▼ reCAPTCHA

Investigate reCAPTCHA tests. Discuss whether you think it is right for companies to use these tests to help translate text and classify information, or whether you think companies are exploiting internet users as unpaid labour.

ANTI-MALWARE

SUBJECT VOCABULARY

real time processing data within milliseconds of it being input and making the output available almost immediately
virus malware that uses networks to spread to connected devices
virus definitions sequences of code that are found in computer viruses
quarantine isolate a suspected virus in a protected area of storage where it cannot harm other files

Anti-malware prevents malware from accessing or operating on computers. It scans computer files in **real time** and allows users to scan files, folders, disks or whole systems.

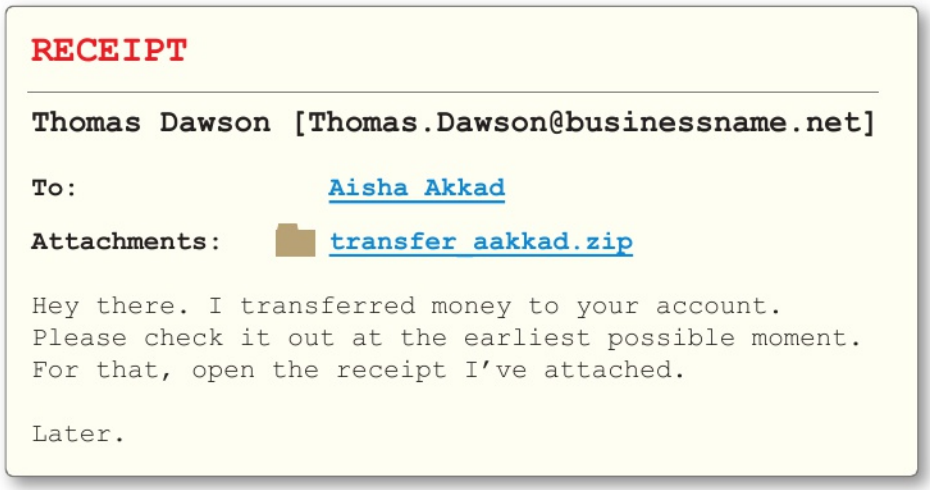
ANTI-VIRUS

A **virus** is malware that uses networks to spread to connected devices. Viruses are spread via communication software such as email or web browsers or by being loaded into a computer's memory from external storage such as USB flash drives. Viruses often look like normal files. However, they have unique **virus definitions** that can be identified by anti-virus software.

Anti-virus software constantly checks files that are downloaded and loaded by a computer for signs of virus definitions. If the anti-virus software finds a match, it **quarantines** the file so that it cannot be run.

▲ **Figure 6.11** A virus checker can quarantine an infected file so that it cannot infect other files

Anti-virus software has to be updated regularly because virus code can be changed, either automatically or by the developers of the virus. There is a constant battle between people who create the threats to data and people who create software to protect data.


RECEIPT

Thomas Dawson [Thomas.Dawson@businessname.net]

To: Aisha Akkad

Attachments: transfer_aakkad.zip

Hey there. I transferred money to your account.
Please check it out at the earliest possible moment.
For that, open the receipt I've attached.

Later.

▲ **Figure 6.12** Viruses are often spread by email

SKILLS PERSONAL AND SOCIAL RESPONSIBILITY
CRITICAL THINKING

ACTIVITY

▼ STAYING ALERT

Identify the items in the email in Figure 6.12 that might alert the user to the fact that opening the attachment may carry a risk.

Anti-virus utilities are often combined with software that protects against adware and spyware (see the next sections on anti-adware and anti-spyware). For this reason, anti-virus software is often known more generally as anti-malware.

ANTI-ADWARE

Adware displays unwanted adverts to users. Anti-adware software detects, quarantines and removes adware.

SUBJECT VOCABULARY

adware software that displays unwanted adverts
spyware software that monitors and records data and user input

ANTI-SPYWARE

Spyware secretly monitors and records computer data and user input. For example, a keylogger is a type of spyware that monitors and records actions such as key presses or mouse movements. Criminals can then analyse this information to identify a user's passwords for websites, or financial data such as credit card numbers and security codes.

Anti-spyware software detects, quarantines and removes spyware.

DID YOU KNOW?
Each day, 230 new keyloggers are discovered.

ACCESS RIGHTS AND FILE PERMISSIONS

Permissions can be set for access to files, folders or drives, allowing users to read only or read and write to the file.

SUBJECT VOCABULARY

permissions authorisation settings that provide the ability for a user or users to access files, folders or drives

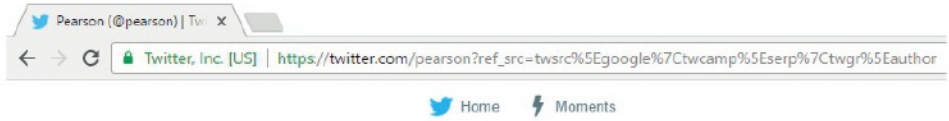
SECURE WEBSITES

SUBJECT VOCABULARY

Hypertext Transfer Protocol Secure (HTTPS) a secure form of HTTP
payment server a computer that authorises financial transactions

Hypertext Transfer Protocol (HTTP) is used to exchange data between a web server and a client (that is, a computer that is accessing the web server). However, data transferred using HTTP is not secure, so **Hypertext Transfer Protocol Secure** (HTTPS) was developed. HTTPS authenticates **payment servers** and provides encryption using Secure Socket Layer (SSL) and, more recently, Transport Layer Security (TLS).

HTTPS keeps communications private and provides security for users' online accounts. Web browsers often show that a website is secure by displaying a green padlock in the address bar.



▲ **Figure 6.13** A green padlock is used by most browsers to indicate that a website is secure

SUBJECT VOCABULARY

legitimate website a website that is operated legally

DID YOU KNOW?

In 2016, experts reported that 75% of all **legitimate websites** had serious security problems.

EMAIL ATTACHMENTS AND WEB LINKS

HINT

Hover over a link to see its URL.

SUBJECT VOCABULARY

executable file a computer file that can be run as a program
hover over use the mouse to position the cursor on an object on a computer screen without clicking on the object

Users should always be careful when opening email attachments or hyperlinks in emails and other messages. This is because some are fake and designed to steal users' personal information (see page 98). Users should ensure that their anti-malware software is up to date and be especially careful if:

- they do not recognise the sender
- the text is general, impersonal or irrelevant to the user
- the text contains spelling or grammatical errors
- the attached file is an **executable file** such as an .exe or .zip file
- the text contains a message telling the user to do something immediately
- the user does not recognise the URL.

BACKUP PROCEDURES

DID YOU KNOW?

There are three types of backup.

1. A **full backup** creates a copy of all files.
2. A **differential backup** creates a copy of all files that have changed since the last full backup.
3. An **incremental backup** saves a copy of only the files that have changed since the last full or incremental backup.

Backups create one or more copies of data. A backup is usually stored to an external storage device. This makes the data more secure, because the backup files will be safe even if the original storage device fails or is damaged, lost or stolen.

Backups can also be saved to online storage. This means that a copy of the data is held in two different geographical locations. Backing up to online storage can be slower because the process uses an internet connection.

Users need to decide how many files to back up and how often they should back them up. More regular backups will require more storage space. However, less frequent backups may result in a loss of data (for example, if that data has not been backed up recently).

Loss of files or damage to files can be caused by:

- theft
- malware
- flooding or fire
- power cuts.

See *Unit 1 Digital devices* (page 42) for information on backup utilities.

Good ideas for backup procedures are as follows.

- Set automatic backups.
- Do not use optical media because they deteriorate over time and are fragile.

- Schedule backups for late in the evening when users will not be using the data that is being backed up in order to avoid conflicts.
- Create more than one copy.
- Keep one copy of a folder containing important files backed up using online storage.
- Store copies at multiple locations.
- Store important data in a fireproof **safe**.

GENERAL VOCABULARY

safe a strong metal box or cupboard with special locks to contain money and valuable things

SKILLS SELF-DIRECTION

ACTIVITY

▼ DATA SECURITY

Read through the list of ideas for creating a thorough backup procedure. Discuss how each idea will help to keep data secure.

SKILLS INTERPRETATION

ACTIVITY

▼ RAID BACKUP STORAGE

Research RAID backup storage. Why is RAID 1 backup storage better for data security than RAID 0 backup storage?

HINT

Never put humans in charge of creating backups because they will forget. An automatic system is more reliable.

DID YOU KNOW?

About 85% of payments around the world are still made in cash.

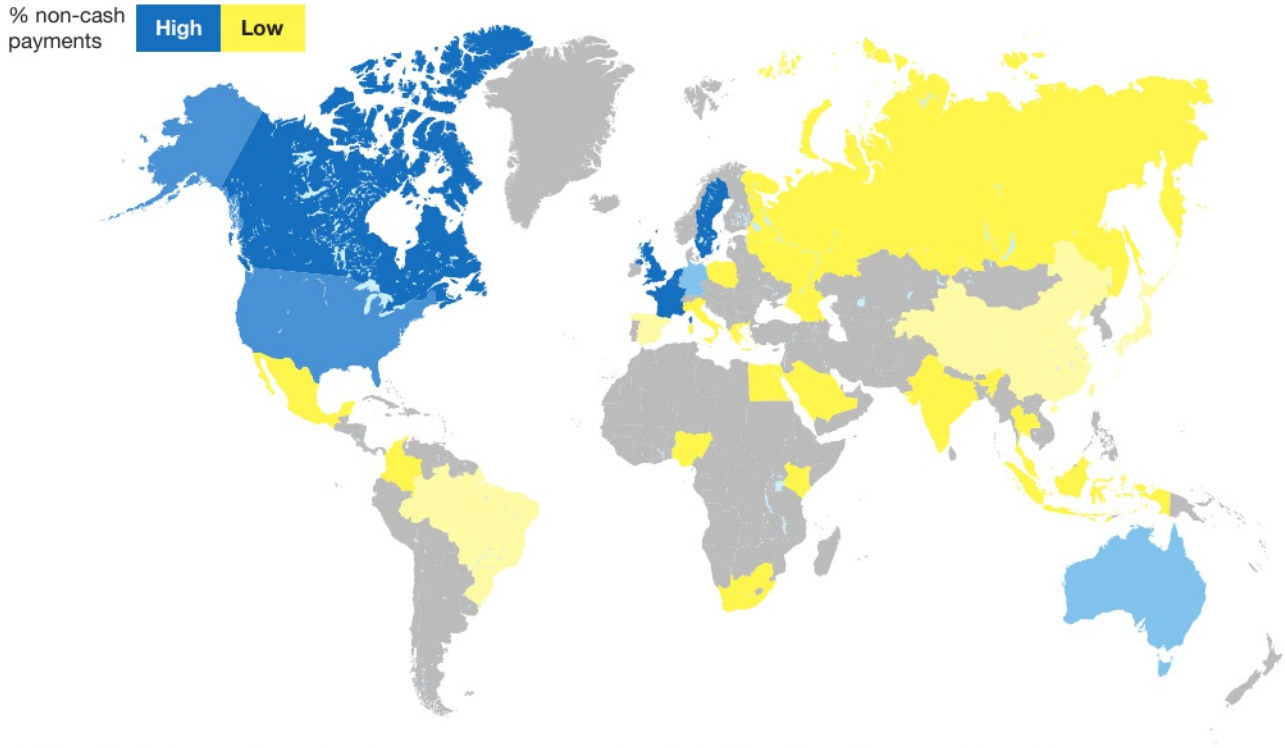
ONLINE PAYMENT SYSTEMS

People can pay for goods and services online using various payment systems. These systems send payment details across networks to computers that process the payments.

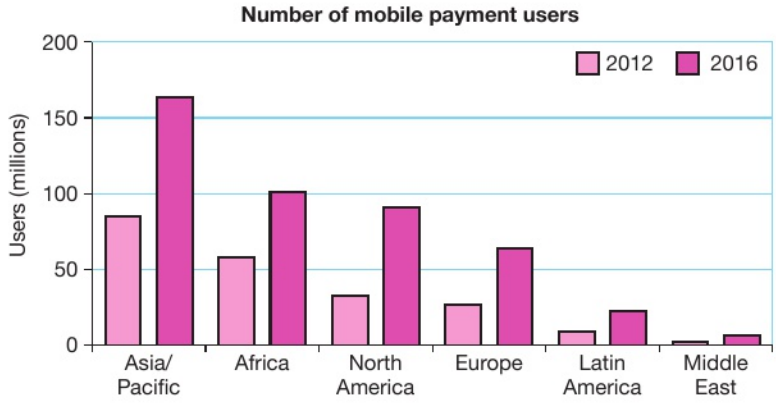
▲ **Figure 6.14** Many countries are moving quickly towards a **cashless society**

GENERAL VOCABULARY

cashless society a society in which people pay for goods and services using methods other than cash



▲ **Figure 6.15** The percentage of people using non-cash payments differs in different countries around the world



▲ **Figure 6.16** Mobile payments are a growing area

ONLINE THIRD-PARTY PAYMENT PROCESSORS

SUBJECT VOCABULARY

payment processor a computer that authorises financial transactions

Online third-party **payment processors** like PayPal or Skrill allow users to create an account so that they can send and receive money using email accounts for identification. Users can also use systems that link with online shopping applications, which can make shopping easier and faster.

BANK CARDS

GENERAL VOCABULARY

expiry date the date after which something can no longer be used

Bank cards allow customers to pay for goods and services online and in shops. When paying online, you usually need to enter the:

- card number
- **expiry date** (and sometimes the start date) of the card
- name on the card
- three- or four-digit card security code (CSC).

HINT

- The card security code is often called a card verification code (CVC) or card verification value (CVV).
- The card number is not the same as the bank account number.

▲ **Figure 6.17** A bank card contains a number of security and identifying features

▲ **Figure 6.18** Systems are used to authenticate people using payment cards online

When a user chooses to use a card online, they are sometimes asked to authenticate the payment by entering a password using a secure system. These systems are used by financial organisations such as Mastercard®[10], which operates the Mastercard SecureCode® system.

CONTACTLESS CARDS USING NFC

SUBJECT VOCABULARY

reader a piece of electronic equipment that can read information that is stored or recorded somewhere, for example, on a card

contactless users can use a contactless debit card or credit card to pay for things by waving it over a machine, without using a pin number

Near field communication (NFC) is used in payment cards to allow the transfer of payment data. The payment does not require a PIN or any form of user-authentication. If a card **reader** is in range and requesting payment, then the **contactless** card will take payment up to a maximum amount. This amount is limited, so that any people using card readers or apps to commit fraud can only steal a small amount.

NFC cards can be wrapped in foil to prevent the very weak signal from being intercepted by criminals. See *Unit 1 Digital devices* (page 30) for more information about the uses of NFC.

▲ **Figure 6.19** Criminals can use card readers or apps on NFC-enabled devices such as smartphones and **smartwatches** in order to commit fraud

SUBJECT VOCABULARY

smartwatch a watch that provides data connectivity and often uses sensors to provide feedback to the device about its environment

10 MASTERCARD® IS A REGISTERED TRADEMARK OF MASTERCARD INTERNATIONAL, INC.

PROTECTING ONLINE PAYMENTS USING HTTPS

See page 104 for more information about secure websites and the use of HTTPS.

SKILLS EXECUTIVE FUNCTION COMMUNICATION

ACTIVITY

▼ RISKS TO DATA

Produce a fact sheet for other students at your school or college. The fact sheet should help to increase their awareness of the risks to their data and the methods that they can use to reduce those risks.

CHAPTER QUESTIONS

SKILLS PROBLEM SOLVING

1 Which **one** of these is used to control internet traffic entering a network? **(1)**

A Server
B Backup
C Firewall
D Encryption

SKILLS INTERPRETATION

2 Explain why CAPTCHA tests work. **(2)**

3 State the purpose of pharming and phishing. **(1)**

SKILLS PROBLEM SOLVING

4 List **three** pieces of data from a bank card that a user is asked to enter when making an online payment. **(3)**

SKILLS INTERPRETATION

5 Describe **one** way in which incremental backup differs from differential backup. **(2)**

SKILLS INTERPRETATION

6 Describe how encryption secures data on a network. **(2)**

SKILLS PROBLEM SOLVING

7 State **two** methods used by an online system to authenticate a user. **(2)**

SKILLS PROBLEM SOLVING PERSONAL AND SOCIAL RESPONSIBILITY

8 State **two** methods used by criminals to get users to visit fake sites. **(2)**

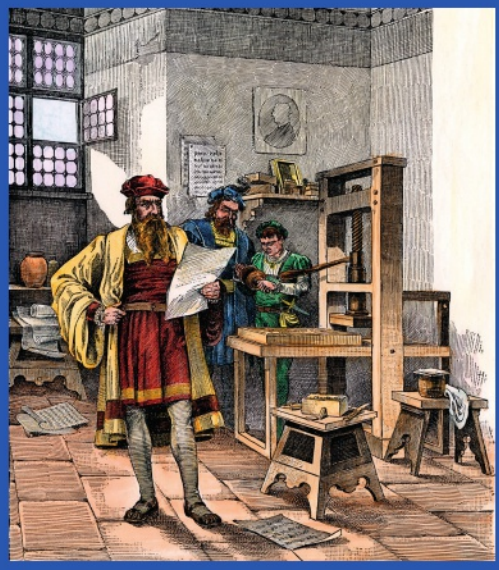
SKILLS INTERPRETATION COMMUNICATION

9 Explain **one** disadvantage of using online storage for backups rather than local storage. **(2)**

7 IMPACT OF THE INTERNET

The invention of printing allowed books to be reproduced quickly and accurately, without the errors caused by copying texts by hand. These inventions enabled the sharing and discussion of a wider range of ideas and information. This led to an increase in knowledge and literacy throughout the world, enabling faster and more reliable academic progress.

Like printing, the internet is one of the most important technological developments in human history. It has had positive and negative effects on individuals, organisations and society as a whole. It enables us to communicate by sharing text, images, video, music and software, to travel all over the world and into outer space, and to distribute and consume goods and services from many different countries.



LEARNING OBJECTIVES

- Know about the impact on employment, such as new job opportunities as the nature of a job changes, new skills requirements, potential job loss
- Understand the impact on working practices, including collaborative working and flexible or mobile working
- Know that the internet gives better access to information and services, new ways of learning, wider range of entertainment and leisure opportunities
- Know about social impacts such as:
  - reduced social interaction
  - increases in cyberbullying
  - reduced physical activity
- Understand how to stay safe online
- Understand how the availability of digital devices and the internet enables individuals to work from home
- Know the benefits and drawbacks of working from home for individuals and organisations
- Understand positive impacts: improved communication, access to global markets and workforce, changes in the way information is managed and used
- Understand negative impacts: security issues, risk of hacking, greater competition
- Understand the impact on society of the ability of individuals to have less-restricted access to networks at any time
- Know about the gap between information rich and information poor
- Understand the causes and implications of unequal access to ICT (locally, globally)
- Know about the impact on individuals and communities of limited or no access to digital technologies
- Understand the impact of changes in ways of socialising

THE INTERNET

The internet is not the same thing as the World Wide Web. The internet is the **inter**connected **net**work of computers that provides many online services to users. The World Wide Web is just one use of the internet.

SUBJECT VOCABULARY

protocols rules that allow the exchange and transmission of data between devices

Protocols are used by applications to transfer data across the internet. These protocols include:

- IMAP (**i**nternet **m**essage **a**ccess **p**rotocol) for email
- FTP (**f**ile **t**ransfer **p**rotocol) for sending files
- SSH (**s**ecure **sh**ell) for secure remote logins
- VoIP (**v**oice **o**ver **i**nternet **p**rotocol), used for voice call services like Skype
- XMPP (e**x**tensible **m**essaging **p**resence **p**rotocol), used for messaging services like WhatsApp
- HTTP (**h**yper**t**ext **t**ransfer **p**rotocol), used for the World Wide Web.

KEY POINT

The internet is connected devices. The World Wide Web is connected content.

IMPACT OF THE INTERNET ON INDIVIDUALS

The internet has changed how people live and work, giving them greater access to information and services.

INFORMATION AND SERVICES

The internet improves users with access to information from news, sport and weather services. Information can spread on the internet within seconds, which means that users have access to the latest news, sport and weather. This ensures that individuals can be up-to-date at all times.

Before the internet, two of the most important channels through which people could access these services were television or radio. These channels have some disadvantages solved by the internet, but they also have some advantages over the internet. These are shown in Table 7.1.

▼ **Table 7.1** The impact of the internet on individuals' access to information services

TELEVISION AND RADIO		INTERNET
Only broadcast at certain times	→	Available all the time
Only a few channels	→	Millions of channels
Content decided by editors	→	Not always edited
Only available within range of a transmitter	→	Access from anywhere with a connection
Limited access to news from other countries	→	More open access, though some content is geo-restricted
Held to enforceable standards	→	Not always held to enforceable standards

SKILLS INTERPRETATION CRITICAL THINKING REASONING

GENERAL VOCABULARY

beneficial resulting in good

ACTIVITY

▼ ADVANTAGES AND DISADVANTAGES OF THE INTERNET

For each of the changes in Table 7.1, decide whether you think the impact of the internet has been **beneficial** or not. Explain each of your decisions.

As well as access to news, sport and weather information, users can also use the internet to:

- access booking systems for travel, leisure and entertainment
- do their shopping and banking
- study using virtual learning environments (VLEs), with online support from teachers and other students.

GENERAL VOCABULARY

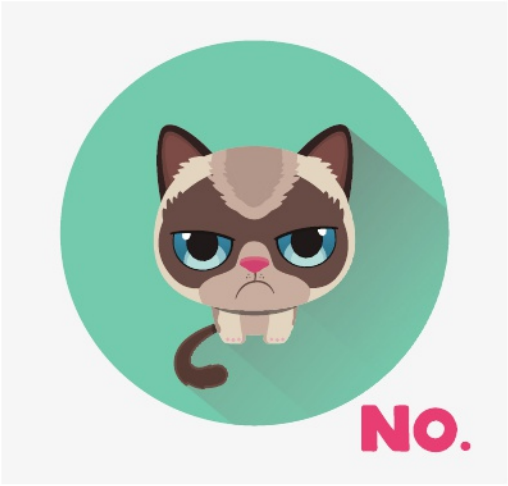
on-demand whenever required (for example, catch-up television services)

The internet has also provided a wider range of entertainment, with more entertainment providers giving access to **on-demand** services, movie and music streaming, downloads and gaming services. You will learn more about these online services in *Unit 4 Online goods and services* (pages 168–175).

Individuals can also add content to webpages. This has had an enormous impact on the way in which information is distributed around the world. It can be used to share information about serious issues and also for entertainment.

KEY POINT

The development of online **interactivity**, which allowed users not only to read webpages but also to add information to them, became known as Web 2.0. It changed the way in which people communicated.



▲ **Figure 7.1 Memes** have amused millions of people

SUBJECT VOCABULARY

meme a photo, a piece of video, a joke or similar content that spreads quickly on the internet
interactivity the ability of a computer to respond to input

SKILLS INTELLECTUAL INTEREST AND CURIOSITY

ACTIVITY

▼ MEMES

Research the story behind 'success kid'. Who is he? Why did this image become so popular? How have some companies used this image?

SKILLS INITIATIVE
SELF-DIRECTION

ACTIVITY

▼ THE INTERNET IN YOUR LIFE

Write a paragraph on how the internet influences a typical day in your life.

EMPLOYMENT

The internet has had an impact on individuals' employment, often requiring people to learn new skills so they can change the way they work.

SKILL REQUIREMENTS

Many employers now require employees to use the internet for work, meaning that employees need to learn new skills. For example, journalists used to write articles using a word processor and submit them to their editor for publication. Now the journalists are often also required to post and update their stories on social media, write blogs, send broadcasts from their smartphones and interact with their audience. In addition, they must be able to react quickly to stories, which means that their typing and proofreading skills must be of a good standard to allow them to post a story quickly and without mistakes.

Similarly, modern teachers must be familiar with the information and services available on the internet so that they can teach their students about them. They must also be able to help their students manage the risks that they face in the online world.

NEW JOB OPPORTUNITIES AS THE NATURE OF JOBS CHANGES

As the internet changes the work that people do, this provides new job opportunities. For example, a plumber is no longer limited to installing and repairing pipework. Homeowners are now purchasing smart systems that can be controlled from digital devices using the internet. This means that plumbers have opportunities to extend their skills to include these new technologies in their work. No matter whether an individual is a plumber, a teacher or a journalist, they will be able to find more employment opportunities if they are able to offer modern services.

As the nature of jobs changes and the use of the internet at work grows, skilled workers are needed to support this development. People are required to train and advise unskilled workers and to create the digital devices and software that workers use. Other people are needed to install and maintain the systems that they use.

SKILLS CRITICAL THINKING
REASONING
INTERPRETATION
ADAPTIVE LEARNING
COMMUNICATION

ACTIVITY

▼ TECHNOLOGY AND JOBS

1 Complete Table 7.2. The first job has been done for you as an example. For each job, add a way in which the internet has changed that job, suggest a new skill to meet the change, and identify a new job opportunity for someone who could support the new skill. Now add a job of your choice in the last row, then complete the rest of the row.

▼ **Table 7.2** The impact of the internet on employment

JOB	NATURE OF CHANGE	NEW SKILL	JOB OPPORTUNITY IN SUPPORTING THIS SKILL
Photographer	Clients want immediate access to photos	Uploading and sharing files online	Maintaining and updating servers
Medical scientist			
Teacher			

2 Use the example of the photographer given in Table 7.2 to explain how the internet has led to the creation of new jobs.

JOB LOSSES

If employees do not keep updating their skills in the use of the internet, they may not have the skills required to carry out new work. If they are not willing or able to retrain, they could lose their jobs.

WORKING PRACTICES

Working practices are the ways in which people carry out the tasks that are part of their jobs.

GENERAL VOCABULARY

collaborative working working together

COLLABORATIVE WORKING

The internet enables people to connect with one another in real-time. This means that the process of sharing work between employees is more efficient. This kind of **collaborative working** allows work to be done more quickly or done 24 hours a day.

Collaborative working allows work to be split into a number of individual tasks, each of which can be done by a different employee. This has benefits and drawbacks.

- **Benefits**
  - Each employee can focus on one task.
  - Employees become experts in their area through (narrow) experience or training.
- **Drawbacks**
  - Employees do not share their skills and expertise.
  - Employees have reduced understanding of the whole project.

Collaborative working also allows more than one person to work on a task at the same time. This also has benefits and drawbacks.

- **Benefits**
  - Expertise is shared.
  - Employees can check each other's work.
- **Drawbacks**
  - It can be difficult for lots of people to agree.
  - It can be difficult to co-ordinate the work of many employees.

FLEXIBLE WORKING

Flexible working is a way of working that suits an employee's needs. For example, it allows employees to decide the hours that they work or enables them to work from home. This is possible because employees can use the internet to access systems from anywhere with an internet connection at any time of day.

Flexible working has benefits, but it also has drawbacks.

- **Benefits**
  - Employees can work at a time of day that is right for them and take breaks whenever they need to.
  - Employees can fit their work around their family life.

Drawbacks

- Employees do not meet face to face as much, which can reduce their understanding of each other and their employer.
- Employees may not manage their work effectively, which could affect their home life or cause exhaustion.

GENERAL VOCABULARY

on-site at a particular place of work or a place where something is being built (rather than away from that place)

The flexibility provided by the internet also enables employees to work when they are travelling. For example, mobile working allows employees to work on their way to and from the office. It also allows employees who work on the move, such as repair engineers and salespeople, to access to up-to-date data when **on-site** or at a client's location. This also has benefits and drawbacks.

Benefits

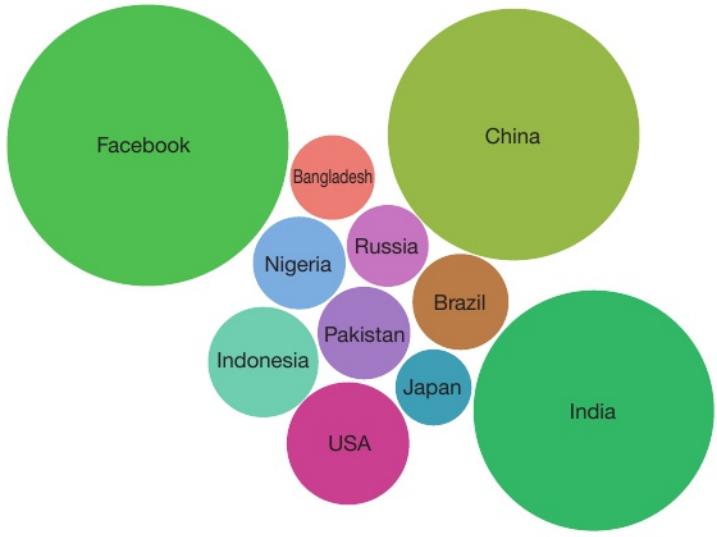
- Employees can access up-to-date information.
- Employees can work from anywhere with an internet connection.

Drawbacks

- Employees could become exhausted if they work longer hours than expected when travelling.
- They may not have access to the same facilities or resources as employees who only work in one place.

SOCIAL IMPACT

The internet has had a huge impact on the way in which people socialise, particularly thanks to the rise of social media sites such as Facebook® and Twitter®. In November 2016, Facebook had 1.79 billion monthly active users spending 50 minutes per day using its various services. If Facebook was a country, this would have meant that it had the biggest population of any country on the planet.



▲ **Figure 7.2** The 'population' of Facebook compared with some of the world's countries

SOCIAL INTERACTION

GENERAL VOCABULARY

social interaction communication with and reaction to others

Humans are naturally social, which means that we require **social interaction** with others. Humans feel a need to connect with each other and to participate actively in the world around us. The internet allows humans to communicate with any other connected person on the planet, through online gaming, video, instant messaging, social networking and online spaces for work and learning.

▲ **Figure 7.3** Society is a network of people and the internet is a network of devices

▲ **Figure 7.4** Some people argue that it is not how you socialise that is important, whereas others are concerned that socialising online is isolating us from reality and affecting our ability to form real relationships

Some people are concerned that our increasing use of virtual environments is replacing face-to-face social interaction. They believe that this is damaging people's ability to talk to each other and understand each other's emotions.

The effects of developing social skills in virtual environments rather than physical environments is now being studied and debated by psychologists and experts in child behaviour. There is particular concern about the effect on young children failing to interact with others face-to-face during the period in which they develop their ability to understand emotions. However, other people argue that being able to connect with more people and information is a good thing. They say that it is not important whether we do this via the internet or face-to-face.

The internet gives users access to a wider community, which can make people more aware of other cultures and societies and can broaden their view of the world. However, some people ask whether socialising online is a good thing. They argue that that we tend to connect with people who think like us or, worse, with people suggested to us by **social network applications**. You will learn more about these applications on pages 133–138.

SUBJECT VOCABULARY

social network applications software that allows social interaction and the creation of links between users based on shared characteristics and interests

SKILLS INTELLECTUAL INTEREST AND CURIOSITY

ACTIVITY

▼ FILTER BUBBLES

Carry out an internet search using the key terms 'Eli Pariser TED talk' to find a video of the author Eli Pariser discussing the concept of 'filter bubbles'. He explores how the code behind websites decides the content that users see online and the connections that users make with others.

DID YOU KNOW?

In some countries, three- and four-year-old children spend an average of eight hours and 18 minutes online each week.

CYBERBULLYING

Cyberbullying is the term used to describe the use of the internet to send text, images or multimedia in order to upset or embarrass someone. Bullying exists offline, but online bullying can be equally upsetting or even more distressing than offline bullying. Online bullies may use hurtful messages or distribute upsetting images of their victims that the bully may even have edited. Bullies can also isolate their victims by preventing them from participating in online events or discussions, which makes them feel upset and lonely.

Bullies who use the internet often hide their identity, making the experience even worse for their victim. However, most online communication is easily monitored and it is often possible to find the bullies by identifying the device which they used. See *Unit 2 Connectivity* (pages 69–70) for more information about identifying devices on a network.

SUBJECT VOCABULARY

cyberbullying using the internet to send text, images or multimedia in order to upset or embarrass someone

One other factor that makes cyberbullying different and possibly more damaging than in-person bullying is that, on the internet, information can spread very quickly and to more people. This can make the victim feel worse.

PHYSICAL ACTIVITY

HINT

When thinking about issues, it is often good to consider both sides of a discussion. When answering extended questions in the examination, consider whether a balanced response is appropriate. If it is, show that you understand the benefits and drawbacks of the issue that you are discussing.

Access to online goods and services means that people do not have to leave the comfort of their homes to shop, go to the bank or even go to school. It has reduced the need to travel, and this reduced need for physical activity as part of daily life could have negative effects on people's health and wellbeing.

However, some people would argue that access to some location-based games, such as Pokémon Go, promotes physical activity. They also argue that the ability to join online communities aimed at fitness motivates people to exercise, as users enjoy the encouragement that they can get from other members of the community.

▲ **Figure 7.5** Some uses of the internet encourage users to be physically active

SKILLS LEADERSHIP
SELF-PRESENTATION
ASSERTIVE COMMUNICATION
PERSEVERANCE

ACTIVITY

▼ DEBATING THE IMPACT OF THE INTERNET

Prepare for and take part in a class debate on the topic: 'the internet has had a positive impact on individuals'.

STAYING SAFE ONLINE

▲ **Figure 7.6** Governments in many countries have launched online campaigns to help young people stay safe when using the internet

SKILLS
INTELLECTUAL INTEREST AND CURIOSITY
INTERPRETATION
PERSONAL AND SOCIAL RESPONSIBILITY

ACTIVITY

▼ STAYING SAFE ON THE INTERNET

Carry out an internet search using the key terms 'CEOP Jigsaw video' to find a video aimed at helping 8–10-year-olds stay safe online. What are the key messages of the video?

To stay safe when using the internet, users should follow three main rules:

- **zip it**
- block it
- **flag** it.

▲ **Figure 7.7** Follow these rules to help you stay safe online

GENERAL VOCABULARY

zip it a colloquialism used to tell someone to say nothing about a particular subject, or to be quiet
flag to make a mark against some information to show that it is important

ZIP IT

Keep your personal information private and do not share it with strangers. This includes being careful about what personal information you share online. Examples of personal information you should not share include your:

- location
- school name
- phone number
- real name
- photos
- mailing address or email address.

SUBJECT VOCABULARY

privacy settings a method that allows users to control who can see information from their online profiles

You can use **privacy settings** on social networks to stop strangers from viewing your profile. You should also use a strong password that you change regularly and never give it to anyone, even your friends.

BLOCK IT

Always block **offensive** messages or friend requests from strangers on social networking sites. Do not open suspicious attachments or links, and you can use safe search filters to reduce the chance of seeing **age-inappropriate content**.

GENERAL VOCABULARY

offensive very rude or insulting and likely to upset people
age-inappropriate content materials (such as text, images, video and animations) that are not suitable for a particular age group
grooming creating an emotional connection with someone with the intention of making them less cautious, making it easier to do them harm

FLAG IT

You should always tell an adult if something online upsets you or if someone you don't know requests to meet you. Users can also report **grooming** behaviour to national crime agencies.

The Virtual Global Taskforce is an international organisation that tries to protect young people online. Its Report Abuse button (see Figure 7.8) can be found on many social media sites.

▲ **Figure 7.8** Many websites provide the Report Abuse button, which links people to online support

SUBJECT VOCABULARY

digital footprint all the data that a user creates online, which is recorded and stored

GENERAL VOCABULARY

impression a mark

DIGITAL FOOTPRINT

Your **digital footprint** is the **impression** that you leave online. Much of what you share online can be recorded forever, either on archive sites or as backups.

SKILLS INTELLECTUAL INTEREST AND CURIOSITY

ACTIVITY

▼ THE INTERNET ARCHIVE

Go online and search for the 'Internet Archive' to see what sort of content is made available on their website.

KEY POINT

Always consider that the things you post online now may not be the same as your views in the future.

Content can be easily viewed by people whom you did not expect to see it. It can also be copied and shared easily, which means that it could become available to more people than you expect.

Ask yourself the following questions before sharing content online.

- Would I show this to my parents or grandparents?
- When I am looking for a job in the future, what will employers think if they see this?
- Could people **misinterpret** this, either now or in the future?
- Am I happy for this to be shared by people that I don't know?

GENERAL VOCABULARY

misinterpret to misunderstand the correct meaning of facts or of something that someone says or does

You can minimise your digital footprint by:

- closing your old social media accounts and requesting that all archive data is deleted
- searching for your own name online and see what information about you is publicly available
- asking website owners to remove old content that is out of date, irrelevant or false
- reading the terms and conditions when you create online accounts, because some services still have rights over your data even after you close your account.

SKILLS
ADAPTABILITY
PERSONAL AND SOCIAL RESPONSIBILITY
EXECUTIVE FUNCTION
CREATIVITY

ACTIVITY

▼ GUIDELINES FOR ONLINE SAFETY

Create a leaflet for students in your school that explains how they can stay safe online. It should contain no more than 200 words and use no more than four images.

ONLINE WORKING FROM HOME

Before the internet existed, offices were seen as necessary to provide a central location for people to discuss business and collect, distribute and file paperwork. Offices also allowed employees to be supervised by their managers.

SKILLS
INTELLECTUAL INTEREST AND CURIOSITY
ADAPTIVE LEARNING

ACTIVITY

▼ CHANGING OFFICE ENVIRONMENTS

Carry out an internet search using the key terms 'Brazil movie Ministry of Information' to find a clip set in the Ministry of Information in Terry Gilliam's movie, *Brazil*. Compare this to a modern office environment. What is the same? What has changed?

Many businesses have established processes and procedures, including set working hours, such as 09.00–17.00, and scheduled meetings. Many organisations also require their employees to work within one or more central offices. Historically, this was logical because employees could only access computer systems in a centralised office space. Later, employees could use LANs to access shared storage and resources, but still had to be within the office in order to do so. See *Unit 2 Connectivity* (page 69) for more information about LANs.

However, this has changed. As computer systems became cheaper and more powerful, they began to be used in people's homes. Many modern digital devices can run a range of software and can be used to access the internet, online systems and applications. People can use digital devices provided by their employer, or even their own devices to connect to the internet and work from home.

KEY POINT

Connected digital devices have led to the availability of a decentralised, distributed approach. For some types of organisation, this has meant that the traditional office is no longer the most appropriate or productive environment for its employees.

Unlike the traditional central office, the internet is decentralised, which means that it is not controlled by any one individual or organisation. Using the internet to work from home has benefits and drawbacks for organisations and their employees.

DID YOU KNOW?

An average office worker spends a total of about 80,000 hours in an office during his/her career.

BENEFITS OF WORKING FROM HOME

▲ **Figure 7.9** Working from home can have benefits for both individuals and organisations

Benefits to individuals

- No need to travel to work:
  - reduces stress caused by traffic, public transport delays and overcrowded transport
  - saves money
  - makes people feel as though they are helping the environment by reducing travel emissions.
- Can spend more time working or resting, because they spend less time travelling to work.
- No need to wear a uniform or business clothes, which reduces cost.
- Can work at a time to suit them.
- Can work on tasks for longer periods of time without distractions from colleagues or scheduled meetings.
- Can work in a comfortable environment.
- Can organise work around social or family commitments.

Benefits to organisations

- Can attract a talented, motivated workforce.
- Can employ people who are located anywhere because they do not need to travel.
- Do not need to buy or rent office space or furniture for employees.
- Workers do not have to commute, so will not be delayed getting to work by weather or transport issues.
- Workers may work more effectively at home.

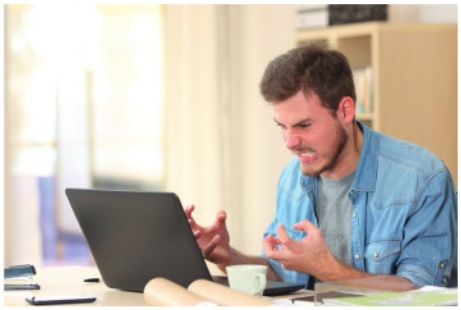
SKILLS INTELLECTUAL INTEREST AND CURIOSITY

ACTIVITY

▼ EFFICIENT WAYS OF WORKING

Carry out an internet search using the key terms 'Jason Fried TED talk' to watch Jason Fried talk about why offices are not the best places to get work done.

DRAWBACKS OF WORKING FROM HOME



▲ **Figure 7.10** Working from home can also have drawbacks for both individuals and organisations

SKILLS PROBLEM SOLVING

Drawbacks to individuals

- May be distractions at home, such as family and leisure activities.
- Suffer from a lack of social interaction with colleagues.
- Feel disconnected from the company.

Drawbacks to organisations

- May be concerns about data security.
- May be more difficult to manage and support employees who are not in the office.
- Employees working at home might not work as hard.
- Can be complicated to organise payments and permissions for workers in different countries.

ACTIVITY

▼ HOW TO IMPROVE WORKING FROM HOME

For each of the drawbacks that you have just read, suggest solutions that would make working from home better for individuals and organisations.

GENERAL VOCABULARY

perks something provided to employees by their employer in addition to their wages, such as goods, meals, or a car

▲ **Figure 7.11** Some organisations like Google™ provide **perks** like sleep pods at their offices to encourage their employees to feel more at home in the office

SKILLS INTERPRETATION
EXECUTIVE FUNCTION
ADAPTABILITY
PRODUCTIVITY
COMMUNICATION

ACTIVITY

▼ PERSPECTIVES ON WORKING FROM HOME

1. Write a letter or email from an employee asking their employer to let them work from home. Explain how the internet makes it possible to work from home.
2. Write a reply from the employer that explains the benefits and drawbacks for the organisation and the employee. Your reply should finish with a decision on whether or not the employer is going to let the employee work from home.

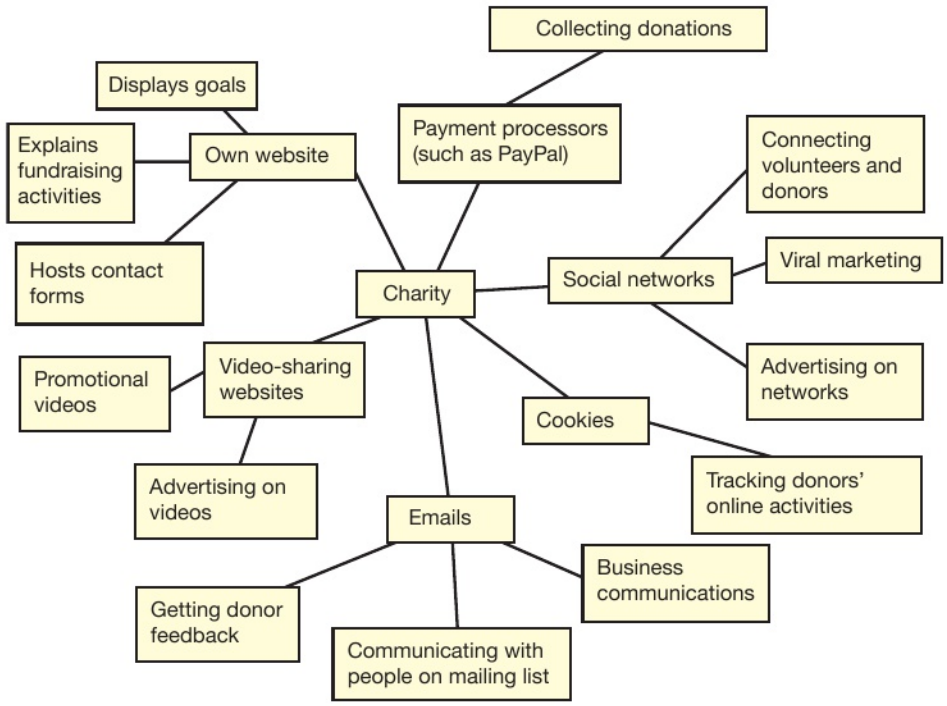
IMPACT OF THE INTERNET ON ORGANISATIONS

The internet has had a significant impact on organisations as well as on individuals. Many of its effects on organisations have been positive, but some have been negative.

POSITIVE IMPACTS

IMPROVED COMMUNICATION

Organisations can communicate and interact with their customers and employees more easily and in real-time using email, instant messaging and social media. They can provide up-to-date information about the development, pricing and availability of their products and services. Organisations can also publish live information online, allowing people to follow the organisation's activities. Figure 7.12 shows how a charity might use internet services to communicate with different groups.



▲ **Figure 7.12** A charity can use many internet services to communicate with different groups of people

SUBJECT VOCABULARY

in-video advertising advertisements that appear within online videos
viral marketing a type of advertising used by internet companies in which computer users pass on advertising messages or images through email, sometimes without realising that they are doing so
cookies information that a website stores on a user's computer so that the website recognises the user when they use it again
profile compilation of personal information about an individual

GENERAL VOCABULARY

corporate communication the process of providing information about a company for its employees or for its customers and the public, so that they know what the company is trying to achieve and have a good opinion of the company

SKILLS INTELLECTUAL INTEREST AND CURIOSITY

ACTIVITY

▼ SOCIAL MEDIA AND POLITICS

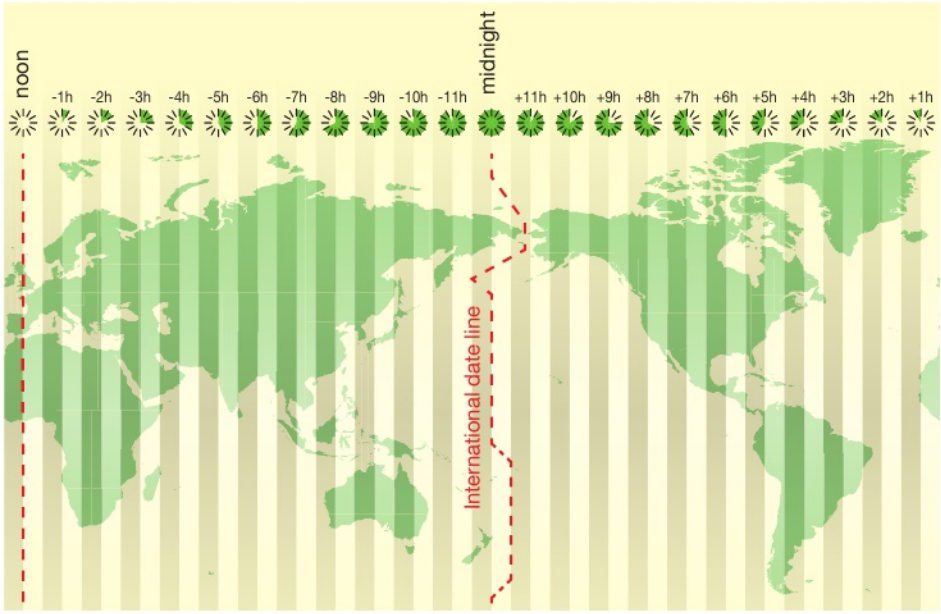
Investigate some of the ways in which political organisations have used social media to communicate with voters during recent campaigns.

ACCESS TO GLOBAL MARKETS

The internet has made it easier for organisations to advertise and sell to customers in countries around the world. Producers of digital content are now able to sell their products online without having to create physical packaging and can avoid postage charges. In addition, the internet has also ensured that manufacturers have easier access to businesses that produce materials and parts and can communicate more easily with them.

ACCESS TO GLOBAL WORKFORCE

Thanks to the internet, organisations can employ people in other countries. This allows organisations to be more selective when hiring employees, because they do not just have to employ people who live within travelling distance of the organisation's offices. This means that the organisation can make use of different skills and time zones. For example, Figure 7.13 shows how three teams in three different time zones can cover all 24 hours in one day by working three shifts of eight hours (3 × 8 = 24). The organisation may also be able to reduce its costs because people in some countries will accept lower wages than in other countries.



▲ **Figure 7.13** Companies often use teams in different time zones in order to provide 24-hour customer support, with all employees working in daylight hours in their local area

SKILLS ANALYSIS PROBLEM SOLVING

ACTIVITY

▼ USING DIFFERENT TIME ZONES

A company employs people in your country from 09.00 until 17.00. Find two other countries in which it could employ people to work the same times of day while still ensuring that the company provides 24-hour customer support.

HOW INFORMATION IS MANAGED AND USED

Organisations can make use of **big data** to understand the behaviour of their customers, improve the customer experience and make their processes more efficient.

For example, a computer game retailer could use data gathered from analysing social media posts, web browsing patterns, movie ratings and current game sales in order to predict which game will sell best in six months' time. The retailer can then make sure that they buy enough stock of the game in order to meet demand, and avoid buying too much stock of any games that they predict will not be popular.

SUBJECT VOCABULARY

big data the analysis of huge quantities of data collected from many sources (such as smartphones, online applications, social media and payment systems) in order to find patterns of behaviour and interactions

Another example is the use of weather data from hundreds of thousands of sensors, smartphones and aircraft. Processing this data allows organisations to understand how different types of weather can affect their services. For example, supermarkets can use the data to change the number of products or staff they will need. Energy suppliers can use it to calculate how many people will need heating. Governments can use it to predict and warn people of extreme weather events, which could protect property and save lives.

NEGATIVE IMPACTS

SECURITY ISSUES

The data stored by organisations is often private and valuable. If data is stored in a central location, it can be physically secured by walls, locks, alarms and security guards. None of these methods is totally safe, but they are all good ways of securing data.

However, as you have already seen, employees often work from home. Organisations use the internet to provide their employees with access to their systems while working from home. They do so using three methods:

- allowing employees to transfer a copy of the organisation's data to home via email
- providing remote access to the data stored in the organisation's building, such as by using a VPN
- storing data on another company's servers and providing access to that data.

Each of these methods means that the data is more vulnerable to being accessed by an unauthorised user than it would be if it remained in a central location.

HINT

If an organisation stores data on another organisation's servers, it must rely on the security of the other organisation.

SKILLS INTERPRETATION ADAPTABILITY

▲ **Figure 7.14** As soon as data leaves a secure building, it becomes much less secure

ACTIVITY

▼ PRIVATE AND VALUABLE DATA

Complete Table 7.3 by providing examples of private or valuable data stored by the types of organisation listed in the table. When you have finished, add your own choice of organisation in the bottom row and identify examples of private or valuable data that it holds.

▼ **Table 7.3** Organisations that hold private or valuable data

ORGANISATION	EXAMPLES OF PRIVATE OR VALUABLE DATA
Banks	
Hospitals	
Online retailers	
Schools	

There are three main ways in which unauthorised users can gain access to systems.

- Authorised users reveal their login details, either intentionally or unintentionally, such as by losing paper copies of their login details, saving their login details to a computer that they lose, being pressured into telling someone their details or having passwords which are easy to guess. Organisations

GENERAL VOCABULARY

accountable when someone is held responsible for the effects of their actions and must be willing to explain or be criticised for their actions

have policies that help employees to understand and manage these risks. Policies like these make employees **accountable** for their actions, which means that they are more likely to act responsibly.

- Unauthorised users intercept the data, either as it is transferred over the internet from the organisation to the employee's computer or as it is transferred within the employee's LAN after it has been transferred via the internet (WAN). Organisations often use encryption to secure data when it is transferred using the internet, which protects data even if it is intercepted. See *Unit 2 Connectivity* (page 90) for more information about encryption.
- Unauthorised users **hack** into the organisation's systems. To prevent access to their systems from the internet, organisations use authentication, firewalls and intrusion detection systems. See *Unit 2 Connectivity* (page 90) for more information about firewalls.

SUBJECT VOCABULARY

hacking accessing a system using malicious methods

HINT

Hacking is not the same as stealing someone's password. Hacking is when the unauthorised and authorised users use different methods to access the same system.

GREATER COMPETITION

In the past, organisations usually competed with other organisations in their local area or their own country. However, the use of the internet means that organisations must now compete in a global marketplace. In some industries, there are more organisations with which to compete. Large organisations can also become less attractive to customers because they may be less flexible than small online businesses.

Some types of organisation and even whole industries have been put at risk due to the way in which the internet has provided new channels for the trade and distribution of goods and services. There are many examples of this.

- Music and film retailers have been threatened by the increased use of online downloads and streaming.
- DVD rental companies have had to deal with similar challenges, as more people now watch films online.
- Record labels have been threatened by the fact that independent artists can publish and distribute their music online.
- Estate agents have lost business as individuals advertise their properties online.
- Newspaper publishers and television broadcasters have had to adapt because individuals have a greater choice and more convenient access to news and information services online.
- Postal services have been negatively affected by people's ability to send messages and digital media instantly.

IMPACT OF THE INTERNET ON SOCIETY

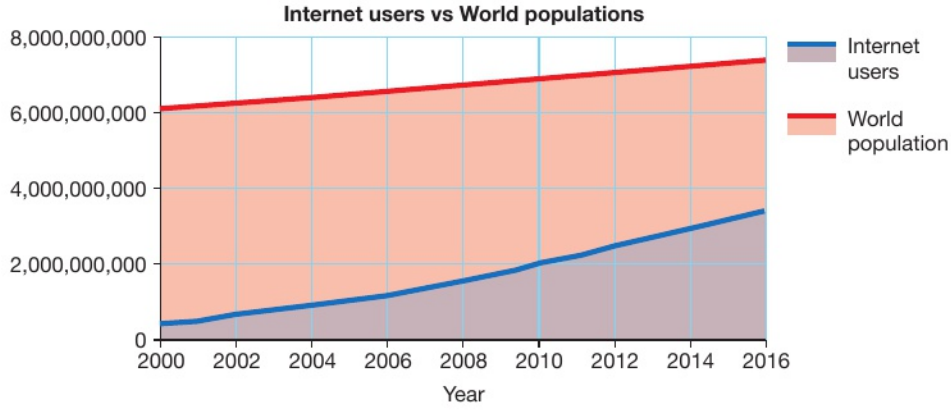
The development of the internet has affected many aspects of society and people's lives.

THE CAUSES OF UNEQUAL ACCESS TO ICT

SUBJECT VOCABULARY

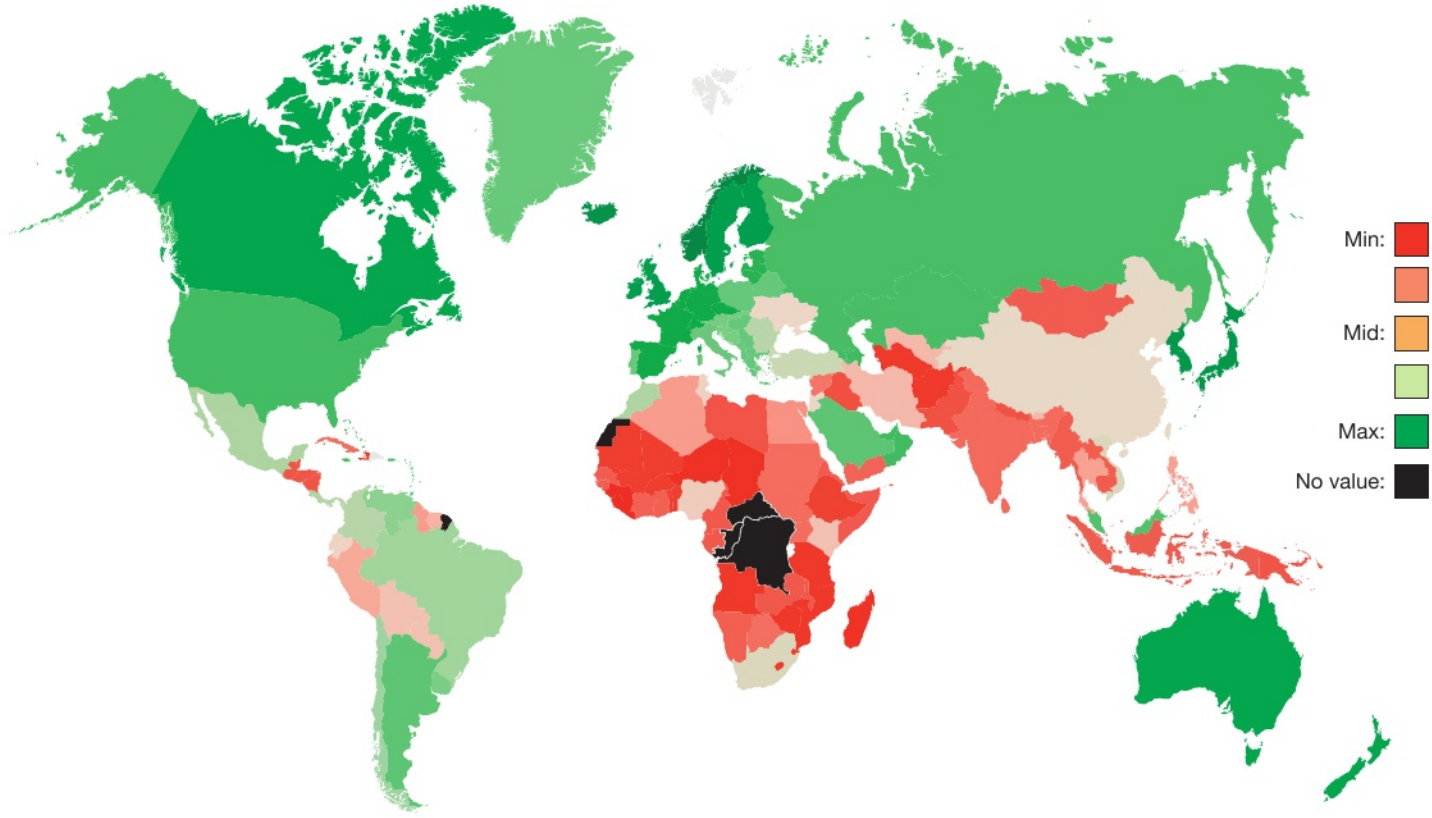
digital divide the gap between people who have access to digital devices and the internet and people who do not

In 2016, approximately 46% of the world's population had access to the internet. Access to information and communication technology (ICT) is not equal. The difference between those with technology and those without is often referred to as the **digital divide**.



▲ **Figure 7.15** Although more people are able to access the internet than ever before, it is still not available to all

In Figure 7.16, countries that are coloured green have high percentages of people who access the internet. Countries that are coloured red have low percentages of people who access the internet.



▲ **Figure 7.16** Lots of people in many regions of the world use the internet, but the proportion of internet users is smaller in Africa and South Asia

SKILLS CRITICAL THINKING
EXECUTIVE FUNCTION
COMMUNICATION

ACTIVITY

▼ THE DIGITAL DIVIDE

Create a mind map that highlights the causes and effects of the digital divide and its impact on society.

KEY POINT

The digital divide is not just about access to the internet. It also relates to access to television, telephones and a wide range of digital devices.

People's access to ICT can be affected by a number of factors.

- **Economy and infrastructure:** Countries with advanced economies can afford to invest in the infrastructure required to provide access to networks and the internet. In countries with emerging and developing economies, governments may prioritise other needs, such as food and healthcare, rather than access to digital technologies.

▲ **Figure 7.17** There is a close relationship between people's income and their access to technology

KEY POINT

Although the proportion of people with access to technology is higher in richer economies, national wealth is not the only factor that determines access to ICT.

DID YOU KNOW?

Some people believe that governments prevent people from accessing ICT in order to control their citizens rather than to protect them. In 2016, the United Nations criticised the way in which some governments deliberately blocked or disrupted their citizens' internet access.

- **Location:** People may not be able to access online systems in remote locations. For example, in rural areas or locations where wireless signals or cabling cannot reach, such as heavily forested and mountainous areas.
- **Politics:** Governments that want to control access to information can either prevent or reduce access to the internet for their citizens. Some governments do not allow people to visit certain websites or content from other countries. Other governments have banned people from using satellite receivers so that they cannot access television or radio broadcasts from countries with cultural influences they disagree with.
- **Religion:** Some religions ban access to certain technologies. For example, Old Order Amish communities in the United States of America do not use radio, television or the internet.
- **Disability**: If digital devices are not designed to be **inclusive**, people with disabilities can find accessing technology more difficult and may have to rely on adaptations to be able to use ICT.
- **Social factors:** In every region of the world, social factors such as age, gender, education and income affect people's ability to access ICT.

GENERAL VOCABULARY

inclusive making sure that all individuals and sections of society are included in or have access to something

SKILLS
CRITICAL THINKING
REASONING
INTERPRETATION
PERSONAL AND SOCIAL RESPONSIBILITY

ACTIVITY

▼ CAUSES OF REDUCED INTERNET ACCESS

Do some research into the cause of reduced internet access for each of the social factors listed on page 127, then use your findings to complete Table 7.4.

▼ **Table 7.4** Causes of reduced internet access

FACTOR	REDUCED ACCESS FOR	CAUSES
Age	Older people	
Education	People with a lower level of education	
Income	People with lower income	
Gender	Female users	

▲ **Figure 7.18** In many countries, women are less likely than men to access the internet or to own a smartphone.

THE IMPACT OF LIMITED OR NO ACCESS TO DIGITAL TECHNOLOGIES

If an individual or community has limited or no access to digital technologies, they have less access to communication with other people. This makes them more isolated and can reduce their understanding of different cultures. It also reduces the availability of:

- goods and services, affecting people's ability to find bargains and good deals
- entertainment, reducing people's access to popular culture
- education, reducing people's employment opportunities.

However, some people argue that limited or no access to digital technologies builds stronger communities, because it increases the amount of time that people within the community spend with each other in person.

THE IMPACT OF LESS RESTRICTED ACCESS TO NETWORKS

GENERAL VOCABULARY

media mass communication such as broadcasting, publishing and the internet

Less restricted access to networks has had an impact on a number of elements of society. For example, one key element of society is the **media**. Before the internet, if an individual person wanted to broadcast a message, they had to own or be able to persuade a media organisation to broadcast it, or they had to go into the street and start shouting! However, the internet has caused a shift in power, because social media and video streaming services like YouTube® have enabled people to broadcast their own messages and interact with global audiences.

Online content is still controlled to an extent by moderators, who enforce the service owners' policies on what kinds of content should be published. What users see online is also determined by the programs that control what stories and videos are promoted to their reading lists and viewing lists. These decisions can be based upon users' browsing history or the browsing history of friends linked to their online profiles. In some cases, these decisions depend on whether individuals and organisations have paid to promote their information to users.

SUBJECT VOCABULARY

user-generated created by the individuals who use the service

User-generated reference sites such as Wikipedia have challenged society's ideas about expertise. This is because truth, knowledge and accuracy are no longer checked by a limited number of experts or editors. Instead, ordinary people can now put information online that may or may not be true.

The development of the internet has created billionaires. At the same time, it also provides millions of volunteers with further opportunities to work for free for good causes.

▲ **Figure 7.19** The internet gave citizens the ability to spread information about the 2011 riots in England

The use of the internet has also had an impact on law enforcement. For example, in 2011, riots spread across parts of England. The spread of the riots was linked with the use of mobile phone networks to spread messages through social media and instant messaging services, which helped the rioters to organise themselves and avoid the police.

However, the police also used networks. For example, they used the network of CCTV cameras to record the actions of rioters. In the days after the riots, footage captured on smartphones was uploaded to photo blogging websites and spread through social media, and communities helped identify those responsible for the damage caused during the riots. To help them gather information about the phones that were used to organise the riots, the police also asked phone companies to provide information about the phones' owners, where calls were made from, and lists of calls made to and from the phones.

▲ **Figure 7.20** By 10am on the morning after the third day of rioting, the tag #riotcleanup was the top trending tag in the UK and second worldwide

Although it was claimed that the police in England were not prepared to keep up with the use of social networks during the riots, they have since developed their use of appropriate technologies and methods to monitor these communication methods. The internet was also used by citizens to organise clean-up events, proving that social media can be used for positive purposes.

SUBJECT VOCABULARY

digital humanitarian movement a group of people working together using ICT to promote human welfare

The **digital humanitarian movement** is an excellent example of socially responsible use of the internet. For example, in 2007, there was civil unrest and tribal violence in Kenya, and traditional media struggled to cover the events. A blogger called Ory Okolloh co-founded a website called Ushahidi, which is Swahili for 'witness'. The website provided people with the ability to record and map incidents of attacks that were happening during the crisis. By giving them a voice, Ushahidi put the Kenyan authorities under pressure to act to reduce the attacks on Kenyan citizens.

SUBJECT VOCABULARY

crowd-mapped data provided by many individuals, forming a 'crowd', which is then superimposed on a map using geolocation information from users' data submissions

Since 2007, Ushahidi has been used to track and report thousands of human rights violations. It also helped people to map victims of the 2010 earthquakes in Haiti and the 2015 earthquakes in Nepal, ensuring that emergency teams and humanitarian organisations were aware of when and where people needed help.

▲ **Figure 7.21** A **crowd-mapped** crisis zone during the Japanese tsunami in 2011

THE GAP BETWEEN INFORMATION RICH AND INFORMATION POOR

As a result of the growth of the internet, a divide has been created between people who have access to online information, and people who do not. This divide is often referred to as the information gap.

SUBJECT VOCABULARY

information rich people with good access to information provided by communication technologies
information poor people with limited access to information provided by communication technologies

People who are **information rich** have good access to information. This improves their level of education and enhances their ability to make decisions. In comparison, people who are **information poor** have reduced access to information, which decreases their education and reduces their ability to make decisions.

The information gap existed before the internet, because some people had more access than others to information from television, newspapers and books. However, the development of the internet has widened the gap because it has increased the amount of information that is available to people online and that is unavailable to people without internet access.

People who do not have access to the internet do have some alternatives to increase their access to information. For example, mobile networks can be used to provide access to SMS so that farmers in remote areas can communicate with buyers to make sure that they get a fair price for their produce. SMS messages can also provide farmers with weather forecast updates so that they can prepare for and protect their farms from bad weather.

▲ **Figure 7.22** Farmers in remote areas can connect to networks using SMS so that they have more information

HINT

SMS messages are often called text messages or texts.

However, mobile text message services do not provide as much access to services and information as the internet can. With the internet, people have greater access to communication, news, entertainment, goods, banking and other services like tax and applications for driving licences.

THE IMPACT OF THE INTERNET ON CHANGES IN WAYS OF SOCIALISING

As people increase their use of the internet, they spend more time in the virtual world than the real world. The internet has arguably affected the way that people think and their ability to form relationships with others.

SUBJECT VOCABULARY

status update a message or post that a user adds to their own social media page to inform others of something that they consider important enough to share

People can use the internet in order to connect with people around the world whom they have never met. However, it can also cause people to become isolated from their own families and local communities because they spend most of their time looking at the screens of their digital devices. For example, having friends' and family's **status updates** sent directly to you means that you no longer have to ask them what they are doing. Some people have argued that social media makes friendship meaningless, because on social media even complete strangers can be labelled 'friends'.

CHAPTER QUESTIONS

SKILLS REASONING

1 Which **one** of these activities is only possible when using the internet? **(1)**

A Television
B Radio
C Streaming
D Mobile telephone calls

SKILLS INTERPRETATION

2 State **two** benefits to employees of working from home. **(2)**

SKILLS INTERPRETATION

3 State **two** drawbacks to organisations of employees working from home. **(2)**

SKILLS DECISION MAKING

4 Explain **one** reason why the use of the internet may affect the ability of individuals to interact with other people face-to-face. **(3)**

SKILLS REASONING

5 Explain **one** reason why cyberbullying can be more distressing than in-person bullying. **(2)**

6 State what is meant by the term 'collaborative working'. **(1)**

SKILLS REASONING

7 State **three** factors that affect unequal access to ICT. **(3)**

SKILLS REASONING

8 State **three** examples of services that are not available to those with limited or no access to digital technologies. **(3)**

SKILLS INTERPRETATION

9 Describe **two** ways in which greater access to networks has affected society. **(4)**

SKILLS INTERPRETATION

10 Describe the effect of the internet on the information gap. **(2)**

SKILLS PRODUCTIVITY REASONING

11 Discuss the impact of the internet on how individuals socialise. **(8)**

SKILLS INTERPRETATION DECISION MAKING

12 Describe **two** ways in which individuals can stay safe online. **(4)**

SKILLS INTERPRETATION

13 Explain why organisations' use of the internet increases the risk to data security. **(3)**

8 ONLINE COMMUNITIES

People use online communities to socialise, share information, play games, work, learn and create. In this chapter, you will consider the functions of different types of communities, the features that provide these functions, how communities are used to reach global audiences and how community members can be protected from online risks.

LEARNING OBJECTIVES

- Understand key features of online communities:
  - social networking
  - online gaming
  - online work spaces
  - virtual learning environments (VLE)
  - user-generated reference sites: wikis, websites, forums
  - user-generated content: video sharing sites, blogs, websites
  - social bookmarking
- Know the functions and target audience of different forms of online communities
- Understand the ways in which online communities are used to communicate and collaborate on a global scale
- Be aware of the purpose of responsible use and acceptable behaviour policies
- Understand how to stay safe online: cyber bullying, anonymity of others (misrepresentation), disclosure of personal information/location

SUBJECT VOCABULARY

online community a group of people with a shared common interest who communicate online
member someone who is part of an online community

KEY POINT

All online communities allow users to interact with other people.

FEATURES AND FUNCTIONS OF DIFFERENT ONLINE COMMUNITIES

Each type of **online community** has:

- a **function**, which is what it does for people who use it
- **features**, which enable (or allow it to achieve) its function.

Different online communities provide different features that their **members** can use to interact with each other. Features that provide the function of one type of community now could be used for other types of community in the future, because the internet and its uses are always evolving.

SOCIAL NETWORKING COMMUNITIES

Social networking is the practice of forming groups in a society. This is something that humans have been doing for a long time before the invention of the computer. However, the internet has provided new ways for us to form social networks. Examples of online social networking communities include Facebook, Baidu® and Twitter.

GENERAL VOCABULARY

professional someone who works in a job that needs special education and training, such as a doctor, lawyer or architect

DID YOU KNOW?

Members of social networking communities typically only interact with five or six friends on a daily basis.

SUBJECT VOCABULARY

profile a collection of information about a user

DID YOU KNOW?

Some people compete to see how many 'friends' they can have on social networks. The maximum number of people with whom you can maintain stable relationships is approximately 150. This is known as the Dunbar number. This is true for humans and also for most primates, such as chimpanzees and orangutan.

THE FUNCTION OF SOCIAL NETWORKING COMMUNITIES

Online social network communities allow members to connect through shared interests or relationships.

These communities include **professional** networks such as LinkedIn® and personal networks such as Facebook. These different types of network started out with separate functions. However, just like the convergence of different types of digital device (see *Unit 1 Digital devices*, page 15), the features and use of different types of social network are starting to mix together. For example, some personal networks such as Facebook and Twitter are used by professionals and businesses as well as for personal relationships.

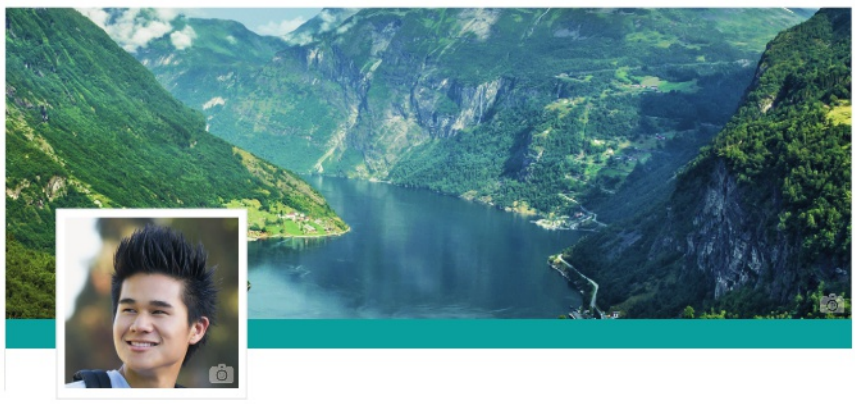
FEATURES THAT ENABLE THE FUNCTION OF SOCIAL NETWORKING COMMUNITIES

Profiles

When you create an account with a social networking community, you can add information about yourself. Some services allow members to decide which information should be made public, which information should only be visible to certain people and which information should not be visible to anyone. A collection of user information is known as a **profile**.

Profiles can be personalised by members and they can include:

- biographical details such as name, gender, date of birth, location and language
- an 'about you' or short description of the user
- details about the user's work and education
- travel history
- family details such as relationship status, family members and pets
- contact information such as telephone number, email address and website
- profile and background images, colour schemes and designs.



Martin Chan

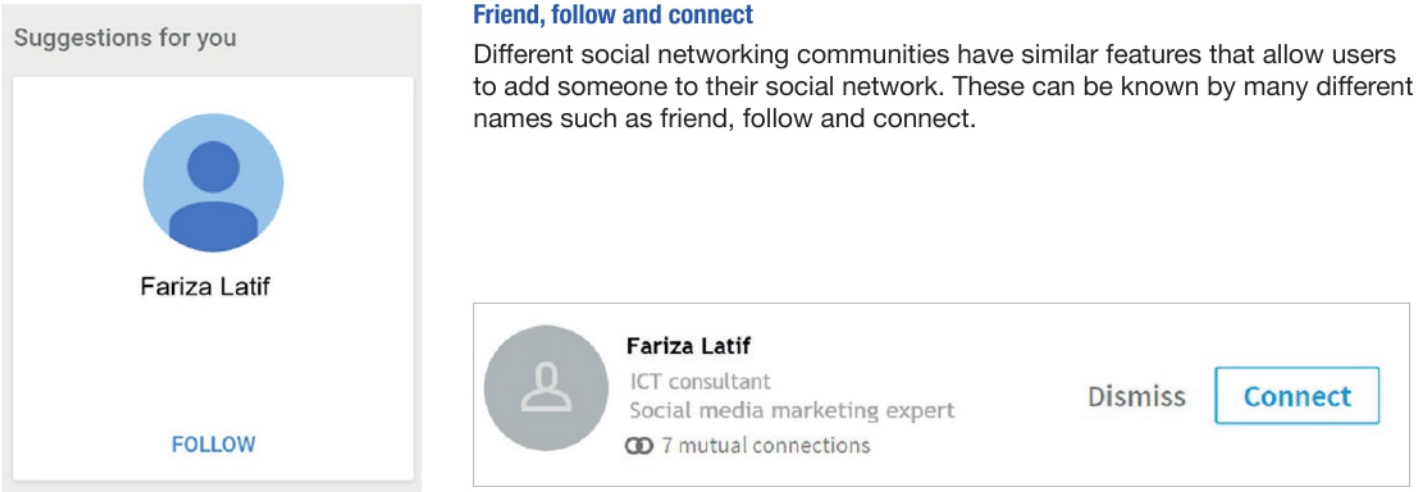
▲ **Figure 8.1** What profiles have you created online?

SKILLS DECISION MAKING
EXECUTIVE FUNCTION
PERSONAL AND SOCIAL RESPONSIBILITY

ACTIVITY

▼ PUBLIC AND PRIVATE INFORMATION

Design your own profile for a professional social networking community. Consider what information you would make public and what you would choose to keep private.



▲ **Figure 8.2** Examples of buttons on social media networks that allow users to add people to their networks

Friend, follow and connect

Different social networking communities have similar features that allow users to add someone to their social network. These can be known by many different names such as friend, follow and connect.

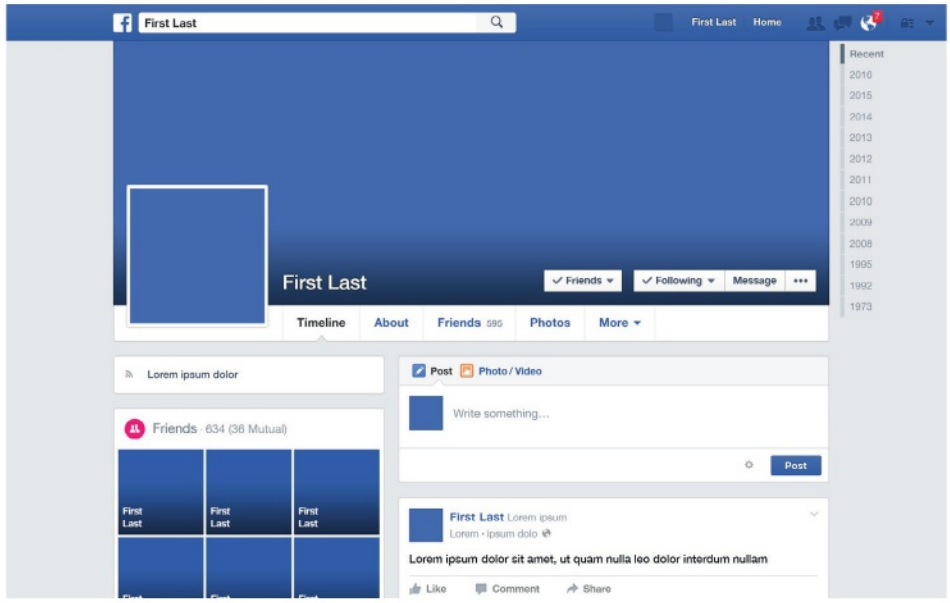
Some communities allow their members to restrict other users' access to their full profile until the other users request to add them to their network. Other communities allow totally unrestricted access. For more information about staying safe online, see pages 143–145.

SUBJECT VOCABULARY

post (noun) a message sent to an internet discussion group so that all members of the group can read it

Stream, wall and timeline

A user's stream, wall or timeline is the place where the **posts** from members' friends appear.



▲ **Figure 8.3** An example of a Facebook wall

The development of the wall or timeline has changed how people communicate online, as it ensures that information is brought straight to the user rather than making the user look for information.

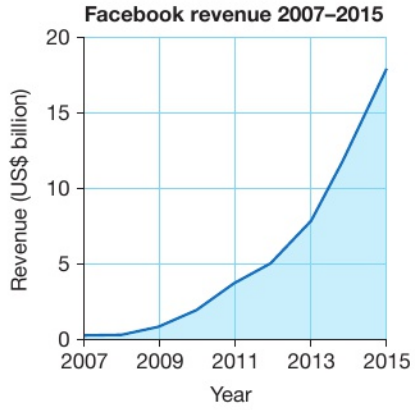
Status updates and posts

Members of a social networking community can either send a message to other members in their network or send it publicly to all members of the community. Some communities allow members to select sub-groups of members within their network that will be able to see their message.

SUBJECT VOCABULARY

post (verb) to put a message or computer document on the internet so that other people can see it
targeted marketing advertising that is matched to internet users based on their attributes, such as their age group or their gender, or their internet browsing history

Social networks are powerful marketing tools because they contain a huge amount of information that people **post** about themselves. The owners of the social networking community can store this information in a database and analyse it. They can then sell this information to advertisers, because this gives the advertisers the ability to specifically target relevant sponsored posts to matched members. The ability to match members to advertisements is called **targeted marketing**.



▲ **Figure 8.4** Selling the use of members' personal information for targeted marketing is a key part of Facebook's revenue, and helped the business to earn almost US $18 billion in 2015

KEY POINT

The use of targeted marketing has made some people consider the cost of social networking communities. They are often free to use, but does this mean that they are really free of charge? The answer to this question depends on the value that you put on your own personal information and the way in which it can be traded.

GENERAL VOCABULARY

promote publicise

Members can also pay a fee to **promote** their posts. This feature is often used by organisations for marketing purposes and allows them to make their posts available to more members of the community. Targeted marketing allows members of some communities to target their promotions at other members with particular profiles, such as a particular age group or gender, so that the promoted posts appear at the top of those members' streams.

Some posts are known as sponsored posts. These posts appear at the top of all members' streams and do not use their profile data in order to target members with relevant profiles.

Groups, lists and circles

Social networking communities usually allow members to create named groups, lists or circles of members. Users' posts can then be made visible only to members of one or more of those groups. For example, a member could use this to keep posts for family separate from posts for work. Organisations can also use this so that smaller teams of people can communicate with each other effectively without sending information to everyone in the entire organisation.

Tags

GENERAL VOCABULARY

categorise to put things into groups or categories according to the type of thing that they are

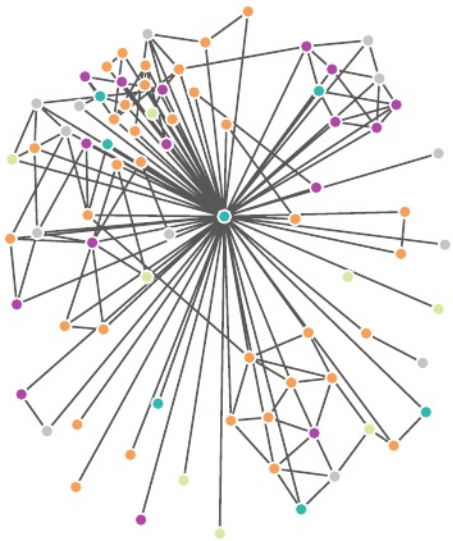
Tags allow members to **categorise** the content that they create and post on social networking communities. Other members can then search for content using the tags that were added to the content when it was posted.

User suggestions

SUBJECT VOCABULARY

tag a label that you can add to a post
connections people or accounts to whom a user is connected

Social networking communities suggest other members that users might want to connect with. They often do this by analysing a user's interests and the interests of people within that user's social network, then matches them to friends of existing **connections**.



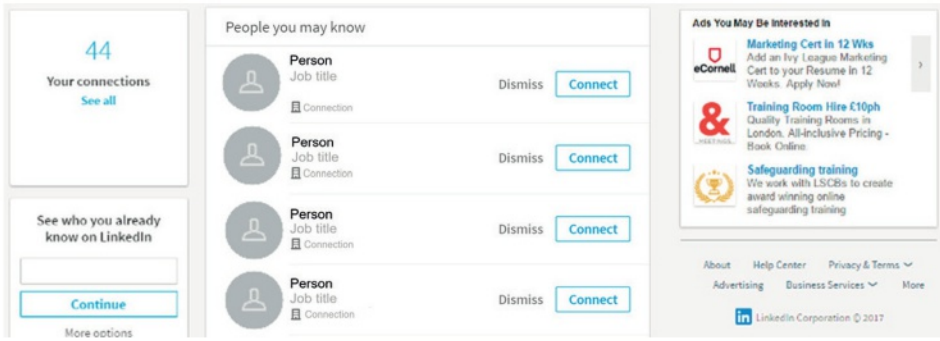
▲ **Figure 8.5** A social network map that shows the connections between members in a professional network; each cluster represents members who work in one particular industry

GENERAL VOCABULARY

cluster a group of things that are arranged very close together

SUBJECT VOCABULARY

viral something that is circulated widely by being shared through networks to large numbers of internet users



▲ **Figure 8.6** An example of a 'Do you know?' web page on a social networking community

Reactions, ratings, likes, upvotes and downvotes

Social networking communities have features that enable users to show their reactions to posts by other people, such as liking them or finding them funny. These features also allow users to recommend posts to other members of their community.

Downvotes are used on some social networking communities to show that users dislike a post. However, some people think that downvotes send a negative message, which is something that social networking communities usually try to avoid.

▲ **Figure 8.7** Examples of buttons that allow users to interact with a post using likes, reactions and ratings

Share

Share functionality allows members of a social networking community to repeat other members' posts to the community. This makes the original posts available to more people. When a post is shared widely on the internet and spreads far beyond its creator's original social network, people describe this as '**viral**' or 'going viral'.

▲ **Figure 8.8** Examples of buttons that allow users to share content

Comments and quotes

Social networking communities provide different ways for members to write comments about other members' posts. This functionality allows members to have online conversations and to communicate with each other.

▲ **Figure 8.9** Examples of buttons that allow users to comment on content

Third-party integration

Many websites now include direct links to social networking sites so that people can easily share the information provided on the third-party website.

SKILLS ADAPTIVE LEARNING

ACTIVITY

▼ FEATURES OF SOCIAL MEDIA NETWORKING SITES

Identify and label the following features of social networking sites on the post shown in Figure 8.10.

- Tag
- Share
- Like
- Connect

▲ **Figure 8.10** A post

ADDITIONAL FEATURES OF SOCIAL NETWORKING COMMUNITIES

Add content to posts

Allowing members to add content such as photographs, videos and URLs to their posts means that members can share their experiences in different ways. This feature usually allows users to **preview** the content before they post it.

GENERAL VOCABULARY

preview see a document, page or film before it is produced in its final form and published

Private or direct messages

Most social networking communities allow their members to send private messages to each other, rather than having to post messages publicly.

Notifications

Notifications tell members about new activities within a social networking community. They help keep members involved with the rest of the community.

SUBJECT VOCABULARY

notification an alert that tells a user about a new interaction or new content within a social networking community

▲ **Figure 8.11** Examples of notification icons

Analytics

Many social network communities also allow their members to see information about how other people have reacted to their posts. This type of **analytics** service helps individuals and organisations to identify their most effective communications so that they can increase the size of their networks and gain new followers.

The size and activity of the social networking community is also important. As more members engage with the community, organisations are more likely to pay to promote their posts on that community as it provides them with a bigger market.

SUBJECT VOCABULARY

analytics information that results from the analysis of data

▲ **Figure 8.12** Examples of analytics services that are available on social networking communities

ONLINE GAMING COMMUNITIES

SUBJECT VOCABULARY

Massively Multiplayer Online Role-playing Game (MMORPG) an online video game that allows large numbers of people to play together

multiplayer games games that are played by more than one person, usually online

experience points credits earned by a user for completing one part of a game

forum a website or web page where users can post comments and information and reply to other users' comments

GENERAL VOCABULARY

tactics the methods used to achieve a goal

Examples of online gaming include PlayStation Network, Xbox Live, Steam©[10] and **Massively Multiplayer Online Role-playing Games** (MMORPGs).

THE FUNCTION OF ONLINE GAMING COMMUNITIES

Online gaming communities exist in order to allow members of the community to play **multiplayer games** together.

FEATURES THAT ENABLE THE FUNCTION OF ONLINE GAMING COMMUNITIES

The features that support the function of online gaming communities include:

- links to social media
- user profiles
- information that allows users to find out how to complete games
- **experience points** that can be tracked and displayed on a user's profile. This enables other users to choose to compete against other players based on their levels of experience, making competitions more or less challenging.
- discussion boards and **forums** that allow members to discuss **tactics**
- statuses that allow users to see if other members are online
- notifications about what is happening in the game.

ONLINE WORK SPACES

Examples of online work spaces include Adobe® Connect™ [11], Slack®, Microsoft SharePoint® and Workplace by Facebook.

THE FUNCTION OF ONLINE WORK SPACES

Online work spaces exist so that members of the community can collaborate together for the purposes of work.

FEATURES THAT ENABLE THE FUNCTION OF ONLINE WORK SPACES

The features that support the function of online work spaces include:

- **cloud storage** and web applications that allow members to work on documents through web browsers
- comments that can be left on documents for other users to see and reply to
- enabling documents to be edited at the same time by two or more members, which allows users to develop the documents together
- messaging systems so that members can discuss the work
- shared calendars so users can see each other's diaries and arrange meetings
- shared **contact lists**
- **chat rooms** to allow discussion of work
- systems for booking resources such as ICT equipment, meeting rooms and transport
- virtual meeting spaces with the ability for members to:
  - give and watch presentations
  - speak to each other using VoIP
  - use video conferencing tools.

SUBJECT VOCABULARY

cloud storage storage provided by servers that are connected to the internet
contact list a virtual address book that allows users to quickly access the contact details of friends and colleagues
chat room a place on the internet where users can write messages to other people and receive messages back from them immediately

VIRTUAL LEARNING ENVIRONMENTS

Examples of **virtual learning environments** (VLEs) include Pearson Active Teach, Google Classroom™ [12], Moodle™, Schoology® and Blackboard®.

SUBJECT VOCABULARY

virtual learning environments (VLEs) websites that contain teaching and learning tools

THE FUNCTION OF VLES

VLEs are used to allow students and teachers to use learning and assessment materials.

FEATURES THAT ENABLE THE FUNCTION OF VLES

The features that support the function of VLEs are very similar to those found in online work spaces. In addition, many VLEs look like and work in a similar way to social networking communities, but they do not aim to connect users with people outside their network.

Features of VLEs include:

- a wall or timeline similar to those on social networking communities that contains posts by teachers and students
- a notice board for announcements about the course
- the ability to share audio, video, web links or files
- quizzes or multiple choice tests that are often graded automatically
- tools for submitting assignments

11 ADOBE® CONNECT™ IS A REGISTERED TRADEMARK OF ADOBE SYSTEMS INCORPORATED IN THE UNITED STATES AND/OR OTHER COUNTRIES

12 GOOGLE CLASSROOM IS A TRADEMARK OF GOOGLE INC. USE OF THIS TRADEMARK IS SUBJECT TO GOOGLE BRAND PERMISSIONS

SUBJECT VOCABULARY

moderate decide whether content is appropriate; moderators decide whether posts should be removed or posted at all
single sign on (SSO) a system that allows users to log in once to access a number of related websites and systems
gradebook a virtual method of recording students' scores on assignments and tests

- communication tools, with posts usually **moderated** by the teacher:
  - forums for discussions
  - chat rooms
  - wikis
  - blogs
  - third-party integration, such as social networking features.

VLEs also have the following additional features.

- **Log-in system:** This is often linked to the school or college's information management systems so that students are logged in automatically if they are already registered on their institution's network. This is known as **single sign on**.
- **Document editors:** These allow teachers to create and edit documents that students can use and sometimes collaborate on with their teachers.
- **Gradebooks:** These allow teachers and students to monitor progress through course materials and assignments.
- **Access statistics:** These allow teachers to track how frequently students access and use the VLE's facilities.

USER-GENERATED REFERENCE SITES

User-generated reference sites are information websites created and maintained by communities of members.

SUBJECT VOCABULARY

wiki a website or database that is developed by a number of collaborating users, all of whom can add and edit content

WIKIS

A **wiki** is a website or database that is developed by a number of collaborating users, all of whom can add and edit content. Examples include the online encyclopaedia, Wikipedia, and the online music database, Discogs.

The function of wikis

The function of a wiki is to allow members of the community to collaborate in order to build and edit web pages.

DID YOU KNOW?
'Wiki' is a Hawaiian word that means 'fast'.

Features that enable the function of wikis

The features that enable the function of wikis include:

- member accounts, which allow users to track which edits have been made by which members of the community
- an edit button, which takes editors to a text editor so that they can edit the content
- structured language, which allows members to format web pages or add links to other content
- search tools.

SKILLS ADAPTIVE LEARNING EXECUTIVE FUNCTION

ACTIVITY

▼ USING WIKIS

1 Carry out an internet search using the keywords 'video Wikipedia contributes free knowledge' to find and watch Wikipedia's video, *How Wikipedia Contributes to Free Knowledge*.

2 Work with your teacher to set up your own class wiki using free online resources accessible through a search engine.

FORUMS

An online forum is a website or web page where users can post comments and information and reply to other users' comments. Forums are also known as bulletin boards or message boards. Examples of forums include Yahoo!® Google Groups™ [13], Stack Overflow®, Quora® and The Student Room®.

SUBJECT VOCABULARY

thread a series of messages concerning the same subject, written by members of an internet discussion group

The function of forums

Forums provide members of the community with online spaces for structured discussions. Posts on the forum are arranged in topics or **threads**.

Features that enable the function of forums

The features that enable the function of a forum include:

- groups, allowing members in one group to have different levels of access or rights to members in other groups
- moderators, who are members who have the right to allow or block posts or members
- administrators, who are members with the same privileges as moderators plus some additional rights, such as being able to promote members to be moderators and **demote** moderators
- posts, which are messages sent by members to the group
- threads, which are topics for conversation, with replies usually arranged and sorted by date or topic
- sticky notes or stickies, which are threads kept at the top of the list of threads to make them easily accessible to members
- ratings, which allow members of the community to rate other members' posts and enable members to see how helpful or genuine the posts are
- private or direct message functions, which allow members of the community to send private messages to each other; sometimes these can also be seen by moderators or administrators.

GENERAL VOCABULARY

demote make someone a lower rank or remove their privileges
mute silence someone or something

Many forums also include a number of **safety features**.

- **Word or URL censoring:** When posts are submitted to a forum, they are scanned (usually automatically by software) for inappropriate words and URLs. If any are found, the post is rejected automatically or sent to moderators to check.
- **Ignore or block:** These are safety features that **mute** members or stop them from being able to access the forum. These are often applied across the whole forum by moderators or administrators.
- **Rules and responsible or acceptable use policies:** These tell members what they can and cannot do on the forum. If members break the rules, then moderators or administrators can send them a warning via private message or block them from the forum.
- **Report or flag a user or post:** This feature allows members to tell moderators if other members have broken the rules of the forum.

USER-GENERATED CONTENT

User-generated content is content available online that has been made by users of a particular site or service.

VIDEO-SHARING AND PHOTO-SHARING SITES

Examples of sites where users can share their videos and photographs include Vimeo®, Flickr®, 500px, Giphy® and YouTube®.

13 GOOGLE GROUPS™ IS A TRADEMARK OF GOOGLE INC. USE OF THIS TRADEMARK IS SUBJECT TO GOOGLE BRAND PERMISSIONS.

The function of video-sharing and photo-sharing sites

These sites allow people to access and share content created and uploaded by members of the community.

Features that enable the function of video-sharing and photo-sharing sites

The features that enable the function of video- and photo-sharing sites include:

- user accounts and profiles
- content management systems, which allow users to add content to a page or to edit content on a page
- tags to categorise shared content
- ratings, which allow users to rate shared videos and photographs
- comments, which allow people to discuss the photographs and videos that have been shared
- third-party integration such as social networking features, which allows users to share and react to uploaded videos or photographs on social networking sites.

SUBJECT VOCABULARY

blog (short for web **log**) a website or web page that is updated regularly, often written like a diary or a series of articles
vlog (short for video **log**) a video blog
blogger someone who creates or maintains a blog

BLOGS AND VLOGS

A **blog** is a website or web page that is updated regularly, often written like a diary or a series of articles. A **vlog** is a video blog. Examples of blog and vlog communities include Weibo®, Wordpress®, Tumblr® and YouTube.

The function of blogs and vlogs

Blog and vlog communities allow people to create online diaries of events or articles. They are very similar to wikis, but they usually contain additional features and more integration with social networking sites.

HINT

Individual blogs or vlogs are only called communities if two or more authors collaborate to create and update them, or if they allow interaction between the **blogger** and their readers.

Features that enable the function of blogs and vlogs

The features that enable the function of blogs and vlogs include:

- user accounts and profiles
- text editors, which allow bloggers to write and edit their content online
- upload tools for adding videos and photographs
- tags
- ratings
- comments
- third-party integration such as social networking features, which allows users to share and react to the blog or vlog.

SKILLS ADAPTIVE LEARNING
EXECUTIVE FUNCTION
COMMUNICATION

ACTIVITY

▼ USING BLOGS

Create a free account with a blogging community and write a blog diary of your week. Read the section on how to stay safe online first.

SOCIAL BOOKMARKING SITES

SUBJECT VOCABULARY

social bookmarking using tags to categorise web documents and URLs so that other people can find content by using the tags in a search

KEY POINT

Many online communities share similar features. For example, some online work spaces provide **social bookmarking** features and social networks provide features also used on forums and gaming communities. Most types of community also provide ways for their users to stay safe online.

Social bookmarking sites allow users to categorise and share web documents and URLs so that other people can access them. Examples include Pinterest®, Digg®, Pocket™, reddit® and StumbleUpon®.

THE FUNCTION OF SOCIAL BOOKMARKING SITES

Social bookmarking sites exist to allow people to share web documents and URLs with each other.

FEATURES THAT ENABLE THE FUNCTION OF SOCIAL BOOKMARKING SITES

The features that enable the function of social bookmarking sites include:

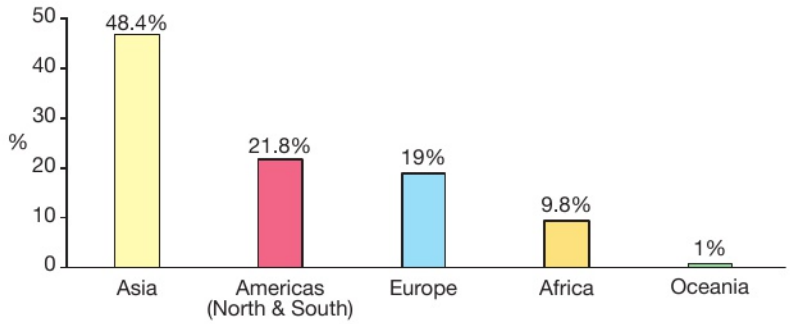
- social networking features to connect users with each other
- third-party integration such as social networking features, which allows users to share and react to content on social bookmarking sites directly from websites using buttons
- tags to organise and categorise URLs
- user accounts.

THE USE OF ONLINE COMMUNITIES FOR COMMUNICATION AND COLLABORATION ON A GLOBAL SCALE

Because of the global reach of the internet, online communities are accessed by members from all over the world. Many communities have translation tools to provide wider access to their content and services.

DID YOU KNOW?

Wikipedia is available in 292 languages. Most of the work to translate the content is done by community members.



▲ **Figure 8.13** Distribution of 2.7 billion internet users by region in 2013

HOW TO STAY SAFE ONLINE

Most online communities have features that help members of the community to stay safe online. For more information about staying safe online, see pages 116–119.

▲ **Figure 8.14** Most online communities allow their members to report users who break the rules of the community. This is an example from Tumblr

ANONYMITY OF OTHERS AND MISREPRESENTATION

Members of online communities can choose to stay **anonymous** online. **Anonymity** can protect users, but it also means that some users can **misrepresent** themselves by pretending to be someone that they are not.

SKILLS PERSONAL AND SOCIAL RESPONSIBILITY
COMMUNICATION
SELF-PRESENTATION

GENERAL VOCABULARY

anonymous unidentified and unnamed
anonymity the state of being anonymous; when other people do not know who you are or what your name is
misrepresentation pretending to be someone or something that you are not
in person face-to-face; in the real world

ACTIVITY

▼ MISREPRESENTATION

Carry out an internet search using the key terms 'NCA CEOP Command – Who Are You Really Talking To Online?' to find the video uploaded by CEOP about misrepresentation. Discuss the video's message with your teacher and the rest of your class.

KEY POINT

Make sure you know who you are talking to online. If you get to know someone online, never arrange to meet them **in person** on your own. If someone asks you to meet them, tell an adult whom you trust.

DISCLOSURE OF PERSONAL INFORMATION OR LOCATION

GENERAL VOCABULARY

disclose make information known to other people
grooming pretending to befriend someone (often a child or young adult) with the intention of harming or abusing that person

SUBJECT VOCABULARY

geotag (verb) to add location data to a piece of content

It can be dangerous to **disclose** too much personal information online. For example, people could use this information for the purposes of **grooming** or to locate the person or their friends and family. In some cases, location data can be given away, either on purpose or by accident, by uploading **geotagged** photographs to photo-sharing sites.

Many online community apps for mobile devices enable users to include their location in their posts. This information is provided by GPS data, or calculated from data provided by the user's Wi-Fi access point or ISP data. If this feature is activated, then any member of the community can find out exactly where that person is.

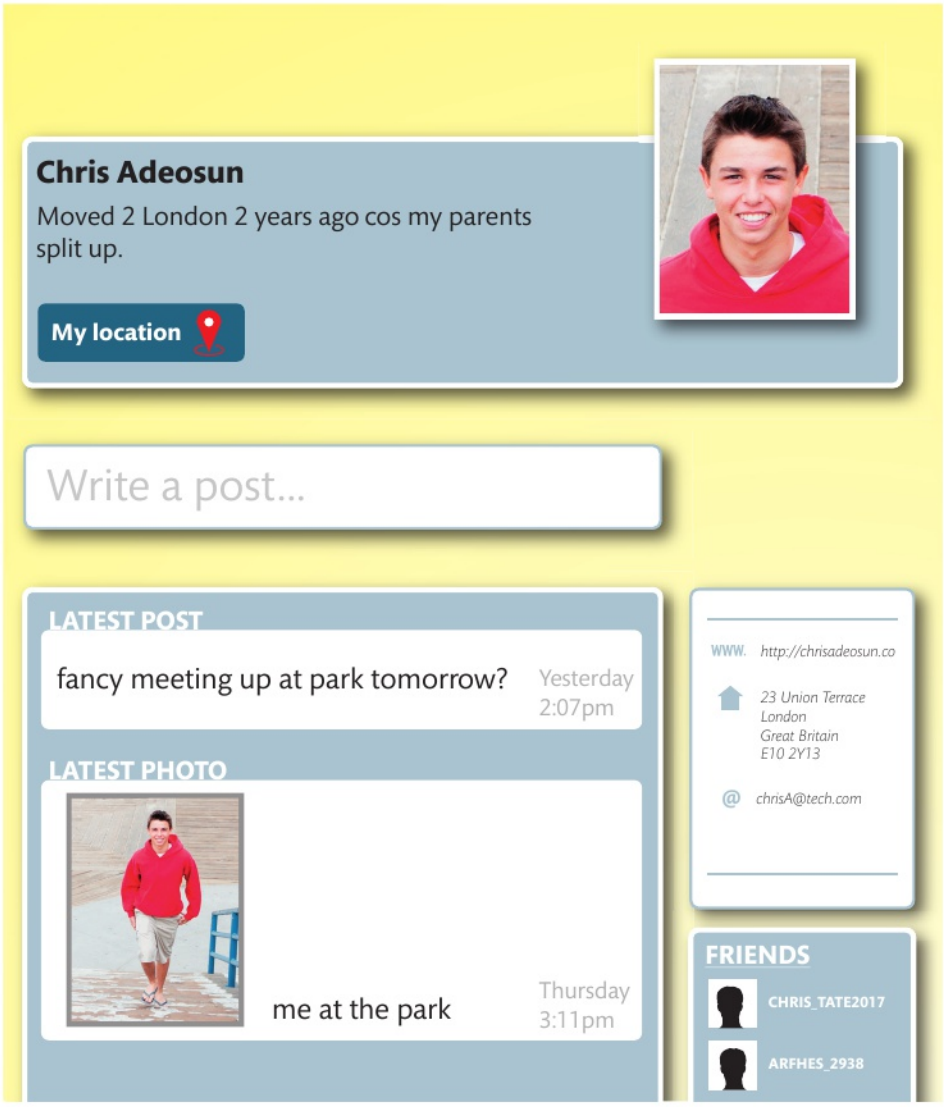
To reduce the risk, online safety organisations advise individuals to think carefully about how much of their personal information they want to make public, and not to post publicly any images containing information about their location. It is also recommended that users check and update their privacy settings regularly, so that only people that they know in the real world can access their personal information online. Finally, members of online communities should report anyone who they think may be misrepresenting themselves or who is acting in a way that puts members of the community at risk.

SKILLS PERSONAL AND SOCIAL RESPONSIBILITY
COMMUNICATION
INTERPERSONAL SKILLS
INTERPRETATION
ADAPTIVE LEARNING

ACTIVITY

▼ DISCLOSING PERSONAL INFORMATION

Look at the social network profile shown in Figure 8.15. Analyse how the information provided in this profile could be used by criminals. How do you think this boy should change his profile in order to keep himself safe online? Discuss your ideas as a class.



▲ **Figure 8.15** A social network profile

SKILLS PERSONAL AND SOCIAL RESPONSIBILITY
ETHICS
COMMUNICATION

ACTIVITY

▼ FAKE SOCIAL MEDIA PROFILES

How do you think you could spot a fake social media profile? Discuss this with your teacher and the rest of your class. Produce some short guidelines to help students at your school or college ensure that they do not talk to people who are misrepresenting themselves online.

CYBERBULLYING

Cyberbullying is the term used to describe the use of the internet to send text or images in order to upset or embarrass someone. For more information about cyberbullying, see page 115.

CHAPTER QUESTIONS

SKILLS PROBLEM SOLVING

1 Which **one** of these is used to set the rules for an online community? **(1)**

- **A** User ratings
- **B** Analytics
- **C** Features that allow commenting and sharing
- **D** Acceptable use policies

SKILLS INTERPRETATION

2 Describe the use of tags in online communities. **(2)**

SKILLS INTERPRETATION

3 Describe how social networking services benefit from members sharing content. **(4)**

SKILLS REASONING

4 Explain why some online communities have administrators and moderators. **(3)**

SKILLS PROBLEM SOLVING

5 State **three** ways in which a user can personalise their online profile. **(3)**

SKILLS PROBLEM SOLVING

6 State the function of social bookmarking **(1)**

SKILLS REASONING

7 Explain why online work spaces could benefit a large international organisation. **(3)**

SKILLS INTERPRETATION

8 Describe how social networking sites are able to make suggestions to members about people that they may want to connect with. **(2)**

SKILLS INTERPRETATION

9 Describe how some social networking sites are able to decide which advertisements to show to different members. **(2)**

SKILLS PROBLEM SOLVING

10 State **four** ways in which students can use the features of VLEs to support their learning. **(4)**

SKILLS PROBLEM SOLVING

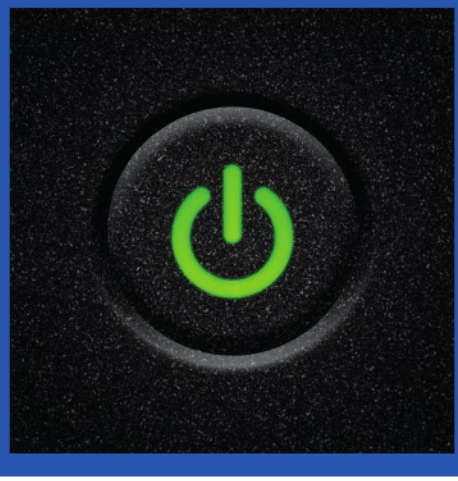
11 State **three** examples of interactions that social network users can have with a member's post. **(3)**

SKILLS REASONING DECISION MAKING PERSONAL AND SOCIAL RESPONSIBILITY

12 Discuss the factors that users of social networking sites should consider when sharing personal information. **(8)**

9 IMPLICATIONS OF DIGITAL TECHNOLOGIES

Digital technologies are incredibly powerful tools. Their implications and how they are used will determine whether their use helps to build a better society. The use of digital technologies has changed the way in which people share and use information, images, music and films. It has introduced new challenges relating to protecting the rights of individuals while also protecting communities from harm. It forces society to rethink and question the concepts of ownership, privacy, identity, censorship and control. It can provide new ways of improving people's health and safety, while at the same time it can put people's health and safety at risk. It also helps people to understand and control their impact on the environment, but also creates new ways in which people can damage the environment.



LEARNING OBJECTIVES

- Know about data protection, the legal requirements of those storing data about individuals and an individual's legal rights
- Understand how copyright legislation affects the use of digital information and media
- Understand that individuals' movements and communications can be monitored
- Be aware of safe and responsible practice when using ICT
- Understand sustainability issues and ways of mitigating the environmental impact of digital devices
- Understand the health and safety issues that arise from individuals' use of ICT and know how they can be minimised

GENERAL VOCABULARY

consent permission to do something
lawfully keeping to the law
specifically in a detailed or exact way

DATA PROTECTION

Some countries have laws to ensure that, when data is stored about individuals, that data is protected. For example, in Singapore, the Personal Data Protection Act ensures that organisations must:

- have an individual's **consent** to collect, use or disclose personal data
- collect, use or disclose personal data in an appropriate manner for the circumstances and must have informed the individual of their purposes
- collect, use or disclose personal data only for purposes that would be considered appropriate to a reasonable person in the given circumstances.

In the UK, there is a law called the Data Protection Act. This law means that organisations who are responsible for using data have to follow rules called data protection principles. These principles mean that they must make sure that the information is:

- used fairly and **lawfully**
- used for limited, **specifically** stated purposes

GENERAL VOCABULARY

adequate large enough in quantity or good enough in quality
European Economic Area (EEA) an area in which goods and services can be traded freely, formed in 1993 by the countries of the European Union (EU) with Norway and Iceland

- used in a way that is **adequate**, relevant and not excessive
- accurate
- kept for no longer than is absolutely necessary
- handled according to people's data protection rights
- kept safe and secure
- not transferred outside the **European Economic Area** without adequate protection.

Under the Data Protection Act, individuals whose data is stored by organisations have the right to:

- access a copy of the information comprised of their personal data
- object to data processing that is likely to cause or is causing damage or distress to the individual
- prevent processing for direct marketing, such as being sent newsletters or emails
- object to decisions that are taken by automated means
- have inaccurate personal data **rectified**, blocked, erased or destroyed in certain circumstances
- claim **compensation** for damages caused by a **breach** of the Act.

GENERAL VOCABULARY

rectified corrected
compensation money paid to someone because they have suffered injury or loss
breach an action that breaks a law, rule or agreement

SKILLS DECISION MAKING
PERSONAL AND SOCIAL RESPONSIBILITY
ETHICS

ACTIVITY

▼ COMPARING DATA PROTECTION LAW

Compare the data protection laws from the UK and Singapore. What are the differences?

SKILLS DECISION MAKING
PERSONAL AND SOCIAL RESPONSIBILITY
ETHICS

ACTIVITY

▼ DATA PROTECTION IN YOUR COUNTRY

1. Investigate whether your country has laws that protect the data that is stored about individuals.
2. Research a country that does not have data protection laws.

KEY POINT

International agreements are very important to ensure that international organisations can act lawfully.

Some countries have international agreements that mean that data can be transferred between countries in the knowledge that they will receive adequate protection.

One example of this is the EU-US Privacy Shield Framework, which aims to ensure that data is protected when it is transferred between the United States of America and countries in the European Union (EU). This is important for American companies like Microsoft®, Amazon®, Twitter and Google™, all of which have large data storage centres in the Republic of Ireland.

KEY POINT

Depending on the online services that you use, your data could be stored in countries that have different data protection laws or no data protection laws at all. This means that you would not be able to take action if your rights were abused.

SKILLS CRITICAL THINKING
PERSONAL AND SOCIAL RESPONSIBILITY

ACTIVITY

▼ THE PRIVACY SHIELD FRAMEWORK

Research how the Privacy Shield Framework protects data transferred between the United States of America and countries in the EU.

COPYRIGHT LEGISLATION

GENERAL VOCABULARY

legislation a law or set of laws
copyright a legal power that provides the creator of an original work with the sole authority to use and distribute it
sole not shared with anyone else

Copyright is a legal power that provides the creator of an original work with the **sole** authority to use and distribute it.

Individual countries have their own laws relating to copyright, and individuals and organisations must obey the laws of the countries in which they operate. Some countries have agreements to stop a publisher stealing work from an author in one country and publishing it in another country. Just like international data protection agreements, international copyright agreements are becoming increasingly important as business becomes more international, partly thanks to the internet.

▲ **Figure 9.1** A copyright notice can be used to inform users that work is protected by **legislation**

When a user downloads original work such as software, books, music, images or videos, the work that they download may be protected by copyright. If they live in a country with copyright laws, or a country that is part of an international agreement, then using someone else's work without permission could result in the user facing legal action from the work's copyright owner.

KEY POINT

In order to protect owners' rights, people must be sure they have the permission to download, use or distribute work.

Copyright owners can choose to distribute their works under licences that users must pay for, such as when buying a music track or an app from an online store. Copyright owners can also choose to distribute their works under free licences such as open source or Creative Commons licences, which allow the owner to distribute their work without payment and say how their work can be used.

DID YOU KNOW?

Creative Commons licences allow owners to distribute their work freely but still protect their rights by specifying how their work can be used, shared and altered by other people.

SKILLS PERSONAL AND SOCIAL RESPONSIBILITY
INTEGRITY
INTERPRETATION
COMMUNICATION
CREATIVITY

ACTIVITY

▼ CREATIVE COMMONS LICENCES

1 Research Creative Commons licences. You could do this by doing an internet search using the key terms 'creative commons kiwi video' to find the video, *Creative Commons Kiwi*, which explains how the different licences work.

2 Create a poster that explains the different types of Creative Commons licences that are available.

KEY POINT

The use of free software licences has made it cheaper for people to access technology, which has helped to narrow the digital divide. This has improved people's access to knowledge, which has helped to narrow the information gap. For more information about the digital divide and the information gap, see pages 125–131.

GENERAL VOCABULARY

exemption having permission to not obey a rule or law
parody an exaggerated imitation for the purpose of humour

SUBJECT VOCABULARY

geoblocking limiting access to internet content based on the user's geographical location (also known as **geolocation rights management**)

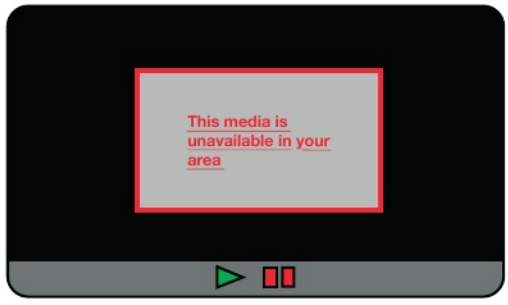
When a customer pays for apps, books, music, images or videos, they pay for the right to use them, but this does not usually also include the right to distribute them to others.

Exemption from copyright applies in some situations. In many countries, such as the UK, an example of this is **fair use**. Some examples of fair use are:

- copies, such as copies of books or documents, made by libraries, educational establishments, museums or archives
- recordings of broadcasts for archive purposes
- uses for the benefit of people with a disability
- for non-commercial research or private study
- when used in **parody**.

In order to check that copyright law is not being broken, owners of digital works can protect their work by using copy protection and digital rights management (DRM). These systems are designed to check that the device on which the work is opened is allowed to open it. For example, music files that are downloaded using Apple iTunes®[14] are often protected with DRM.

Geoblocking is often used to prevent online users from accessing digital content. This prevents users in countries with different legal frameworks from accessing copyrighted work.



▲ **Figure 9.2** Organisations can use geoblocking to prevent global access to their work

MONITORING INDIVIDUALS

GENERAL VOCABULARY

controversial likely to provoke public disagreement

Digital technologies can be used to monitor individuals. This can have benefits but it can also have significant drawbacks and is considered **controversial**.

KEY POINT

The use of digital devices and software to monitor individuals is controversial because it affects their right to privacy. It has both benefits and drawbacks for individuals.

MOVEMENTS

SUBJECT VOCABULARY

closed circuit television (CCTV) a system of cameras placed in public buildings or in the street that are used to help prevent crime

Individuals' movements can be monitored using many methods. Examples include:

- **closed circuit television** (CCTV), which sometimes uses facial recognition software
- automatic number plate recognition (ANPR) cameras used by law enforcement agencies such as the police
- monitoring the use of identification cards, travel cards, passports at borders and bank card transactions

14 ITUNES® IS A TRADEMARK OF APPLE INC., REGISTERED IN THE U.S. AND OTHER COUNTRIES

- identifying devices on networks by their IP or MAC address
- using GPS data shared by apps such as friend finder apps for mobile devices
- GPS trackers that can be attached to items of clothing such as belts.

ACTIVITY

SKILLS INTELLECTUAL INTEREST AND CURIOSITY
PERSONAL AND SOCIAL RESPONSIBILITY

▼ ANTI SURVEILLANCE CLOTHING

Some companies produce clothing that is designed to fool facial recognition systems.

Clothing patterns can contain features that the software interprets as a face. This overloads the system with data, meaning that it is less likely to recognise the actual face of the person wearing the clothing.

1. Investigate how facial recognition software recognises points on a person's face.
2. Do an internet search using the key terms 'Anti surveillance clothing revealed' to watch a video and find other online information about how some clothing is designed to confuse facial recognition technology by overloading it with the very thing it is searching for.
3. Investigate how some CCTV cameras use infra-red light to capture footage in low light or no light areas.
4. Do an internet search using the key terms 'Anti surveillance eyewear infrared' to watch a video and find other online information about how some eyewear is designed to reflect the infra-red light used by CCTV cameras, thereby blocking them from being able to record a face.

DID YOU KNOW?

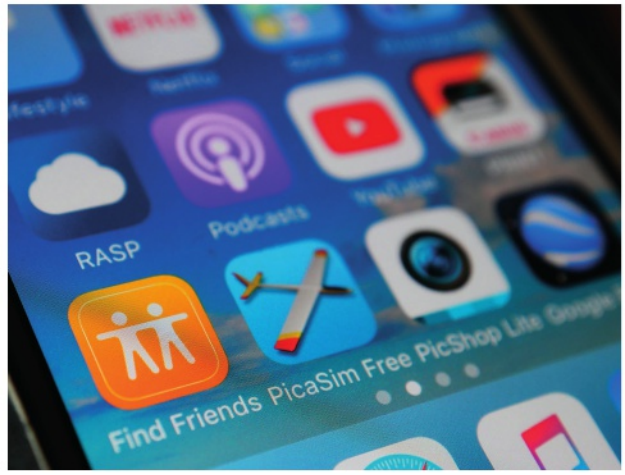
Some companies produce clothing that is designed to fool facial recognition software. The clothing patterns contain features that the software interprets as a face. This overloads the system with data, meaning that it is less likely to notice the actual face of the person wearing the clothing.

▲ **Figure 9.3** Fashion can be used as camouflage against monitoring systems such as facial recognition software

There are benefits to monitoring individuals' movements, such as being able to:

- find people who are lost, especially young children
- locate nearby friends in order to arrange to meet socially
- identify people on networks

- identify and locate potential criminals at events, such as checking at sporting events for fans who take part in violent behaviour
- keep travellers safe, such as by checking for potential criminals at airports
- verify individuals for financial transactions in order to reduce financial crime.



▲ **Figure 9.4** Apps provide users with ways of locating their friends and family, though users usually have to give their consent before the app can make their location available to others

DID YOU KNOW?
Some parents can use locator devices that clip onto their children's clothing or bags. These devices send an alert to a paired device if their child goes outside a pre-set range.

However, there are also drawbacks to monitoring individuals' movements, such as:

- compromising people's privacy
- the expense of setting up, monitoring and maintaining systems
- the energy consumption of the systems and the effect on the environment
- making people feel as though they are not trusted.

SKILLS PERSONAL AND SOCIAL RESPONSIBILITY
REASONING
COMMUNICATION
INTERPERSONAL SKILLS

ACTIVITY

▼ MONITORING PEOPLE'S LOCATION

Research the number of children that were reported missing in your country last year. Discuss whether you think it is right for parents to track their children's location. Can you explain your reasons?

COMMUNICATIONS

DID YOU KNOW?
UK mobile phone and internet service providers must keep a record of all customers' phone and online activity for one year.

There are many ways in which individuals' communication can be monitored. For example, parents can use parental control software to monitor their children's online activity and use of applications. Text messages, emails, posts on social networking sites, comments on blogs and web histories are just a few examples of communications that can be monitored and recorded.

In the UK, the Investigatory Powers Act 2016 allows the police and many other agencies to access these kinds of digital communication. This law is controversial and human rights organisations have voiced concerns about the use of these powers.

▲ **Figure 9.5** Some of the most common terms used in the UK's Investigatory Powers Act 2016

KEY POINT

The right to privacy is in conflict with governments' responsibility to protect their citizens.

SAFE AND RESPONSIBLE PRACTICE

Digital technologies offer great opportunities for individuals. However, there are risks associated with their use. For more information about the safe use of digital technologies, see pages 116–119.

SUSTAINABILITY ISSUES

The use of ICT can negatively affect the environment. For example, it can use up natural resources and contributes to long-term harm to the **ecology** of the planet. Table 9.1 shows three ways in which the use of ICT can cause **sustainability** issues and lists some of the ways in which the effects of these issues can be **mitigated**.

GENERAL VOCABULARY

ecology the biological science that looks at the way in which organisms interact with each other and their environment
sustainability not using up natural resources until they run out; maintaining the balance of nature
mitigate reduce the severity of a problem
renewable energy a source of energy that will not run out when it is used, such as wind power or solar power
non-renewable energy a source of energy that cannot be replaced once it has been used, such as coal or gas
energy-efficient using as little energy as possible
hydroelectric using water power to produce electricity

▼ **Table 9.1** Sustainability issues and mitigating the effects

CAUSE	SUSTAINABILITY ISSUE	MITIGATION
Power requirements of digital devices	The power is produced using **non-renewable energies**, which reduce the planet's natural resources	• Using **renewable energies** • Using more **energy-efficient** devices • Building data centres next to rivers to make use of natural **hydro-electric** power
Power requirements of cooling systems in data centres	Cooling systems use a lot of power, which is produced using non-renewable fuel sources and reduces the planet's natural resources	Building data centres in cold climates to reduce the need to artificially cool the rooms using air conditioners, which use a lot of energy
Use of poisonous substances such as bromine, mercury and chlorine in digital devices	When devices are thrown away, these chemicals leak out and can cause health risks to people's cardiovascular and central nervous systems and to wildlife; they may also cause cancer and lung disease	• Education • Recycling schemes • Laws, such as the EU's Waste Electrical and Electronic Equipment Directive • Using harmless alternative materials for components

DID YOU KNOW?

- The world's biggest data centre uses over 386 million litres of cooling fluid per year.
- Google uses recycled canal water and seawater to cool its data centres in Belgium and Finland.

▲ **Figure 9.6** Facebook built this data centre in northern Sweden so that it is cooled by Sweden's cold climate rather than an air conditioning system

SKILLS INTELLECTUAL INTEREST AND CURIOSITY
PERSONAL AND SOCIAL RESPONSIBILITY

ACTIVITY

▼ REDUCING THE ENVIRONMENTAL IMPACT

There are 62 different types of metals that are used in the average smartphone. In 2013, academics at Yale University in the United States of America tried to identify possible replacements for these metals in order to reduce the environmental impact of manufacturing smartphones. They concluded that 12 of these materials could not be replaced by any other substances.

1 Investigate some of the metals used inside smartphones.

2 Do an internet search using the key terms 'Singapore NEA e-waste recycling' to find out about Singapore's guidance on recycling digital devices.

3 Does your country have an e-waste recycling system? What guidance on e-waste recycling is provided by your government?

GENERAL VOCABULARY

implication a possible future effect or result of an action, event or decision

For more information about the sustainability **implications** of digital technologies, see *Unit 1 Digital devices* (page 20).

HEALTH AND SAFETY ISSUES

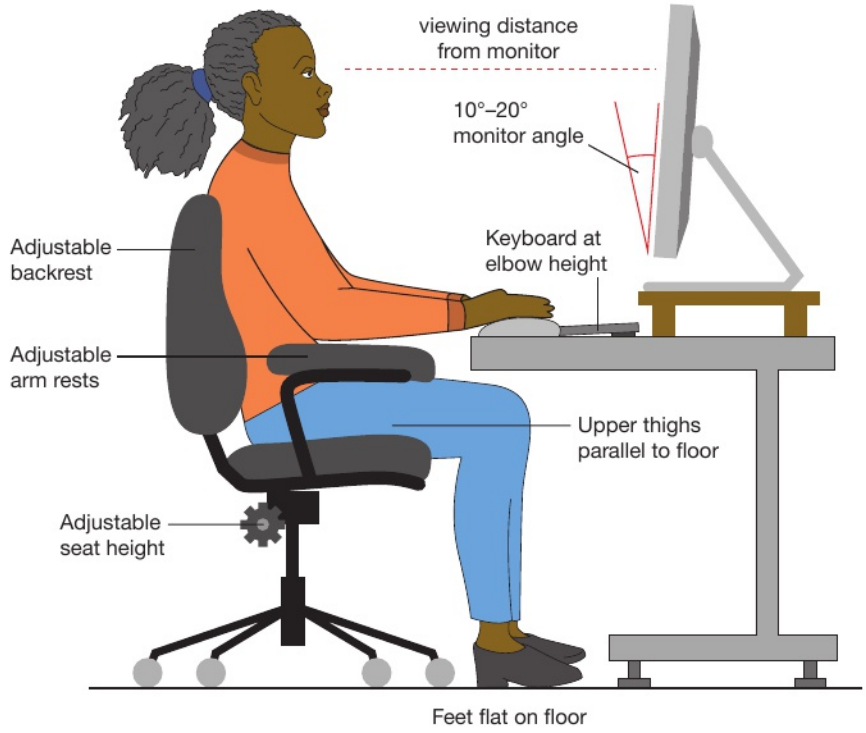
It is important that you should know about the health and safety risks associated with digital technologies, for both yourself and for others. You also need to know what causes those risks and how to minimise them.

▼ **Table 9.2** Risks to health and safety, their causes and ways of minimising the risk

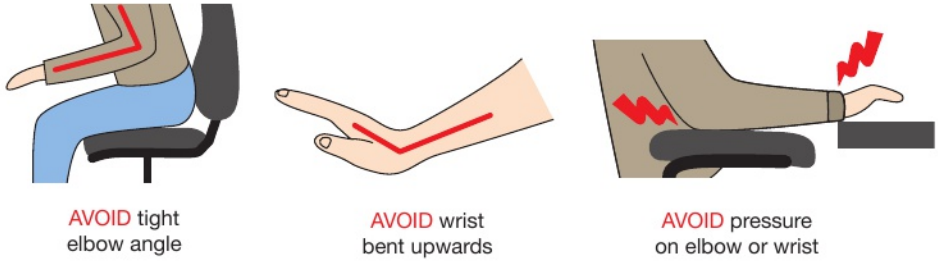
RISK	CAUSE	HOW TO MINIMISE
Eye dryness and eye fatigue	Looking at a screen for long periods of time can cause dry, sore eyes. Human eyes are sensitive to the short wavelength (blue and blue-green) light emitted by LEDs used in digital devices. Some scientists have said that this can affect our sleep.	• Take breaks and look away from the screen into the distance regularly • Make sure the screen is not too close • Use a large enough screen • Use blue light filters • Use screens that do not **flicker** • Use suitable lighting and reduce **glare** of sunlight through windows
Repetitive Strain Injury (RSI), such as Carpal Tunnel Syndrome, which is pain caused by compressing the nerve in the wrist	• Using devices incorrectly • Poor **posture** (see Figure 9.9)	• Use **ergonomic** devices • Use ergonomic supports such as wrist pads (see Figure 9.11)
Back and neck ache	Poor posture	• Maintain correct posture when using devices (see Figure 9.8)
Trip hazards	Trailing wires	• Good cable management • Tidy and secure cables in **trunking** (see Figure 9.12)
Electric shock	• Damaged cables • Liquid on devices	• Use **residual current devices** (RCDs) on the supply to the electrical circuit • Regular cable inspections • Repair or replace damaged cables • No liquids near devices
Fire	• Overheating • **Overloaded** plug sockets	• Use cooling devices • Regular maintenance • Install **fire extinguishers** • Ensure that **plug sockets** contain **fuses** that are suitable for the devices that are plugged into them
Injury or death	Failing to notice immediate danger because of distractions caused by a digital device such as a smartphone	Do not use or be distracted by devices when near roads and other hazards

GENERAL VOCABULARY

flicker shine with an unsteady light that goes on and off quickly
glare a bright unpleasant light that hurts the eyes
repetitive strain injury (RSI) pain caused by repeating the same movement many times
posture the way in which you position your body while standing or sitting
ergonomic designed for efficiency and comfort, especially in a working environment
trip hazard an object that a person could trip over
trunking tubes or channels designed to contain cables
residual current device (RCD) a device that interrupts an electrical current to prevent electric shock
overload put too much electricity through an electrical system or piece of equipment
fire extinguisher a metal container with water or chemicals in it, used for stopping small fires
plug socket a point in a wall where you can connect equipment to the supply of electricity
fuse a safety device used in plugs and plug sockets that breaks an electrical current if too much electrical current is supplied



▲ **Figure 9.7** Maintaining good posture when sitting at a computer



▲ **Figure 9.8** Incorrect posture can cause health problems

SKILLS
INTELLECTUAL INTEREST AND CURIOSITY
PERSONAL AND SOCIAL RESPONSIBILITY
COMMUNICATION
INTERPERSONAL SKILLS

ACTIVITY

▼ DIGITAL DEVICES AND PERSONAL SAFETY

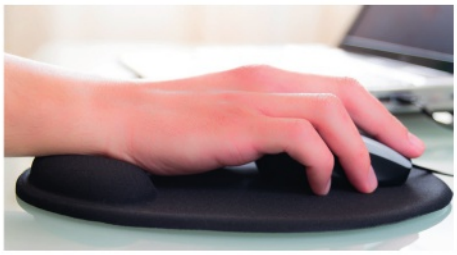
Do an internet search using the key terms 'ABC News texting while walking' to find an ABC News report, *Texting While Walking Accidents*. Watch the video and then discuss the safety issues related to texting while walking and driving.

SKILLS
INTELLECTUAL INTEREST AND CURIOSITY
PERSONAL AND SOCIAL RESPONSIBILITY
INTERPRETATION

ACTIVITY

▼ USING SOCKETS SAFELY

Search 'electrical safety first' and find their guide to avoiding overloading electrical sockets. What do you think of this advice? Is it helpful?



▲ **Figure 9.9** Use of wrist pads can help maintain good posture and reduce the risk to health

▲ **Figure 9.10** Good cable management helps minimise risks to health and safety

SUBJECT VOCABULARY

artificial intelligence (AI) the ability of a computer program to make decisions that would otherwise be made by humans

DID YOU KNOW?

It is estimated that 94% of car accidents are caused by human error. However, a computer can react much faster than a human.

GENERAL VOCABULARY

pedestrian a person who is walking

KEY POINT

People must be responsible in their use of digital technologies. Digital technologies are not yet capable of human judgement, which means that they are not yet capable of taking ethical or moral responsibility for their actions.

SKILLS INTERPRETATION
DECISION MAKING
PERSONAL AND SOCIAL RESPONSIBILITY
INTELLECTUAL INTEREST AND CURIOSITY

As we increase the number of decisions that technology makes for us in our everyday lives, we reduce the control that we have over important decisions that can have an impact on our health and safety. For example, **artificial intelligence** (AI) is now used in self-driving cars and it can make decisions about whether the car should apply the brakes if it is likely to crash into the car ahead, or whether it should swerve to avoid another vehicle. These cars can use sensors to detect whether the car is crossing a lane divider in the road in order to prevent the car drifting into the wrong lane. AI can also read speed limit signs, adjusting the car's speed in order to ensure that the car does not travel faster than the speed limit.

These are all useful tools. However, these AI systems do not have human judgment and cannot apply common sense. Consider the following situations.

- What if a car needs to travel over the speed limit, perhaps to avoid a hazard? Would AI software prevent the car from doing this if it was also supposed to stay under the speed limit?
- What if a car had to swerve to avoid another vehicle, but in doing so veers off the road and into a **pedestrian**? What would the computer decide to do in that situation? Can we know what it decided to do? Can we hold it responsible?

DID YOU KNOW?

The longer that people are not engaged in the driving process because a computer is controlling the vehicle, their reaction times get slower. In some instances, researchers found that people can even fall asleep, leaving the computer to control the vehicle.

ACTIVITY

▼ USING AUTOPILOT

Research the use of autopilot in aeroplanes. Do you think humans need to be in control of an aircraft at all times? Do you think the use of autopilot improves the health and safety of passengers and crew?

CHAPTER QUESTIONS

SKILLS PROBLEM SOLVING ETHICS

1 Which **one** of these is used to reduce the risk to health and safety? **(1)**

- **A** Using a small monitor
- **B** Increasing the amount of blue light emitted by a screen
- **C** Using an RCD
- **D** Working in a room with low-level lighting

SKILLS REASONING PERSONAL AND SOCIAL RESPONSIBILITY

2 Explain why free software licences have helped to reduce the digital divide. **(2)**

SKILLS REASONING PERSONAL AND SOCIAL RESPONSIBILITY

3 Explain why users should be able to give their consent before an app shares their location. **(2)**

SKILLS INTERPRETATION

4 State **three** types of digital information that can be protected by copyright. **(3)**

SKILLS INTERPRETATION

5 State **one** method of monitoring an individual's movements and describe how it is used. **(2)**

SKILLS REASONING

6 Explain why owners of digital information may decide to use copyright. **(2)**

SKILLS REASONING

7 State **one** benefit to individuals of having their location monitored. **(1)**

SKILLS REASONING

8 State **one** benefit to individuals of having their communications monitored. **(1)**

SKILLS REASONING

9 State **one** drawback to individuals of monitoring their location and communications. **(1)**

SKILLS DECISION MAKING

10 State **three** ways in which organisations should act responsibly to make sure that they protect the data they hold about individuals. **(3)**

SKILLS REASONING PERSONAL AND SOCIAL RESPONSIBILITY

11 Explain why the large-scale use of online storage and applications can have a negative effect on the environment. **(4)**

SKILLS REASONING INTERPRETATION PERSONAL AND SOCIAL RESPONSIBILITY

12 Describe **one** way in which individuals can reduce the effect of their use of digital devices on the environment. **(3)**

10 ONLINE INFORMATION

Living in a connected world means that there is a lot of information available for individuals to find. However, it can be difficult to find good quality information. When you find quality information, it is important that you know how to use it appropriately.

"Getting information off the Internet is like taking a drink from a fire hydrant"
- Mitchell Kapor

LEARNING OBJECTIVES

- Understand that information can be gathered from a wide range of sources
- Be able to select and use appropriate sources of information
- Know how to use search engines effectively
- Be able to evaluate the **fitness for purpose** of available information in terms of accuracy, age, **relevance**, reliability, **bias**
- Understand issues related to copyright: permission to use, acknowledgement of source
- Understand issues related to **plagiarism**: copy and paste, rewriting, **paraphrasing**

GENERAL VOCABULARY

fitness for purpose whether the information is suitable or good enough for the intended use
relevance whether the information relates directly to what you want to know
bias unfairly favouring one point of view, or not considering other points of view
plagiarism using someone else's work and pretending it is yours
paraphrasing expressing what someone else has said in a shorter, clearer or different way
primary source something that you have created yourself
secondary source something that has been created by someone else

INFORMATION SOURCES

Information is available from a wide range of sources. These can either be **primary sources**, which are those that you have created yourself, or **secondary sources**, which are those that have been created by someone else.

▼ **Table 10.1** Examples of primary and secondary sources

PRIMARY	SECONDARY
Photographs that you have taken yourself	Newspapers, books and maps
Interviews or questionnaires conducted by you	CDs, DVDs or Blu-rays created by others
Your own blogs, social media posts or emails	Television and radio broadcasts
Your own sound or video recordings	Websites created by other people

SKILLS ADAPTIVE LEARNING

ACTIVITY

▼ PRIMARY AND SECONDARY SOURCES

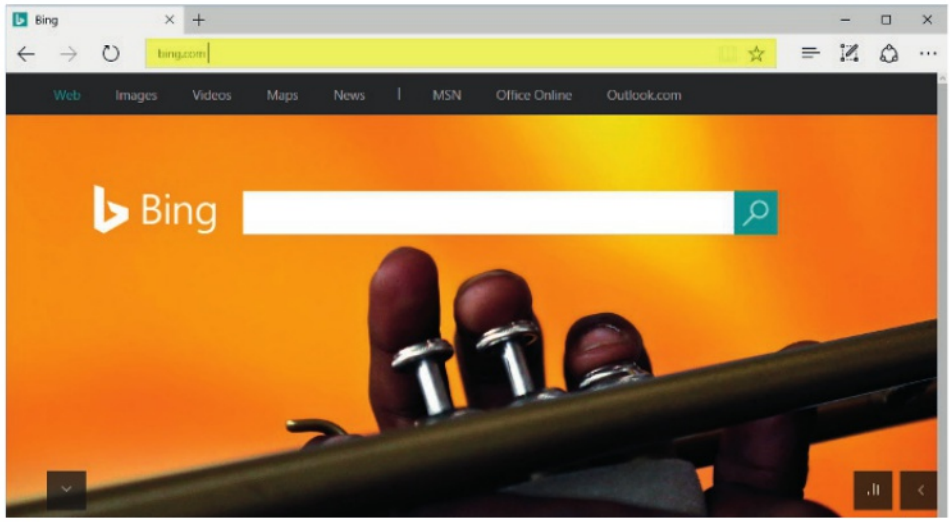
List two more examples of primary sources and two more examples of secondary sources that could be added to Table 10.1

You can decide whether the information that you have found is appropriate for use in a document or digital product by considering whether the information is fit for purpose and for the intended audience. For more information about purpose, see page 163.

If you know the URL of the website you want to access in order to gather information, you can type its name into the address bar of a browser (see Figure 10.2).

HINT

The address bar is not the same as the search field in the web page from a search engine.



▲ **Figure 10.2** The address bar in a browser

SEARCH ENGINES

If you want to find information online and do not know the URLs of any sites that contain that information, you can use a search engine. Search engines compare the words entered by a user with words in a database of web pages. They then show the user the results that are the closest match to their original keywords.

Search engines can be used in browsers, but they are also used by smart personal assistants such as Amazon's Alexa® and Apple's Siri®[14]. These personal assistants allow you to speak your search terms aloud and have results returned through a speaker.

▶ **Figure 10.3** Have you used Siri or Alexa?

14 SIRI®IS A TRADEMARK OF APPLE INC., REGISTERED IN THE U.S. AND OTHER COUNTRIES

Examples of web-based search engines are:

- Bing
- Creative commons
- Duck duck go
- Google
- Yahoo

For more information about search engines, see *Unit 2 Connectivity* (page 87).

KEYWORDS

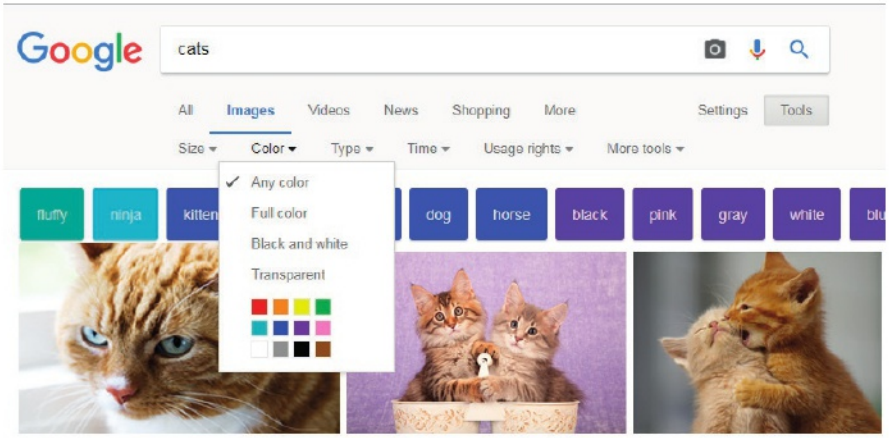
SUBJECT VOCABULARY

keywords the words or search terms that a user types into a search engine in order to look for matching information

Keywords are the words or search terms that a user types into a search engine in order to look for matching information. When entering keywords into a search engine, only enter the important words that you think websites will contain. Keep it simple and do not add too many keywords.

SEARCH TYPES

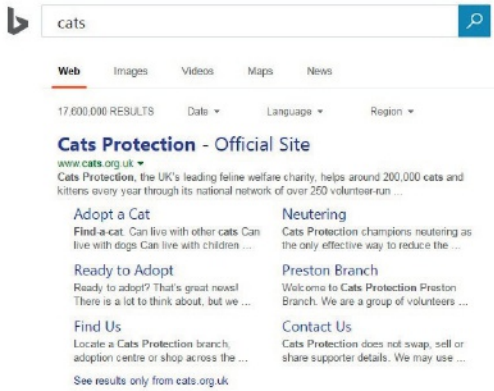
Some search engines allow you to specify the type of information that you are searching for, as shown in Figure 10.4.



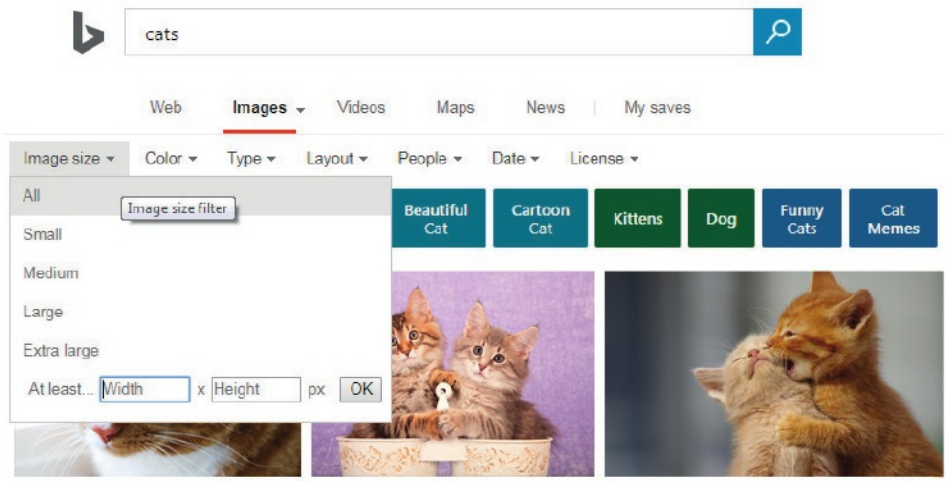
▲ **Figure 10.4** Some of the types of information you can find with a search engine

SEARCH TOOLS

Search tools help you to filter the results that the search engine returns, as shown in Figures 10.5 and 10.6.



▲ **Figure 10.5** Search engines can filter the results by time, date, country and more



▲ **Figure 10.6** When searching for images, search engines can find specific types of images, including those with different types of copyright or **usage rights**

SUBJECT VOCABULARY

usage rights the way in which a piece of information is permitted to be used

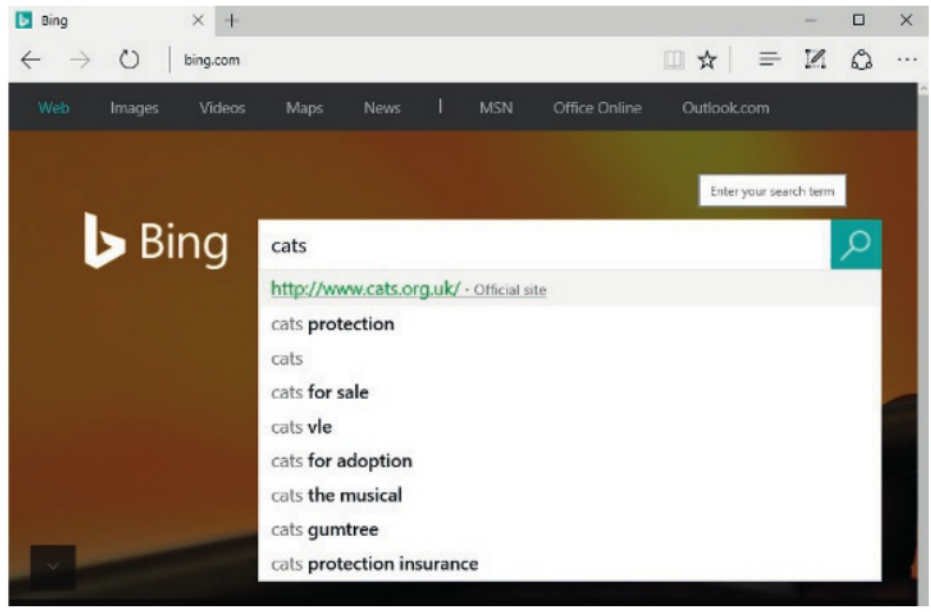
SUGGESTED SITES AND AUTOFILL

SUBJECT VOCABULARY

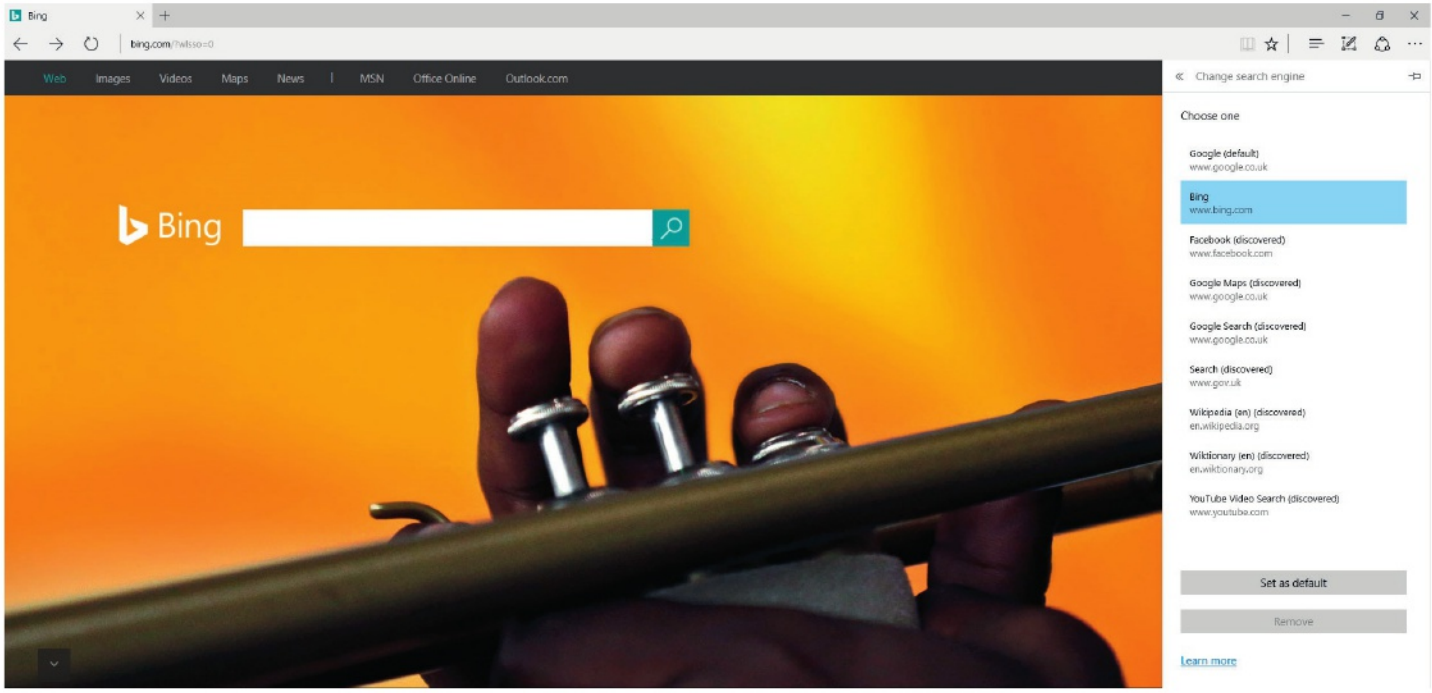
autofill the automatic suggestion of a completed word or phrase that is provided as the user types
browsing history the URLs that an individual user has visited, which are stored in a file

Some search engines give results using **autofill** as soon as you start to type keywords into it (see Figure 10.7). Some browsers also allow you to choose a search engine so that you can type keywords directly into the browser's address bar (see Figure 10.8).

The suggested results often change as you continue to type more text, because the additional terms allow the autofill software to narrow its search for more relevant words or phrases. Similarly, other search engines suggest sites that users might be interested in visiting. These suggested sites can be based on popular searches made by other users or your own **browsing history**.



▲ **Figure 10.7** Some browsers allow you to select a search engine that will show results when you type into the browser's address bar



▲ **Figure 10.8** You can change the browser's usual search engine in the browser's settings

DID YOU KNOW?

Some search engines keep users' data and then suggest results based on the user's search history. Others claim to protect users' privacy by not tracking their online behaviour.

SEARCH SYNTAX

SUBJECT VOCABULARY

syntax the rules that describe how words and phrases are used in a language

Syntax is the rules that dictate how words and phrases are used in languages, including computing languages. For example, you can use special characters in searches. This will make the search engine give you more specific results.

AND (+)

Adding + between words will return only results that match **both** words.

NOT (-)

Adding - before a word will return only results that **do not include** that word.

PHRASE MATCHING ("")

Placing speech marks around a group of words will return only results that **include the whole phrase** with the words in that specific order.

FITNESS FOR PURPOSE

When you use information from a primary or secondary source, you need to decide whether it is suitable or good enough for the purpose for which you are planning to use it.

▼ **Table 10.2** Methods and reasons for checking information

YOU SHOULD CHECK YOUR INFORMATION'S...	BY...	OTHERWISE IT MIGHT...
Accuracy	• Checking that the information is from a trustworthy source that has good systems for checking facts before publication • Comparing it against other trustworthy sources • Seeing if the information uses evidence to support its claims	• Be incomplete • Be false
Age	Checking the publication date	• Be too old or no longer true • Be too recent if you are looking for historical information
Relevance	Checking that the information's topic matches the topic for which you intend to use it	Not be about the topic you wanted to know about
Reliability	Comparing it against other unrelated sources to see if it matches	Not match the results from other sources of information
Bias	• Checking to see if it provides a range of viewpoints • Considering whether you could use the same information to tell a story from a different perspective • Checking for missing information: are explanations given, or does the information just give the facts? • Checking the use of any statistics and questioning them: who collected the statistics and who funded the research?	• Be too focused on one side of an issue without considering other points of view • Be **prejudiced**

GENERAL VOCABULARY

prejudiced having an unreasonable dislike of someone or something

COPYRIGHT

If you use information, you should ensure that you have permission to do so. Some information will require you to state the owner or source of the information if you choose to use it. For more information about copyright legislation, see pages 149–150.

KEY POINT

In some cases, you might not be allowed to use copyrighted work, even if you state the name of the owner or source of the information.

PLAGIARISM

The internet has made information easily available to many people. However, this means that it is becoming more common for people to copy and paste information, sometimes without even checking that it is suitable or true. Sometimes, they may even claim that this information is their own. This is known as plagiarism.

▲ **Figure 10.9** Just because something is on the internet doesn't make it true

HINT

There are special types of software that can help you to avoid plagiarism. The software will automatically search for phrases and sentences and tell you whether they already exist.

If you use another person's work but fail to state that it is theirs and not yours, you are violating their rights and committing plagiarism. If you do this in your assignments for school, college or university, you will be punished and your marks could be reduced or you could fail the assignment completely.

One way to avoid plagiarism is to rewrite or paraphrase information. When you do this, it shows that you can find information, understand its meaning and then express it in your own words. You should also state where the original information came from. If you found the information online, include the URL, the author's name (if it is available) and the date on which you found the information.

CHAPTER QUESTIONS

SKILLS PROBLEM SOLVING

1 Which **one** of these is used to match a full phrase in a search? **(1)**

A +
B –
C @
D “”

SKILLS PROBLEM SOLVING

2 State **two** ways in which an image search can be refined. **(2)**

SKILLS REASONING

3 State **one** reason why you should check whether information is biased before using it. **(1)**

SKILLS INTERPRETATION

4 Describe how a search engine works. **(4)**

SKILLS REASONING
PERSONAL AND SOCIAL RESPONSIBILITY

5 Explain why it is important to check whether information is protected by copyright before using it in your own work. **(2)**

SKILLS PERSONAL AND SOCIAL RESPONSIBILITY

6 State **one** benefit to students of rewriting information rather than copying it word-for-word. **(1)**

7 State **three** examples of search syntax. **(3)**

SKILLS INTERPRETATION

8 Complete Table 10.3 by stating whether each source is primary or secondary. **(8)**

▼ **Table 10.3** Identifying primary and secondary sources

SOURCE	PRIMARY OR SECONDARY?
A podcast that you have created	
A video of a discussion that you have with an expert	
Your own copy of a film	
Notes that you take while visiting a museum	
A book that you borrow from someone	
An image that you download from the internet	
Your own recording of a radio broadcast	