REVISE BTEC TECH AWARD
Digital Information Technology

REVISION GUIDE

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Introduction

Revising Component 3 of your BTEC Tech Award

This Revision Guide has been designed to support you in preparing for the externally assessed component of your course.

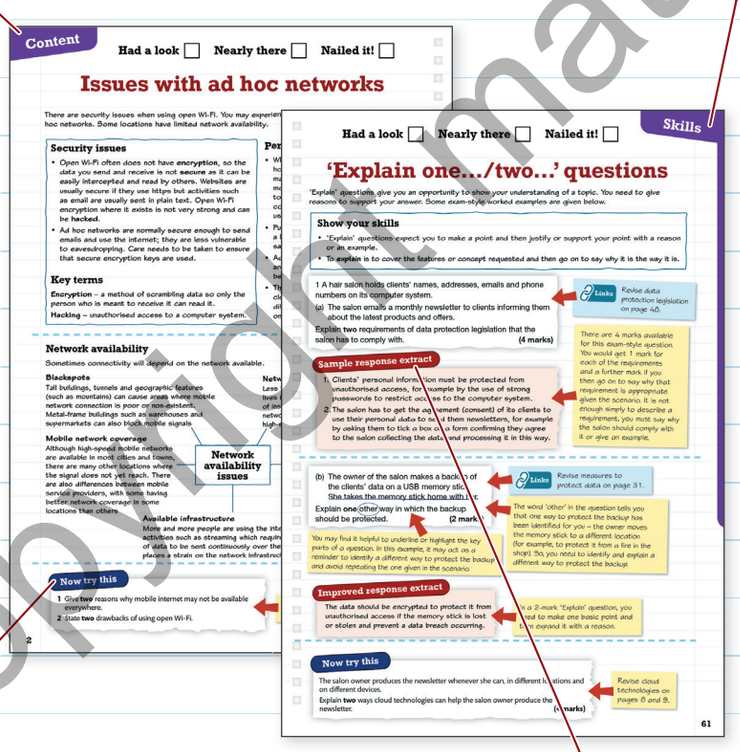
Component 3, Effective Digital Working Practices, builds on the knowledge, understanding and skills developed in Components 1 and 2. The assessment requires you to be able to explain how organisations use digital systems and to understand the wider implications associated with their use.

Your revision guide

Content **pages** help you revise the essential content you need to know for Component 3.

Skills **pages** help you prepare for your assessment.

Skills pages have a coloured edge and are shaded in the table of contents.



Use the **Now try this** activities on every page to help you test your knowledge and practise the relevant skills.

Look out for the **sample response extracts** to example assessment tasks on the skills pages. Post-its will explain their strengths and weaknesses.

Contents

A small bit of small print

Pearson publishes Sample Assessment Material and the Specification on its website. This is the official content and this book should be used in conjunction with it. The questions in Now try this have been written to help you test your knowledge and skills. Remember: the real assessment may not look like this.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Ad hoc networks

An **ad hoc network** is a type of wireless network. Unlike traditional networks, it does not depend on cables to connect to routers and other devices or any central device to organise the network. Ad hoc networks can provide an organisation's employees with internet connectivity when they are working outside the workplace.

Open Wi-Fi

Many public places such as hotels, cafes and train stations provide Wi-Fi access for anyone visiting them. To use an **open Wi-Fi** network, you may need to register and some shared Wi-Fi networks require a **network key**.

What is a network key?

A **network key** is a code, provided only to authorised network users to allow them to access the network.

Tethering and personal hotspots

Tethering enables a device with an internet connection, such as a smartphone, to share its internet connectivity with a device that does not have internet access, such as a laptop. It is simple to set up a **personal hotspot** using the smartphone's tethering facility. Several devices can be tethered to a personal hotspot either wirelessly using Wi-Fi or Bluetooth or by using a USB cable.

A personal hotspot allows users to connect to a mobile device's internet connection.

Benefits

Benefits of ad hoc networks

- Personal hotspots provide internet access to one or more devices that do not have connectivity, for example a user tethering a laptop to their smartphone
- They provide access to the internet at all times in most locations
- Open Wi-Fi allows users to connect to the internet without using the data allowance on their phone
- It is simple to set up a connection to the internet
- They allow users to work in places other than their workplace

Now try this

1 (a) Explain what a personal hotspot is.
(b) Give **one** example of when you might use it.
2 State **two** benefits of connecting to open Wi-Fi in a cafe.

Think about situations where a person might need to use a personal hotspot.

For example, think why use Wi-Fi on your phone rather than the mobile data connection?

Content

Had a look ☐ Nearly there ☐ Nailed it! ☐

Issues with ad hoc networks

There are security issues when using open Wi-Fi. You may experience performance issues when using ad hoc networks. Some locations have limited network availability.

Security issues

- Open Wi-Fi often does not have **encryption**, so the data you send and receive is not **secure** as it can be easily intercepted and read by others. Websites are usually secure if they use https but activities such as email are usually sent in plain text. Open Wi-Fi encryption where it exists is not very strong and can be **hacked**.
- Ad hoc networks are normally secure enough to send emails and use the internet; they are less vulnerable to eavesdropping. Care needs to be taken to ensure that secure encryption keys are used.

Key terms

Encryption – a method of scrambling data so only the person who is meant to receive it can read it.

Hacking – unauthorised access to a computer system.

Performance issues

- When using tethering or personal hotspots, the internet connection is made through a smartphone via the mobile data network. Devices tethered to the phone will share the same network connection. Where there are several users, data transfer may be slow.
- Public Wi-Fi hotspots may be slow if a lot of people are using them at the same time.
- Ad hoc networks have a limited range so any device using the network needs to be fairly close to the Wi-Fi transmitter.
- The signal may be weak if you are not close to the transmitter. You may have difficulty connecting or lose the signal once connected.

Network availability

Sometimes connectivity will depend on the network available.

Network availability issues

Blackspots

Tall buildings, tunnels and geographic features (such as mountains) can cause areas where mobile network connection is poor or non-existent. Metal-frame buildings such as warehouses and supermarkets can also block mobile signals

Networks in cities versus rural locations

Less than one-fifth of England's population live in rural areas. Because of the high cost of installing equipment in rural areas, mobile network coverage there may be poor, with high-speed connections more available in cities

Mobile network coverage

Although high-speed mobile networks are available in most cities and towns, there are many other locations where the signal does not yet reach. There are also differences between mobile service providers, with some having better network coverage in some locations than others

Developed versus developing countries

Developed countries such as the UK have advanced mobile networks. Developing countries often lack money to invest in mobile phone networks and may have difficulty managing the country's resources to set up an advanced network

Available infrastructure

More and more people are using the internet for activities such as streaming which require large amounts of data to be sent continuously over the network. This places a strain on the network infrastructure

Now try this

1 Give **two** reasons why mobile internet may not be available everywhere.

2 State **two** drawbacks of using open Wi-Fi.

Think about rural versus city locations.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Cloud storage

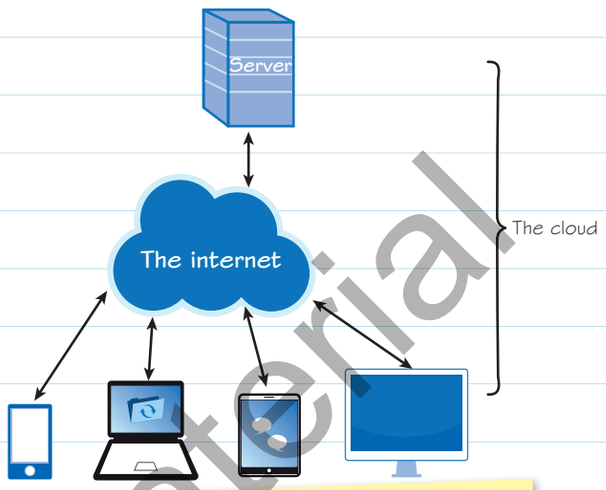
Cloud storage is a method of storing files and folders remotely.

Uses of cloud storage

Files and folders can be stored on remote **servers**, known as the cloud. You can **upload** files from any device – PC, laptop, tablet or smartphone – to the cloud. When you want to access files, they are **downloaded** from the cloud to your computer or other devices. If you have given other users access to your files (see below), they will be able to access them through cloud storage.

Key term

Server – a computer that provides services (such as file storage) to multiple users.



Data such as documents, videos and music can be stored on servers in the cloud.

Access rights

In organisations, files stored in the cloud may often be shared by employees, sometimes working in different locations. The user who creates the file normally controls the **access rights** to it and can either allow other users to make changes to the content or limit them to read-only access. Employees given access rights may require a user name and password to open the file.

Availability

- Cloud storage can be accessed on any device at any time (24/7) whatever your location, provided there is an internet connection.
- Some cloud storage providers synchronise copies of files on the user's PC and other devices, so that data is available even when the user has no access to the internet.

Synchronisation

Cloud storage providers such as Dropbox and Microsoft One Drive store copies of files on the user's PC and other devices. This speeds up access and allows users to open files when an internet connection is not available. When a user makes changes to the content of a file, system software **synchronises** the file in the cloud and on all devices to ensure the content is the same.

More or less storage

Different users will require different amounts of cloud storage space depending on the quantity of files and type of content. Users can rent additional space from the cloud storage provider, or they can reduce their storage capacity, allowing them to save on the cost of the rental. This is known as **scalability**.

Now try this

1 Explain **two** ways in which cloud storage could benefit an organisation that has employees on different sites working on the same project.

2 An organisation requires flexible storage capacity. Describe **one** feature of cloud storage that it could use to keep its costs down.

Think about synchronisation.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Benefits and drawbacks of cloud storage

Benefits	Drawbacks
Cloud storage can be accessed through any device that has an internet connection, for example PC, laptop, tablet, smartphone. Some cloud storage providers keep copies of the user's files on their PC or devices so that they can be accessed without the need for internet access.	Cloud storage systems require you to have an internet connection to access them, e.g. access will be terminated if the signal is lost.
Cloud storage providers offer a 24/7 service, 365 days a year, so cloud storage is available at all times (providing there is an internet connection).	A slow or poor internet connection will reduce the speed at which files download/upload.
Users can share access to files whatever their location. For example, employees can work on files at the same time, either in the workplace or elsewhere.	Cloud storage systems that store data locally on a user's computer or devices may suffer from delays in synchronisation if the internet is not available or the connection is slow.
Cloud storage automatically synchronises any changes across all devices.	Although many cloud storage providers offer a free version of their service, this is usually for a limited amount of storage space. The more data to be stored, the more expensive the service is likely to be.
Cloud storage can be used to store backups of files. If a device is lost or damaged, backups can be easily retrieved from the remote servers.	Users have no control over the set-up and management of the servers where their data is stored. There may be potential security issues. For example, what would happen if the cloud storage provider was a victim of a hacking attack and data was stolen or destroyed?
The amount of storage space can be easily increased or decreased so that users have exactly the storage capacity to meet their needs. The ability to reduce storage space allows users to control their costs.	
The cloud storage provider is responsible for the purchasing, set up and maintenance of the storage servers. Users pay only for the cost of the storage space they rent. Many providers offer a small amount of free storage.	

For more about the points in this table, see page 3.

Now try this

A small business rents cloud storage space. This allows staff to share files.

(a) Explain **one** other benefit to the business of storing its data remotely.

(b) Explain **one** drawback to the business of storing its data remotely.

There may be security concerns relating to the storage of personal data.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Cloud computing

There are benefits for organisations using online applications.

Online applications

The computer you use is likely to have applications such as Microsoft Office installed on its hard drive. Only the person using the computer can access these applications. **Cloud computing** provides an alternative way to access a range of applications such as word processing, spreadsheets and email. Online applications run on a remote server in the cloud. Users can access and share online applications on any device via the internet using a web-based browser.

Cloud computing and cloud storage

Google provides one of the best-known suites of cloud computing applications. For example:

- Google Docs (word processing)
- Google Sheets (spreadsheets)
- Google Slides (presentations)
- Gmail (email)
- Google Calendar.

It also offers cloud storage – Google Drive.

Some providers only offer a storage service, such as Dropbox.

Benefits of online applications for organisations

Benefits of using cloud computing applications

Cloud service provider maintains and updates online applications

- Organisation not responsible for cost of maintaining and updating software

All employees run the same version of software directly from the cloud

- Ensures consistency of file types and features
- Allows employees to access and use files created by others from any location with internet access
- Less need for support and training

Installation not required

- Saves technician time as no need to install software on employees' computers
- Local computers require less processing and storage capacity, allowing the organisation to buy or rent less expensive machines

Online applications are cost-effective

- The organisation pays for the cloud services it requires and can scale up or down as needed
- Software licences are not required for individual computers

Now try this

1 Describe the difference between cloud computing and cloud storage.

2 Explain **two** benefits of cloud computing to organisations.

Recap cloud storage on page 4.

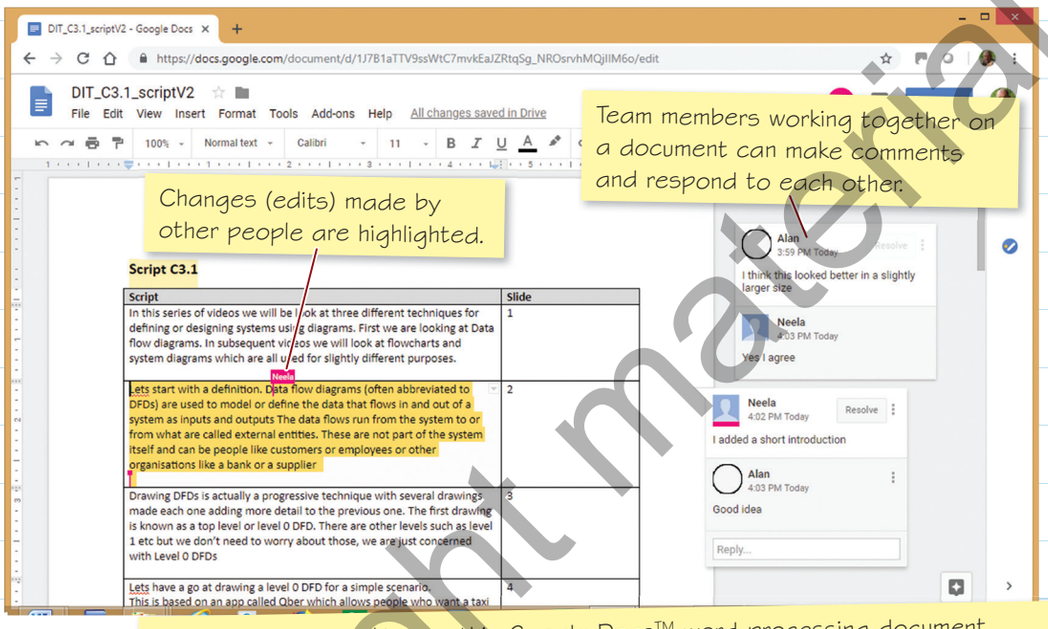
Had a look ☐ Nearly there ☐ Nailed it! ☐

Working with others

Cloud computing applications provide tools for two or more users to collaborate (work together) on the same file.

File sharing at the same time

Online applications such as Microsoft Office 365 and G Suite by Google Cloud allow employees in an organisation to work on a document or spreadsheet at the same time. Colleagues can make changes to documents which can be seen (and accepted or rejected) by others who share the document.



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Collaboration tools

Online applications include tools that allow users to collaborate on a document.

Tool	What it does
Comments	Users can leave comments in a document which allows them to ask questions and make suggestions. Other people working on the document can see the comments and, if needed, reply to them.
Version history (track changes)	Allows users to see the changes made to the document, who made them and when. This is very useful when collaborating as you can see what changes have been made and also restore previous versions of a document.
Chat	Allows people to chat (using text messages) in real time so they can discuss the document.
Suggested edits	Users' edits show up as suggested changes rather than actually altering the document. This allows other users to review the suggested changes before agreeing to them or making further changes.

Now try this

A team of software developers is creating a user interface for a customer. They are writing a report on the customer's requirements.

Describe **two** collaboration tools the team might find useful.

Have you ever worked with someone else to create a document?

Had a look ☐ Nearly there ☐ Nailed it! ☐

Suitability of platforms and services

Cloud technologies and services may function differently on different platforms. When selecting platforms and cloud services, organisations need to consider the impact this may have on their day-to-day use of digital information technology.

Access to cloud technologies

Desktop computers, laptops, tablets and smartphones can all access cloud technologies, but their differing features will impact on:

- what cloud services they are able to access
- which services are suitable for use on individual devices.

Platform

A computer or device and the operating system on which applications run is known as a **platform**.

Influences on choice of platforms and cloud services

Organisations need to consider how suitable their chosen platforms and cloud services will be for their users.

Aspect	Influence on choice
Screen size, usability, portability	Desktop and laptop computers with their larger screens and full-size keyboards can be easier to use for many tasks. They are less portable than smartphones and tablets. Mobile devices are ideal for workers who need to access computing facilities when working remotely.
Interface design	Apps are generally designed to run on different platforms. Sometimes functionality may be limited or unavailable depending on the interface, for example some features may not appear on small screens.
Suitability for intended purpose	A cloud application may not be suitable for the purpose the organisation wants to use it for. For example, a sports club might want to use cloud applications to store its accounts. A cloud spreadsheet would be able to do this, but there are more suitable cloud applications such as QuickBooks Online.
Compatibility with existing systems	• If an app is not available on a cloud platform, it will limit the user's access to cloud technologies. It may not be possible to use cloud storage. • Some cloud technologies may offer similar apps to those traditionally used on a PC but display them in their own format. Features and functionalities may be similar but not identical. Some parts of a document may be displayed differently or not at all. For example, a Microsoft Excel spreadsheet may be edited using Excel Mobile but it looks a little different and not all the features that the full version of Excel has are available.
Speed of connectivity	Where a device is dependent on a Wi-Fi connection or mobile data connection, the user's experience of an app may be poor if signal strength is low or intermittent.
Hardware	Hardware requirements such as disk size and processor speed become less important when using cloud technologies and storage because data is not stored locally on the user's device and some of the application processing is done remotely. This has led to laptops with cloud-connected operating systems so that the only app they run locally is an internet browser. An example is Chromebook which uses Google cloud-based applications.

Now try this

AJ Wrapit supplies packaging materials to the UK food industry. Its sales team works remotely, using videos to demonstrate packaging products to food manufacturers. Price lists are on Excel spreadsheets. The company has decided to replace the sales team's ageing laptops with smartphones.

Explain **one** impact on the sales team of the company's choice of platform.

Think about the size of the smartphone display.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Features of cloud services

There are a range of cloud services available – some free, others paid for. The choice for an organisation depends on which features are most suitable for their needs.

Frequency of updates

Regular updating of cloud services allows an organisation to benefit from the latest software and new features. This may be cheaper than updating software on its own systems and avoid the downtime required to update them

Accessibility across devices

An organisation using a range of devices will need to be sure that it can access the full range of cloud technology to meet its needs

Methods of working

Traditional applications may have more sophisticated features and functionality but cloud-based software supports features such as file sharing and collaborative working which traditional software does not support. Organisations may choose a mix of traditional and cloud-based systems. (See pages 6 and 13 for more on collaborative working)

Ease of use

Cloud platforms and services should be easy to use. This will reduce the amount of technical support that the organisation has to provide to its employees and reduce its costs

Storage

Most cloud services include a limited amount of free storage. Additional storage space can be purchased. An organisation can scale up or down the amount of storage space it requires

Free or paid for?

Most cloud-service providers (such as Microsoft, Google and Dropbox) provide free versions of their services, but these are often limited. For example, there may only be a limited amount of storage space. Organisations requiring additional features such as unlimited storage space, advanced collaboration tools and online support would need to pay for these. Cost may be an issue for some organisations

Security

All data stored within an organisation must be kept secure. Depending on the sensitivity of the data, an organisation may prefer to store this on its own systems rather than in the cloud. For a fee, many cloud-service providers offer advanced data protection and data recovery

Online and offline working

- PC users in organisations usually work **online**.
- Employees may also use laptops, tablets and smartphones to carry out day-to-day tasks outside the workplace. Devices connected by Wi-Fi to the internet will be able to synchronise files and upload to the cloud.
- Where a Wi-Fi connection is unavailable, it may be possible to tether laptops and tablets to a smartphone to enable them to synchronise and upload. Otherwise the employee will work **offline**. Synchronisation of content, including uploads, will take place once the device is connected to the internet.

Benefits of online working

- ✓ Reduces the amount of processing and storage required on the local computer.
- ✓ Allows a user to share the same file across multiple devices, for example, a desktop computer in the workplace and a mobile device when working remotely.
- ✓ Supports remote working as files are available wherever the user is.
- ✓ Files can easily be shared with others.
- ✓ Employees can work together by viewing and editing files at the same time.
- ✓ Workers can use collaboration tools such as shared calendars, online meetings and video conferences.

Now try this

An organisation is planning to add cloud services to its traditional computer systems.

Identify **two** ways in which it can keep down its costs.

Think about the difference between free and paid-for cloud services.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Cloud and 'traditional' systems

Cloud and traditional systems are often used together. Data held on both systems is synchronised to ensure all devices are able to access the same content. Notifications alert users when shared files are edited. Synchronisation can only take place when working online.

Synchronisation

Organisations may combine the use of apps and files located on their own systems or employees' PCs with apps and files stored on the cloud. This allows employees to work flexibly on different devices both within the workplace and remotely. For cloud and 'traditional' systems to work smoothly, apps and files must be regularly synchronised so that all devices have access to the same content.

Shared files stored on remote server in the cloud

File name	Last edit
file1.doc	Yesterday
file2.doc	Today
file3.doc	Today

Shared files on an engineer's laptop

File name	Last edit
file1.doc	Yesterday
file2.doc	
file3.doc	

The engineer edited file 1 on their laptop yesterday, while working away from the office without an internet connection. File2 and file3 will be synchronised with the latest files stored on the cloud once the engineer reconnects their laptop to the internet.

Shared files on desktop PC at head office

File name	Last edit
file1.doc	
file2.doc	Today
file3.doc	Today

A user at head office has been editing file2 and file3 today. As the PC is connected to the internet, the files are synchronised with the cloud every time they are saved on the PC.

Cloud technology notifications

- let you know when a shared file has been edited by another user
- alert you to who has changed what in files shared by multiple users
- warn you if you try to save a version of a file that is older than the one stored in the cloud
- remind you when online meetings and video conferences are about to take place.

Now try this

Explain **two** reasons why cloud-based shared files need to be regularly synchronised on all the devices sharing them.

What would be the impact of a user working on an outdated version of a file?

Disaster recovery and data security

A **disaster recovery policy** sets out the actions an organisation will need to take to enable it to restore its systems as quickly as possible following a disaster such as a fire or flood. Where an organisation uses cloud technologies, some of this planning becomes the responsibility of the service provider. Cloud service providers also need to maintain data security.

Disaster recovery

An organisation does not require the same complexity from a disaster recovery policy for services that are on the cloud. This is because:

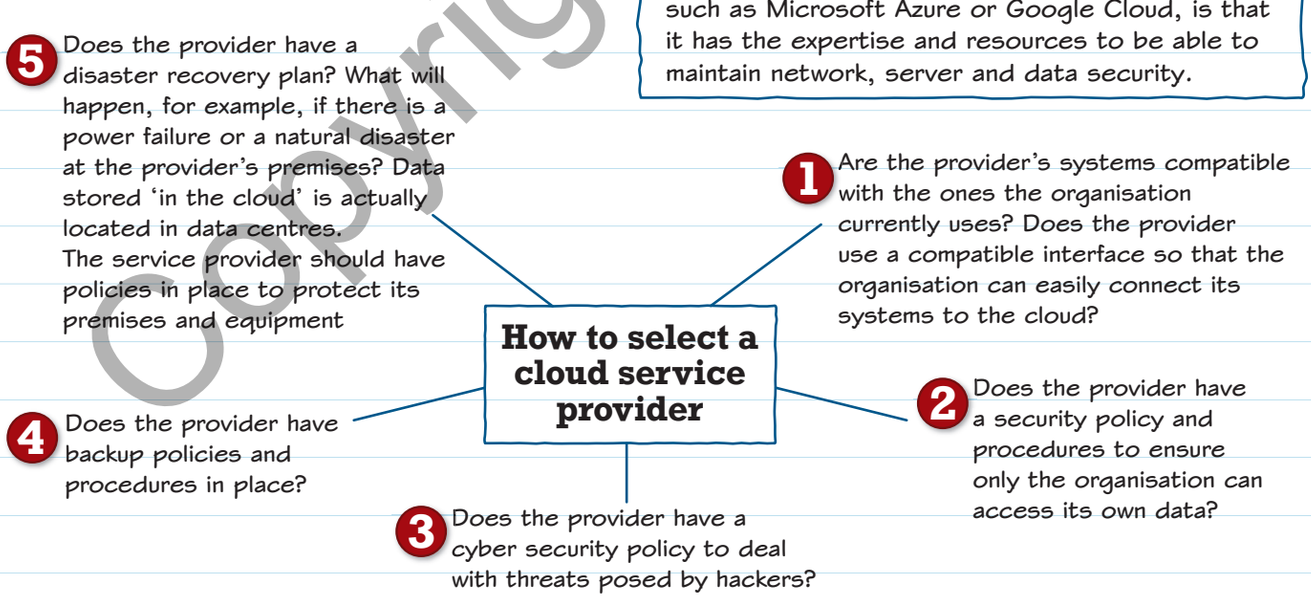
- services and data are maintained in a remote location so would not be affected by physical damage to an organisation's systems and premises
- data is regularly backed up in the cloud so only data not stored in the cloud or not yet synchronised would be lost. Loss of data may be minimal.

Relying on the cloud service provider

An organisation has a responsibility to protect its data and ensure that it is secure. This is especially important in the case of customer data. When using cloud technologies, data is transferred from the organisation to the service provider and stored on its server. The organisation may not know the physical location of its data. It has to rely on the service provider to keep its data secure. A cloud provider can show it takes security seriously by complying with international standards such as ISO 207017.

Choosing a cloud service provider

Organisations need to think carefully when choosing a cloud service provider because it will impact on data security. The diagram below shows the factors they need to consider.



Security of data

For small organisations, **data security** may be an issue as security threats are always changing and it can be difficult to keep up with the latest requirements to ensure systems remain secure. The benefit of using a large cloud service provider, such as Microsoft Azure or Google Cloud, is that it has the expertise and resources to be able to maintain network, server and data security.

Now try this

Describe the difference regarding who is responsible for putting in place disaster recovery procedures, backup and security between 'traditional' computing and cloud computing.

Both organisations and cloud service providers have responsibilities.

Maintenance, set-up and performance

Using cloud technologies can impact on the maintenance of IT systems, the ease with which new systems can be set up and system performance.

Maintenance – traditional

Where an organisation runs its own servers, the responsibility for setting up and maintaining the servers usually lies with the organisation itself.

- The maintenance of servers can be a complex task and may involve **software updates**, during which the server may be shut down for a period – **downtime** – so updates can be carried out.
- The organisation will need to employ IT staff who have the expertise to carry out the support and maintenance of the servers. Staff with this type of technical expertise may be difficult to find and expensive to employ.

Maintenance – using cloud technologies

The cloud service provider is responsible for the maintenance of servers. It has the resources to employ skilled staff to set up and update the servers, as well as enough servers to minimise downtime by swapping between them.

Downtime

During downtime servers go offline and staff will be unable to access cloud services. Downtime may be caused by a software update, cyberattack or power failure. Disruption caused by downtime can be minimised, for example by carrying out updates at night. Downtime can be costly where servers need to operate 24/7, as in hospitals.

Set-up – traditional

Setting up the required IT infrastructure can take time as hardware needs to be ordered, delivered, set up and tested, server rooms may need to be built and set up with power supplies, air conditioning and network connections. Software also needs to be purchased, installed and set up.

Set-up – using cloud technologies

Where a new start-up uses cloud technologies, setting up the IT infrastructure is likely to be much quicker and cheaper because the cloud service provider already has servers and security processes set up and running.

Performance

Before an organisation decides to use cloud technologies, it needs to be sure that they will provide adequate performance.

- Because cloud technologies rely on the internet, a reliable high-speed internet connection is required to ensure good performance. This may be available in fixed locations via fibre optic internet connections. For remote workers mobile devices that rely on slow-speed connections may not provide consistently reliable performance.
- Some IT tasks remain better suited to traditional computing methods. For example, video editing is a highly complex process that deals with very large files, and may not work well with cloud technologies and on devices such as smartphones and tablets. Simpler tasks involving editing of much smaller files, such as documents, are better suited to cloud technologies.

Now try this

Explain **two** ways in which using cloud systems would make the maintenance of computer systems easier for an organisation.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Modern teams

Modern teams may be made up of office-based workers and individuals working remotely. Some team members may work full time, others part time, perhaps in locations around the world in different time zones. Collaborative technologies enable teams to work together effectively and in a flexible way.

Working collaboratively

Modern teams do not need to work together in the same office. Technologies and software have made it easier to communicate and share information, allowing team members to work side by side on complex projects and day-to-day tasks no matter where they are located.

Working 24/7/365

- Technology such as email, messaging and document sharing allows team members to communicate during their working hours, which may vary between employees depending on their needs and the time zone in which they are working
- Collaborative technologies allow teams to communicate at any time of the day (24/7), 365 days of the year – there are no set working hours

Working flexibly

- Technologies allow team members to work in a location which suits them rather than commuting to a place of work. For example, parents caring for young children or elderly relatives may find it easier to work from a home office
- Collaborative technologies allow teams made up of permanent workers and casual staff such as freelance workers to communicate and work together, sometimes without ever meeting

Benefits of collaborative working

Working globally

- Collaborative technologies enable skilled individuals from around the world to work together as a team
- A global workforce allows teams to benefit from the knowledge, talents and creativity of many cultures

Working together (inclusivity)

- Collaborative technologies enable individuals with health-related needs to play an active role within a modern team, for example an employee who is unable to commute to a workplace being able to work from home
- Accessibility features on modern devices allow team members with specific needs (such as limited vision or hearing) to work within a team

Now try this

A firm of architects based in the UK is working with an organisation in South-East Asia to design and build a high-tech tower block. A team has been put together from both organisations to work on the project. Some members of the UK team are freelance and work remotely.

Describe **one** benefit of modern technologies that will enable the team to work collaboratively.

Think about working in different time zones.

Collaboration and communication tools

Modern teams may work different hours in different locations which can be a challenge for organisations to manage. A range of online collaboration and communication tools enable team members to work together efficiently and effectively.

Collaboration tools

Online collaboration tools, such as Microsoft Office 365/OneNote and Basecamp, offer a range of features such as:

- **To-do lists** – used to identify tasks the team needs to complete and allocate them to specific people. To-do lists can be linked with scheduling software to show deadlines for time-critical tasks.
- **Shared message boards** – allow users to ask questions or make comments that the rest of the team can see and respond to.
- **Document sharing and group editing** – enables team members to share a single copy of the same document and to edit the document at the same time. Team members can work together on a document even though they are in different locations. Version control methods ensure everyone has the latest version of the document.
- **Email** – messages can be sent between the team or a group email can be sent to everyone in the team.
- **Shared online calendar** – enables teams to arrange meetings. Calendar systems can also send email meeting invitations.

Chat apps

Chat apps, such as Google Hangouts or WhatsApp, offer an informal way for team members to ask questions, share information and have quick discussions. Online chat is a fast, instant way to communicate. It is less formal than email and less time consuming than a phone call or taking time to find and speak to a colleague in the office.

Online meetings

Conferencing software, such as Skype and GoToMeeting, can be used to hold online meetings when participants are in different locations. Communication tools offer audio and video conferencing facilities. Computer screens can be shared so that documents can be viewed by everyone. Meetings can be recorded for those unable to attend.

Benefits of collaboration and communication tools

Managing teams – benefits of modern technologies

1 Online meetings

- Enable sharing and discussion of ideas and documentation. Saves travelling time and cost
- Records of online meetings may be stored as evidence of what was said and agreed at the meeting

2 Chat apps

- Allow instantaneous communication between team members. Saves time wasting
- Individual team members' online status is shown (online, busy, unavailable, offline), so you can see who can be contacted
- Messages can be sent simultaneously to every member of the team

3 Collaboration tools

- The latest documents can be accessed and edited by all team members from the cloud
- Files can be shared and edited by authorised users at the same time
- Archived versions of older documents may also be accessed

Now try this

Describe **two** ways in which inter-office chat apps can be used to manage a team.

Communication is instantaneous.

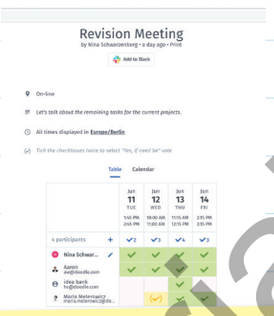
Had a look ☐ Nearly there ☐ Nailed it! ☐

Scheduling and planning tools

Modern teams use a range of scheduling and planning tools to manage everything from the simplest to the most complex projects efficiently and effectively.

Online scheduling tools

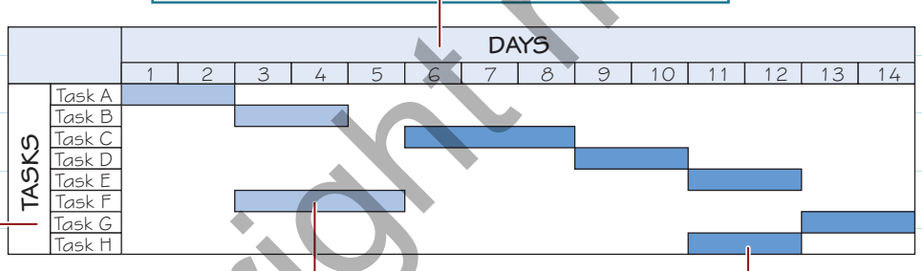
Scheduling a date and time for a meeting where there are several participants may be tricky and time-consuming. Online scheduling tools allow team members to suggest dates and times for the meeting, and the program then selects a date and time that is convenient for everyone. This is useful where there are a lot of participants. Meeting scheduling tools may be linked to time zones and users' online calendars such as Google Calendar.



Doodle is an example of an online scheduling tool.

Online planning tools

Online project management tools such as Wrike or Microsoft Project (online version) help teams to plan and manage tasks. All tools are shared by the team. **Gantt charts**, **PERT charts** and **critical path diagrams** give a visual understanding of how projects are progressing, when individual project tasks will be completed and how each task interacts as part of the whole.



The time allocated to the project is shown here.

A brief description of the tasks is given here.

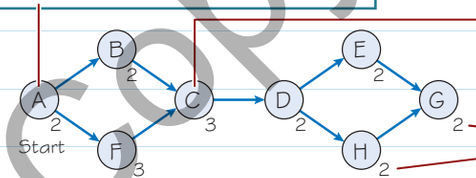
Gantt charts show how various tasks fit into a time/date schedule.

Here you can see that Task B and F can be done at the same time.

Each bar shows the amount of time allocated to each task.

Each node represents a different task.

Here you can see that Task C relies on Tasks A, B and F being completed.



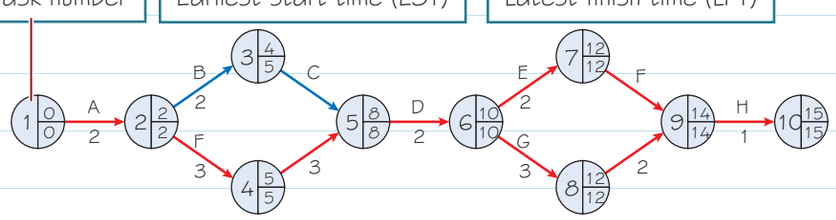
This number represents the amount of time allocated to the task.

PERT charts show how different tasks are related to each other. For example, some tasks depend on the completion of an earlier task before they can start.

Task number

Earliest start time (EST)

Latest finish time (LFT)



Critical path diagrams add further information to a PERT chart showing which tasks are 'critical' in that a delay in the task would delay the overall completion date of the project.

Now try this

A construction company is building a large office block and the project team needs to hold a progress review meeting.

Describe **two** benefits of using online tools to organise and hold the progress review meeting.

Both scheduling and planning tools will be used.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Communicating with stakeholders

Organisations may use a variety of modern technologies to communicate with their **stakeholders**.

Technologies used to communicate with stakeholders

Stakeholders

A stakeholder is anyone with an interest in an organisation – such as the owner, employees, managers, shareholders, suppliers and customers.

Communications platforms

1 Corporate website
- Promotes the organisation to consumers – provides information about products and services, prices, special offers and sometimes sells goods online. Charities may publicise the cause they support, and seek donations to help them do their work
- Stakeholders may be able to contact the organisation through the 'contact us' page. Such communication tends to be brief and formal and may relate to the use or quality of a product

2 Social media
- An informal method of communication used by the organisation to share the latest news, information and products with stakeholders
- Users can post comments, questions and ask for advice (often publicly)

3 Email
- A formal method of communication
- Used by organisations and stakeholders to communicate with each other on specific matters

4 Voice and video communication
- Podcasts, webinars and video sharing may be used to promote products and also provide information, user training and support. The communication is one way – from the organisation to the user
- Used for online team meetings where participants are in different locations (see page 13)
- Often used to deliver training to staff in different locations. The trainer may use screen sharing to show slides and videos to demonstrate a product or service. There may be an online chat facility where participants ask questions through a text messaging app, and the trainer responds by voice to all participants

5 Live chat
- A text chat linked to the organisation's website. A chat window may pop up when a user visits the site
- Answers questions that potential customers may have about products and their features or options
- Assists customers, for example with technical problems, and deals with customer service issues

Now try this

An online retailer sells a range of coffee machines to cafes and for home use. It has just added a live chat app feature to its website.

Describe **two** ways in which live chat could support its customers.

Think about the types of question customers might ask.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Choosing communication channels

An organisation may need to share information with stakeholders individually or with lots of stakeholders all at once. Organisations need to choose the right communication channels to share information, data and media. There are two main types of communication channels: private (direct message) and public.

Private communications

Private communications are used to contact individual stakeholders, either individuals or other organisations, directly about specific issues. As a **direct message** to the stakeholder, its contents are private to the receiver.

The table shows examples of private communications channels.

Email	Live chat	Voice and video communication
• To confirm details of business transactions or send attached documents such as contracts or invoices to other organisations or individuals. • To respond to customer queries and request customer contact and payment details. • To send newsletters, details of special offers and promotional materials to multiple customers. The same email may be sent to many people using a mailing list but the communication is private to them.	Provides one-to-one communication between the customer and the organisation, usually to answer specific queries (see page 15). Initially, queries may be handled by a 'bot' (automated response) to try to address frequently asked questions.	Online meetings, training and webinars are usually private with only those people who have an invitation able to attend (see page 15).

Public communications

Public communications are used to promote the organisation among a wide audience and to share information and data publicly.

The table shows examples of public communications channels.

Social media	Corporate website	Voice and video communication
Based on posts which are snippets of short-lived information. Best suited to brief updates and items of interest to stakeholders. Posts can be commented on and forwarded to strengthen (or weaken) the message. This type of communication needs to be carefully managed as interaction is public and could be damaging.	Provides detailed information that may not change as often as social media. May include information about products and services such as catalogues, prices and special offers, as well as information about the organisation and customers' reviews.	Instructional videos such as on YouTube are available to anyone who wants to find out more about how a specific product should be used or may be fixed.

Now try this

A leisure centre is reopening after a major refit. It has a new spin studio and climbing wall, and offers a range of fitness classes to suit all ages. A leisure card will give members discounts on all activities.

(a) Describe **two** ways in which it could use private communications to reach members.

(b) Describe **two** ways in which it could use public communications to reach potential customers.

Members could be contacted by email.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Interface design and accessibility

Some users may have difficulty accessing all areas of the interface on some devices. Modern devices have built-in accessibility features that allow users to adapt the interface to their needs. Technologies may be used by organisations to ensure systems are accessible to all users.

Interface design and layout

Interfaces such as web pages may be designed to support users with limited vision, enabling them to use devices more easily. Interface design and layout may include:

- using a clear, easy-to-read font which can be increased in size
- using a high contrast between foreground text and background
- using bright colours carefully
- having clear and consistent navigation features
- providing **Alt text** (alternative text) for images and videos so **screen readers** can describe what the image or video shows
- creating designs with different layouts for different screen sizes and devices.

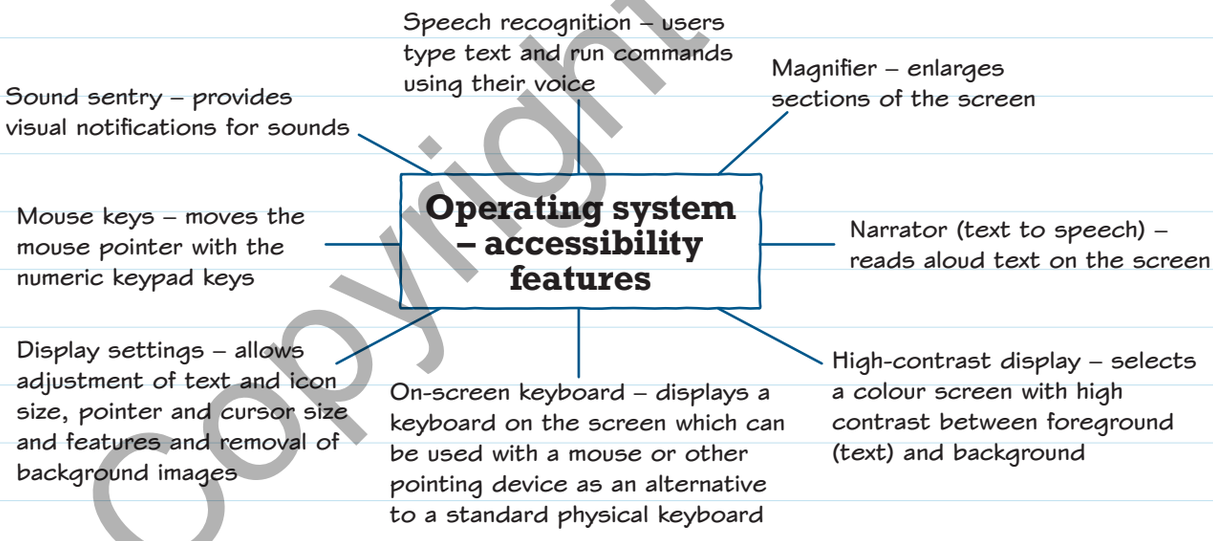
Accessibility needs

Users may have:

- limited vision or be colour blind
- limited hearing
- speech needs – they may take time to communicate or not be able to say words clearly
- motor needs – they may not be able to move a mouse or use a keyboard, for example
- cognitive needs – they may need additional time to use features on a device.

Built-in accessibility features

Operating systems such as Microsoft Windows and Mac OS X include built-in tools.



Aiding inclusivity

Employees with accessibility needs may have the skills to contribute to an organisation but require additional support to do so. Organisations may offer flexible working hours and enable staff to work from home. Modern technologies facilitate home working and collaborative tools remove barriers that this might have otherwise caused.

Now try this

State **two** ways in which an organisation could design a website interface to support users with limited vision.

According to Colour Blind Awareness, about 4.5% of the UK population is colour blind.

Had a look ☐ Nearly there ☐ Nailed it! ☐

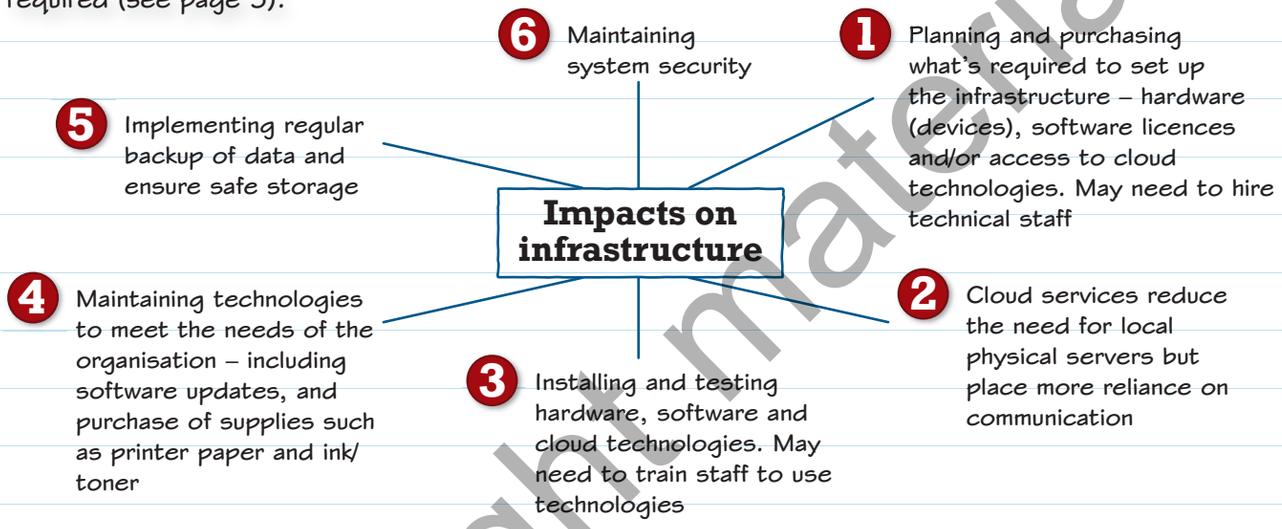
Impacts of modern technologies on infrastructure

Many organisations rely on modern technologies to help them run their business. The introduction and use of technologies will impact on an organisation's infrastructure.

Infrastructure

Every impact costs time and money. The organisation needs to consider:

- Can it expand its current infrastructure to introduce technologies, or make better use of what it has?
- Will the benefit of new technologies outweigh the cost of set up and maintenance?
- Cloud technologies may reduce the need to purchase software. Less technical support will be required (see page 5).



Local and web-based platforms

- **Local platform** – software that is installed as part of the computer's operating system.
  - 👍 It may run faster than a web-based app.
  - 👎 Only accessible on the user's computer so will limit collaborative working.
- **Web-based platforms** – software is run from the cloud and is not part of the computer's operating system.
  - 👍 Accessible anywhere via internet connection.
  - 👎 Requires internet connection to function and may be slow if connection is poor.
- **Demands on infrastructure** – more reliance is placed upon communications infrastructure.
  - 👍 Uses existing communications capacity.
  - 👎 But the loss of communications has a bigger impact.

Real world Footwear retailer

A chain of footwear retailers with an online shop issued tablets to staff working in its stores. It worked out that the benefits of the new technology would outweigh the costs.

- 👍 Better customer service – staff would be able to tell customers instantly whether footwear was in stock in the store, if it could be ordered from the warehouse for delivery to the store or was available online.
- 👍 More efficient inventory (stock) control – when stock of a popular trainer is running low, supplies can be delivered to the store.
- 👎 Cost of buying devices and linking them to own systems and cloud technologies.
- 👎 Time and cost of training staff to use the devices.

Now try this

The retailer has introduced a wheeled robot to get footwear from the stockroom to the shop floor in some stores. Shop workers enter shoe style and size into the tablet and the robot collects the footwear and returns it to the stockroom if the customer doesn't buy it.

Describe **one** negative and **one** positive impact of using this technology.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Impacts of modern technologies on organisations

Modern technologies have other impacts. They allow constant access to an organisation's systems and services, which has benefits and drawbacks for different stakeholders. The security of data needs to be considered.

24/7 access – benefits and drawbacks

In the past, many businesses worked 'office hours' only, typically 9 am to 5 pm, Monday to Friday.

With the use of modern technologies, office hours have become more flexible, as:

- workers can access office systems anywhere and at any time
- online retailers can take orders on their websites any time of day or night.

Removing the restriction of office hours can have negative impacts on both workers and organisations.

- Workers may feel pressure to work outside of office hours, for example responding immediately to a work-related email in the evening, at the weekend or when on holiday.
- Businesses may need to employ staff at night or at weekends to provide 24/7 customer support, which would increase their wage costs.

Security of data

In the past, organisations stored data on their own servers located in their data centres. The security of the data was their responsibility. The introduction of modern technologies (cloud storage) means data are likely to be stored at a variety of different locations (**distributed/dispersed data**). This has positive and negative impacts.

- If a fire or flood destroys data at one location, then data stored at other locations is still safe and the organisation can continue using data from the other locations.
- As data is held remotely and has to be transmitted across the network, there is a greater threat from hackers, so measures need to be put in place to protect the data, such as encryption.

Real world Death of the high street

Technology has had a huge impact on the retail sector, with traditional high-street shops struggling to compete with online retailers. This has forced a number of well-known chains to close down, and many more are finding it increasingly difficult to continue trading. Online retailers don't have the expense of running high-street stores, which have to pay expensive rent and employ staff to work on the shop floor. This has had a dramatic effect on many British town centres, which were once busy and vibrant but which now often have empty shops and fewer shoppers. However, online retailers bring their own benefits, by providing 24-hour shopping opportunities for the public from the convenience of their own home and, while high streets may have struggled, home-delivery services have grown.

Now try this

A large builder's merchant is planning on moving all its data currently stored on servers at head office to a cloud-based storage provider who will distribute its data across a number of servers.

Explain **one** positive impact of having data distributed across servers at different locations.

Distributed data is usually held on servers at different locations.

Had a look ☐ Nearly there ☐ Nailed it! ☐

Impacts of modern technologies on working practices

Modern technologies can improve an organisation's way of working and ensure it is inclusive and able to find the most skilled workers when employing staff. Sometimes technologies may have negative impacts.

Impacts of modern technologies on working practices

Remote working

- 👍 Modern technologies allow staff to work from locations of their choosing, such as their home, rather than commuting to a specific workplace. The organisation may benefit from having access to a wider pool of workers
- 👍 Remote workers usually do not require office space. This will reduce the organisation's costs in providing physical resources
- 👎 When team members are in separate locations, it is not possible to cross the office to have a quick discussion with colleagues, and meetings have to be arranged in advance

Accessibility

- 👍 A range of portable devices, such as smartphones and wearable technologies, allows teams to stay in touch with each other 24/7
- 👍 By law, organisations must adapt the working environment to ensure staff members with a health-related or accessibility issue can access their work
- 👎 It may affect an employee's mental wellbeing if they are expected to respond to emails or messages in the evenings or at weekends

Collaboration

- 👍 Cloud technologies enable team members who may be in different locations to work together using file sharing and collaboration and communications tools
- 👎 Chat apps may lead to time wasting if conversations do not relate to work
- 👎 Video conferencing may be of poor quality if the signal strength is low or there are interruptions to the network connection

Inclusivity

- 👍 Modern devices and cloud technologies open up an organisation's workforce to those with health-related or additional needs as well as a range of ages
- 👍 Cloud technologies expand the geographical reach of an organisation and may enable it to recruit its workforce from a range of cultures from around the world

Now try this

An accountancy firm has introduced a policy to allow current and future staff to work from home rather than in the office.

Describe **two** impacts of staff working remotely.

Think about positive and negative impacts.