ICT
Core Knowledge
Unit 1

Learning Core Knowledge is a key part of your success in the ICT course.

You should spend half an hour every week reviewing the pages for your weekly quiz.

1.1.1 Functionality of different hardware devices
IT1: Peripheral devices

What is an input device?

A piece of equipment that allows users to enter data into a computer. These device are used to create a digital product.

Capturing images

Scanner: To digitise documents which means to convert a hard copy (paper) into a digital version stored on a computer. There are two types of scanner: flatbed and handheld.

Digital camera: A way of capturing a digital image. Commonly embedded within smart devices now**.**

Graphics tablet: It allows the user to input a drawing to the computer using a type of pen called a stylus.

Navigation

Mouse

To select, drag and drop items, control tools and scroll through pages.

Trackball	Gaming	Touchpad
Includes a large ball on the top or side that can be controlled by a thumb.	Designed to play for long periods with a right and left button and a scroll wheel.	A pointing device built into a keyboard on devices like a laptop.

Keyboard

A standard QWERTY keyboard is a fast method of data input for those who are able to touch-type.

Braille keyboard	Concept keyboard
Uses raised patterns on each key to aid users with visual impairment.	Uses symbols/images on each key to allow fast input of data.

1.1.1 Functionality of different hardware devices
IT1: Peripheral devices

Capturing sound

Webcam: Used to communicate with each other using an internet connection. This captures audio and visual elements and is commonly used for online meetings.

MIDI keyboard: A way of inputting sounds to a computer through digital signals.

Microphone: Used to input data that can be converted digitally or outputted to an output device like speakers.

Sensors

Sensors: It uses different methods to input data into a computer for a specific purpose. For example, a thermostat will read room temperature and an infrared sensor may detect movement

Readers

QR code reader (Quick Response)
This allows you to scan the code normally found on a mobile phone and get information about a product or service.

Barcode reader
This allows data held by a barcode to be transferred to a computer. This could be information about a product in a supermarket.

Optical mark reader
An optical mark reader recognises the position of marks on a document and inputs this information to the computer.

Magnetic ink character recognition
This input device reads magnetic ink characters such as those at the bottom of a cheque.

Magnetic stripe reader
A magnetic stripe reader is needed to input the information held on the black magnetic stripe that you find on the back of cards,

RFID reader (Radio Frequency Identification) A small chip and an antenna to identify electromagnetic fields using radio waves and can be used from a distance.

Biometrics: It uses unique physical characteristics of an individual to input data into a computer such as: eye (retina and iris) recognition, facial recognition or fingerprints.

1.1.1 Functionality of different hardware devices
IT1: Peripheral devices

What is an output device?

A piece of equipment that allows users to receive data from a computer. These device are used to view a product in digital or hard copy form.

View

Monitor/Screen
This allows you to view information on a screen.

Projector
This is used to view data on a larger screen, used in meetings and conferences.

Listen

Speakers
This allows the user to hear sound such as: listening to music, watch a video, enhance the sound quality on a computer game.

Headphones
This is an alternative way of hearing sound but instead this is used so that one individual can hear the sounds instead of being heard by everyone.

Printers

Inkjet printer
Common household printer which is affordable and prints to a good standard.

Laser printer
A quicker and more expensive form of printing which uses toner instead of printer ink.

Dot matrix printer
It has small pins on the print head that hit against an ink-soaked ribbon to make a mark on the paper.

Thermal printer
Produces a printed image by passing paper with a special coating over small electrical print heads.

Dye-sublimination printer
Uses heat to print onto materials other than paper such as plastic, fabric and cards.

3D printer
These use instructions from CAD software to create a 3D design of a product. Useful when creating prototypes.

Plotter: This allows large scale drawings such as maps and large posters to be printed. It also uses vector graphics which enables high quality content to be printed.

1.1 1.1.1 Functionality of different hardware devices
IT2: Solid-state storage

What is solid-state storage?
A solid-state drive (SSD) is a solid-state storage device that uses integrated circuit to store data persistently, typically using flash memory. Examples include Solid-State Drive, USB Flash Drive and SD Card.

Advantages:
- No spin up time.
- Fast access to data
- Silent
- More robust, uses less energy and no moving parts.

Disadvantages:
- High cost (compared to HDD)
- Relatively low write speed
- Limited of read/write cycles.

Evaluation against storage characteristics

Cost	Capacity	Reliability
Expensive, even the cost per MB. Although, the price is beginning to come down.	You can purchase up to 4TB of data, not as much as you can with a HDD.	It has a limited number of read and write cycles which means performance will deteriorate quickly.

Durability	Portability	Speed
Resistant to being dropped because it has no moving parts.	Most devices are small, lightweight and easy to carry around. Easy to transfer files.	It doesn't use a mechanical arm and relies on the processors embedded within.

1.1 1.1.1 Functionality of different hardware devices

IT3: Magnetic storage

What is magnetic storage?

- The most common example of magnetic storage is a Hard Drive.
- The hard drive contains several moving mechanical parts such as a spinning platter with a thin magnetic coating.
- A "head" moves over the platter, writing 0's and 1's on the platter. A magnetic tape device another form of magnetic storage primarily used for data archiving.

Advantages:

- Low cost per GB
- It has an unlimited number of read/write cycles.

Disadvantages:

- Slow to read and write data because it uses an actuator arm.
- Uses more energy.

Evaluation against storage characteristics

Cost	Capacity	Reliability
Expensive from the outset but cost per MB represents value for money.	Enough capacity to store different types of files.	Performs well for a long period of time but will eventually deteriorate.

Durability	Portability	Speed
If it's external, then it can become damaged if dropped because it has moving parts.	Would have to be detached from the computer and it's heavy.	Uses a head that moves over a platter to read and write data so it's not instant.

1.1 1.1.1 Functionality of different hardware devices
IT4: Optical storage

What is optical storage?
- Optical storage works when lasers write data to the disc and read from it using a series of pits and lands.
- Examples of optical storage include CD, DVD and Blu-ray

Advantages:
- Portable as it's small, lightweight and easy to carry around.
- Reliable if it's looked after properly (i.e. in a protective case)

Disadvantages:
- Might not be as durable because the disk may get scratched.
- Low capacity in comparison to other portable alternatives (e.g. USB flash drive)

Evaluation against storage characteristics

Cost	Capacity	Reliability
Cheap to buy and cheaper to buy as a bulk. You can get a blank CD for less than £1.	CD's can only store 700 MB which might not be enough to store larger files. Blu-ray can hold up to 25GB.	If CD's are stored in cases or plastic wallets then they can continue to be used for long periods.

Durability	Portability	Speed
Sensitive to scratches and dust which can make it difficult to read the data.	Most devices are small, lightweight and easy to carry around. Easy to transfer files.	It is slow reading the data because it has to access the optical disk drive.

1.1 1.1.1 Functionality of different hardware devices
IT5: Cloud storage

What is online storage?

- Cloud storage is a form of online storage that enables data to be stored and backed up over a network.
- Many individuals and organisations will pay cloud service providers to store their data remotely which can be accessed anywhere if there is an internet connection.

Cloud storage providers

- Google Drive
- Dropbox
- Microsoft OneDrive.
- iCloud

Organisations that use cloud storage/computing:

- E-mail, virtual desktops, software development/testing, databases and big data analytics.

Advantages	Disadvantages
Data is backed up frequently and easy to recover.	Data is held offsite by a company you do not control.
You can extend the amount of available storage by varying how much you pay.	If your Internet connection fails, so does your access to remotely stored data.
Since your data is stored remotely you can access it whether you are in Manchester or Madrid.	Difficult to migrate data to another cloud provider later.

1.1 1.1.1 Functionality of different hardware devices
IT6: Internal components

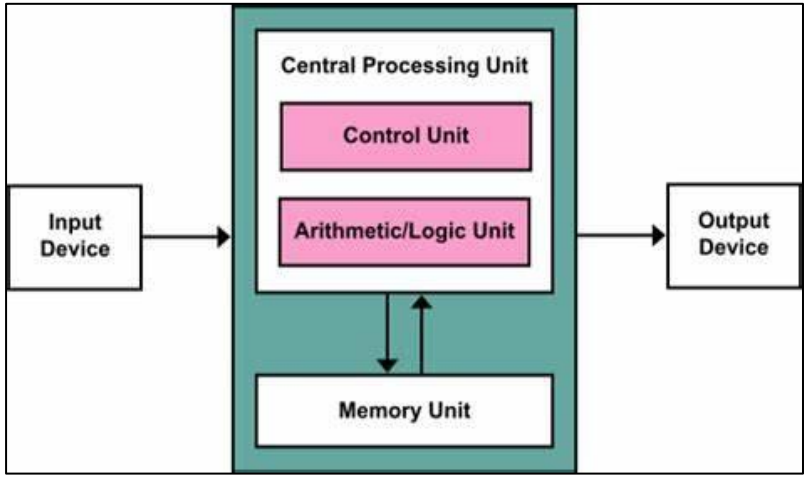
What is an internal component?

An internal component is a part that is designed to be connected/attached to the inside of a computer system.

Internal components

- CPU - To fetch, decode and execute instructions
- Graphics card - It outputs images to a display device and controls each pixel on the screen.
- Main memory - To store data/programs currently in use.
- Sound card - Generates sounds that could be recorded and played.
- Motherboard - To connect all the components together.
- Network interface card - Enables users to connect to a network.

Structure of the processor



Control Unit:
Decodes instructions and sends signals the other components on how to respond to this instruction.

Arithmetic Logic Unit:
Responsible for performing arithmetic calculations and logical decisions.

What is a computer port?

Ports are slots on the motherboard into which a cable of external device is plugged in.

Examples

HDMI	VGA	PS/2	Ethernet	Serial
USB	Parallel	Display	DVI	

1.1 1.1.2 Functionality of different software
IT7: Systems software

What is systems software?

- Systems Software comprises of two parts: Operating System and Utility Software.
- The purpose of the operating system is to provide an interface that will allow the user to interact with the computer.

Examples of operating systems

From left to right: iOS (Used in Apple devices), Android, Linux (Open-source operating system) and Windows (A widely used proprietary operating system.

Tools of an operating system:

- User interface – This allows the user to interact with the computer.
- User management – This will allocate the user with an account which will give them access to files based on the permissions set by an administrator.
- File management – This allows users to store files in a logical structure.
- Device drivers – Each peripheral device will contain software called a driver that will allow the device to communicate with the CPU. In the modern era of technology, this would be referred to as 'plug and play'.
- Memory management – This ensures that programs/data do not corrupt each other and is stored in correct memory locations.
- Multitasking – To ensure that all tasks appear to run simultaneously.

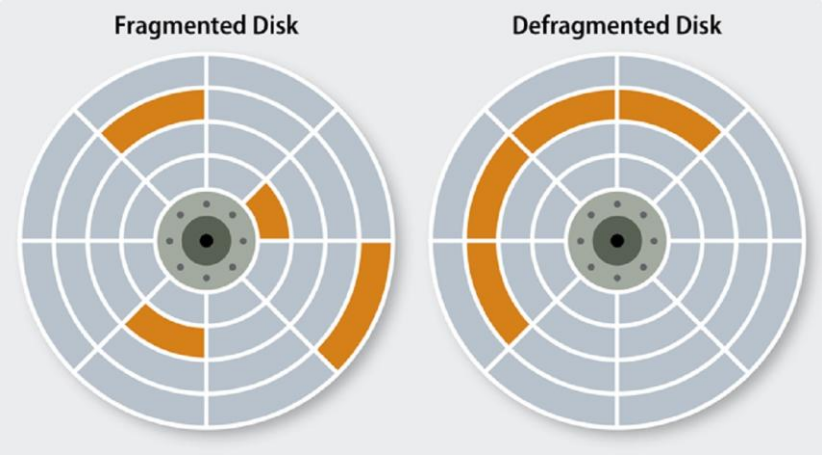
1.1 1.1.2 Functionality of different software
IT8: Utility software

What is utility software?

The purpose of the utility software is to maintain and optimise the performance of the computer.

Defragmentation

Data is divided into multiple chunks of data that are stored on the hard drive. This means they're not grouped together.



Other utility software tools

Anti-virus: It is designed to protect your computer from viruses that can infect your computer or steal confidential data.

Compression: It is designed to reduce the size of one or more files in order to take up less disk space.

Encryption: Designed to make data unreadable to users that should have no access to this information

Package installer: Installs files such as applications, drivers, or other software onto the computer.

Backup: Designed to create duplicate copies of files so they can be distributed or retrieved in the case of data loss.

Systems cleaner: Frees up disk space on your computer by removing unnecessary files.

Firewall: Firewall software monitors what data is attempting to enter your computer or network.

File explorer: A graphical user interface (GUI) for accessing the file systems.

1.1 1.1.2 Functionality of different software
IT9: Applications software

What is applications software?
Software that is designed to perform a specific task. Some applications are designed to handle information, communicate with others or perform a specific set of functions for one organisation.

Types of applications software

Word processing software
Desktop publishing software
Presentation software
Spreadsheet software
Database software

Photo editing
Video editing
Webpage editor
Computer-aided design (CAD)
Computer-aided manufacturing

Information handling software
Software that is able store large sets of data. That could be databases, spreadsheets or any other application that is able to handle information.

Specialised software
Specialist software is software written to achieve a task for an individual or company. For example, payroll can be managed through spreadsheet software, but organisations opt to use payroll management software

Pros	Cons
Time saving	Initial high cost
More specific purpose	More time to develop
Better support	Not readily available

1.1 1.1.2 Functionality of different software
IT9: Applications software

What is open-source software?
Proprietary software is software that is owned by one person/organisation and they have exclusive control over it. Open-source software allows users to access the source code and modify the software to meet their needs.

Open-source	Proprietary
Very little professional and technical support and no user manuals to troubleshoot.	Professional and technical support available. User manuals provided for troubleshooting.
Reliable as there are community of users constantly creating updated versions.	Stable product that will contain regular updates to automatically fix any bugs.
There are very little or no upfront costs.	Can be costly to buy a license.
Source code can be viewed, shared and modified.	Source code cannot be modified.

What is source code?
The part of software that most computer users don't ever see; it's the code computer programmers can manipulate to change how a piece of software works.

Examples

Examples of Proprietary Software:
Windows, Adobe Web Premium, Microsoft Office, Internet Explorer.

Examples of Open-source Software:
Linux, WordPress, Mozilla Firefox, Open Office

1.1 1.1.3 Services provided by IT
IT10: Online services

What is an online service?
There are a range of services provided by IT that improves efficiency/productivity for individual users.

Online shopping
Online shopping is a convenient way of buying goods. Users can enter the name of a product in a search engine and a list of results appears almost instantly.

Benefits of online shopping
- You can search for goods, sort them by price, relevance, reviews.
- Images of the products provided.
- 24/7 Availability
- Read customer reviews
- You can compare prices from different shops
- Book a delivery/collection service.

Online entertainment
To access content for our enjoyment and pleasure such as VoD and streaming services.

Benefits of using a smart TV
- Apps made available to use.
- Access the internet
- No need to buy an additional smart device as smart TV offers the same functions.

Benefits of streaming music
- Accessible on all smart devices.
- Create your own playlists.
- No requirement for additional equipment such as a radio player.
- Access to large libraries of songs and audiobooks.

Online booking
Software that's used to manage reservations for business services. Most systems can accept customer payments online as well as making bookings.

1.1 1.1.3 Services provided by IT
IT10: Online services

Online banking

Online banking is a convenient way to organise your finances. It allows you to view multiple accounts so that you can effectively view and manage your transactions.

Benefits of online banking

- You can view up to date bank statements
- You can view all incoming and outgoing transactions
- You can make payments online such as a standing order or direct debit.
- You have secure access via a login and encryption tools used by the banks network security system.
- Promotions can be offered to online customers.

Online gaming

Online gaming is constantly developing. 3D graphics have given game creators the ability to provide life-like textures, realistic physical characteristics and in-game interactions between objects. Special effects allow players to immerse themselves in the online gaming world.

Benefits of online gaming

- Players can select the game they want to play, create online accounts
- Interact with other players as well as computer opponents.
- Access games for download 24/7.
- Quick access to games as they can be downloaded straight away with an internet connection.
- Other acceptable answers.

1.1 1.1.3 Services provided by IT
IT10: Online services

Online education
Online learning is when you study at home with all the lessons, materials, support and assessment provided over the Internet

Benefits of online education

- It provides the opportunity for teaching material to be more interactive instead of just using a text book as a source.
- Students can interact with each other and teachers through forums or chat facilities.
- It can provide personalised learning.
- It allows students to work from home providing they have access.

Blended learning
Blended learning is a mixture of online study and face-to-face teaching in a classroom. Learners spend some time at school or college for lessons taught by teachers or lecturers, and some time learning remotely using digital learning methods.

Benefits of blended learning

- Blended learning provides flexibility in terms of time and location.
- Students can access online materials and complete assignments at their own pace and convenience.
- Blended learning enables personalized and individualized instruction.

1.1 1.1.3 Services provided by IT
IT11: Smart technology

Mobile phones
A smartphone is an example of a smart device which provide messaging services, access to the Internet amongst other features.

Features:
- Make calls
- Text using SMS
- Torch
- Timer/Stopwatch
- Play games
- Browse the internet
- Calculator
- Photo libraries
- Weather forecasting
- Social media
- Shopping

Control systems
A control system is a set of devices that work together to achieve set objectives such as to regulate an environment.

Examples:
- Motion-activated security cameras
- Lighting
- Cooking appliances
- Pet feeders.
- Thermostat

Wearable technology
The term wearable technology covers any kind of smart electronic device designed to be worn on the body. These 'wearables' can be worn as accessories, embedded in clothing, implanted in the user's body or tattooed on the skin.

Examples:
- Heart rate monitors
- Sleep monitors
- Checking glucose levels
- Smart watches
- Fitness trackers (e.g. Fitbit)
- Smart jackets
- Full body suits with sensors.
- Head cameras.

1.1 1.1.3 Services provided by IT
IT12: Artificial Intelligence

What is Artificial Intelligence?
Artificial Intelligence is the broader concept of machines being able to carry out tasks in a way that we would consider "smart".

Examples of AI being used.
- Voice assistants
- Driverless cars
- Smart bins
- Smart alarms
- Streaming services
- GPS (Google Maps)
- Healthcare
- Video games

Three branches of AI

Neural networks
A Neural Network is a computer system designed to work by classifying information in the same way a human brain does. It can be taught to recognise, for example, images, and classify them according to elements they contain.

Machine learning
Machine learning use systems that automatically learn and improve from experience without being explicitly programmed.

Deep learning
Deep learning closely tries to mimic how the human brain works.

1.1 1.1.3 Services provided by IT
IT13: Autonomy

What is Autonomy?
With the help of artificial intelligence and some clever programming, technology that can perform jobs that would normally be done by humans.

Examples of autonomy

Robotics
- This is to undertake functions normally done by humans.
- An example of this is to manufacture cars in factories, where an action needs to be carried out many times.

Bionics
- Uses a combination of mechanical engineering and electronic control technology to create mechanical systems that function like living organisms.
- This is the technology behind prosthetic limbs.

Pros and cons to Autonomy

Pros	Cons
Operate 24 hours without a break,	High development costs.
Can make reliable and accurate decisions.	Risk of computer malfunction.
Will accurately repeat actions over and over again	If it relies on electricity and there is a power cut.
Do not need to be paid.	Uncertainly that a human isn't in control.

1.1.3 1.1.3 Services in IT
IT14: Immersive technologies

What is Virtual Reality?

Virtual reality (VR) refers to a computer-generated simulation in which a person can interact within an artificial three-dimensional environment using electronic devices, such as special goggles with a screen or gloves fitted with sensors.

Advantages

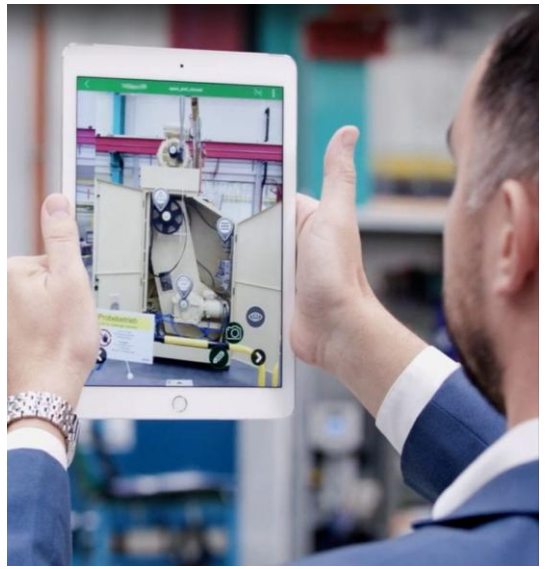
- Connect with people from around the world.
- Accessible for people with disabilities
- Experience things that are impossible in real-life

What is Augmented Reality?

Augmented reality (AR) applications are best suited for use cases where users need to be connected to and present in the real world. Examples of this include remote assistance, on-the-job training, remote collaboration, and computer-assisted tasks.

Advantages

- Enhances experience of natural environment.
- Can reduce stress, anxiety and depression.
- Smartphone apps embed AR technology.



1.1.3 1.1.3 Services in IT
IT15 – Social networking

What is Social networking?

Social networking is the creation of a website to set up an online community where people are linked together using their personal information.

Social networking categories:

Social networking	Media sharing	Blogging
News interest	Content curation	Shopping
Consumer review	Interest-based network	

Benefits to using Social networking:

- Staying connected with friends and family, especially those who live far away.
- Finding and sharing information and resources.
- Participating in online communities and discussions with others who have similar interests.
- Promoting businesses, organisations, and causes.
- Easy to create a personal page/profile.
- Easy to keep in contact with people.
- Easy to make new friends with similar interests
- Often free to join and use.

1.1.3 1.1.3 Services in IT
IT16 – Image capture and manipulation

Drones

A drone is an unmanned aerial vehicles (UAVs) that can be controlled remotely or fly autonomously.

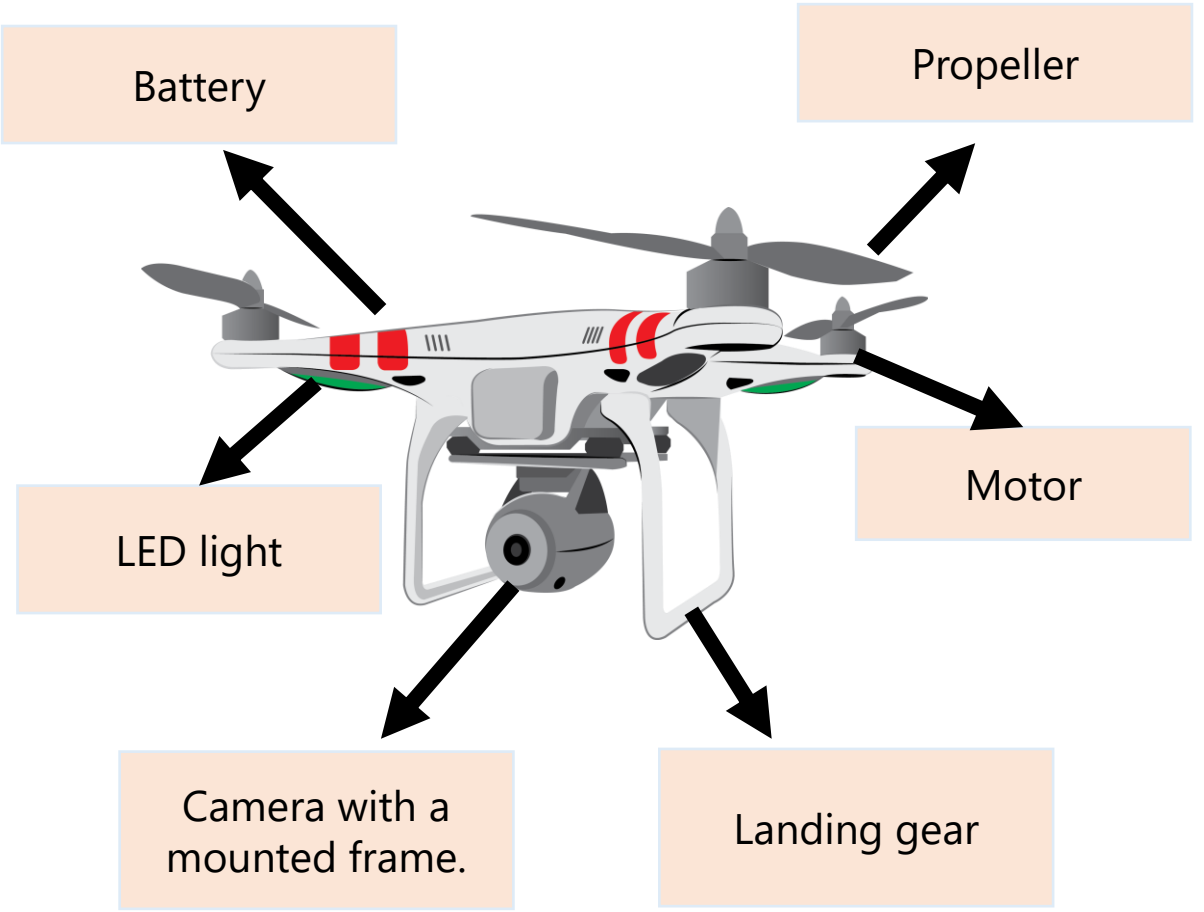
Uses

This device used for capturing images is commonly used in fields such as: agriculture, search and rescue, or delivery services.

Advantages

Because of it's size and portability it can be good to access areas that may be difficult for bigger equipment and this makes it a cost-effective option. It may be able to cover areas that are dangerous for humans to access so it's much safer and finally, it's designed to capture images which gives users data they wouldn't normally be able to capture.

Diagram of a drone



1.1.3 1.1.3 Services in IT
IT16 – Image capture and manipulation

Head cameras

Head cameras can record footage when on the move and capture images while in action.

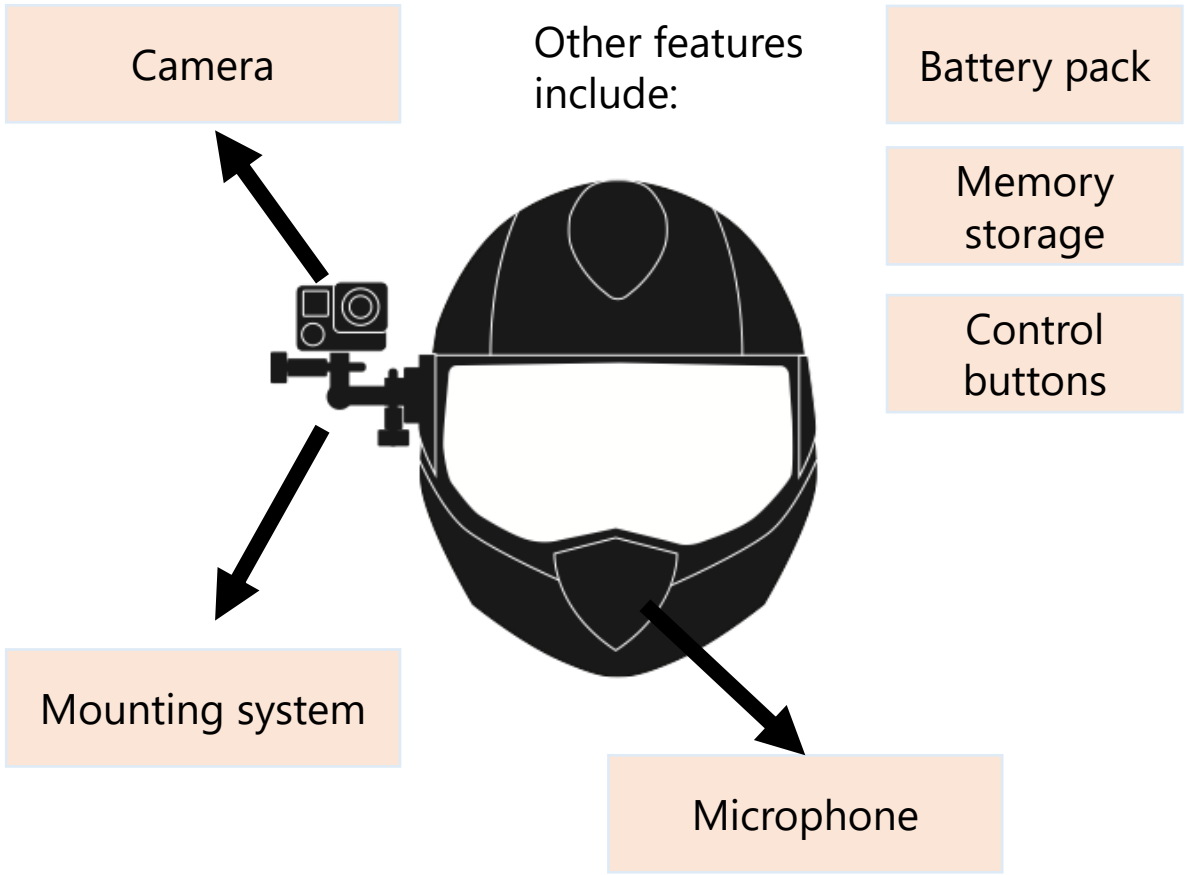
Uses

Commonly used in video production, extreme sports, and first-person gaming

Advantages

It's small, portable and lightweight option that is easy to carry around because it's operated hands-free. It's useful for users who want to take point of view shots. It can be a useful too for athletes can it can help them to better analyse the techniques used, their performance and how they could improve.

Diagram of a head camera



1.1.3 1.1.3 Services in IT
IT16 – Image capture and manipulation

Webcam

A video camera that is connected to a computer or integrated in a device and allows its images to be seen online.

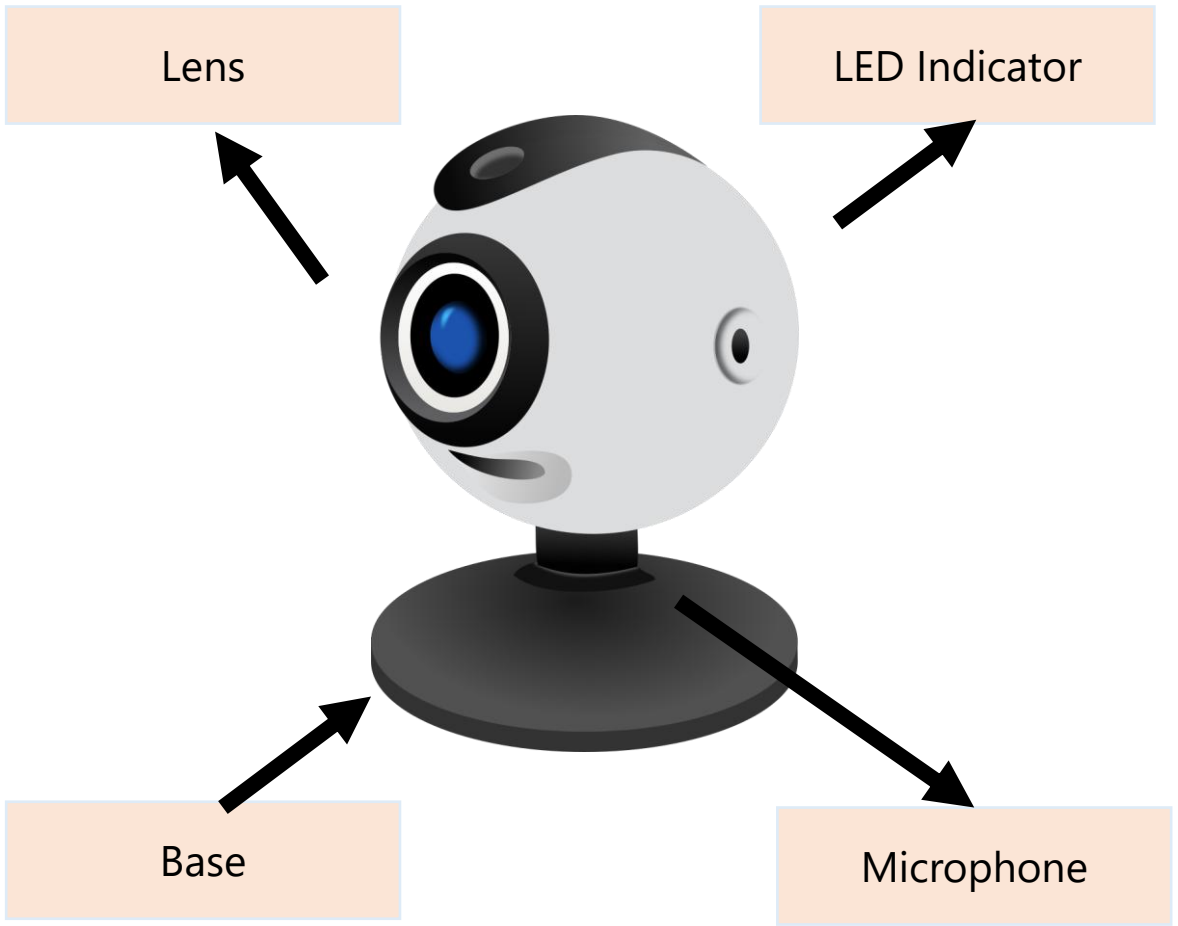
Uses

Commonly used for video conferencing and online gaming.

Advantages

It's convenient because webcams allow for easy video communication with friends and family, as well as for online meetings and classes. This makes them generally inexpensive and widely available and compatible with multiple devices that have a built-in webcam, and external webcams can be easily connected to a computer via USB.

Diagram of a webcam



1.1.3 1.1.3 Services in IT IT17 – Management information systems

What is an information management system?

A management information system (MIS) is a computerised system that provides managers with the information they need to make informed business decisions.

Advantages

- More efficient because tasks can be automated to increase productivity and save money.
- Allows managers to quickly access and analyse data from different sources, which can help them to respond more quickly to changing business conditions.
- Better planning and forecasting which provides managers with the historical data they need to make better predictions about future trends and patterns.
- Improved customer service by tracking customer data and monitor customer satisfaction
- Increased likelihood to comply with legislation

Features of an MIS

Hardware	Software	Outputs
Inputs	**Management information system**	Messaging
Personnel		Databases
Procedures	Personnel	Payroll

Who uses MIS?

Retail companies, Financial organisations. Health organisations. Schools. Manufacturing companies Government agencies

1.1.3 1.1.3 Services in IT
IT17 – Management information systems

What is Payroll software?

Payroll software is a computer program or system used to manage and automate the process of calculating, collecting, and distributing employee wages and taxes.

Advantages

- Saves time because tasks and processes can be automated.
- Reducing errors such as incorrect calculations.
- Better security of employee data.
- Cost effective as it removes manual data entry.
- Better reporting and analysis.
- It can be easily integrated with other systems.
- Remote access so can be accessed anywhere as long as there is an internet connection.
- A more efficient way of keeping and maintaining records.

Features of Payroll software

Employee information	Time and attendance	Payslips
Mobile and remote access	**Payroll software**	National insurance
Deposits	Tax calculations	Generating reports

1.1.3 1.1.3 Services in IT
IT18 – E-commerce services

What is an e-commerce service?

E-commerce refers to the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the Internet.

Examples:

- Online retail shopping (Amazon, eBay)
- Digital marketplaces (Uber, Airbnb)
- Online banking and bill payments
- Online ticket sales (movie theatres, concerts)
- B2B (business-to-business) sales and purchasing.

Benefits of an e-commerce service:

Customers	Businesses
Convenience and 24/7 accessibility	Start-up and running costs are low
Wide selection and access to a global market	Increased/wider customer reach
Time-saving and streamlined shopping experiences	Provides a more convenient service for their customers.
Ability to easily compare prices and products	
Improved ability to track and analyse consumer behaviour.	

1.1.3 1.1.3 Services in IT
IT18 – E-commerce services

What is mail handling?

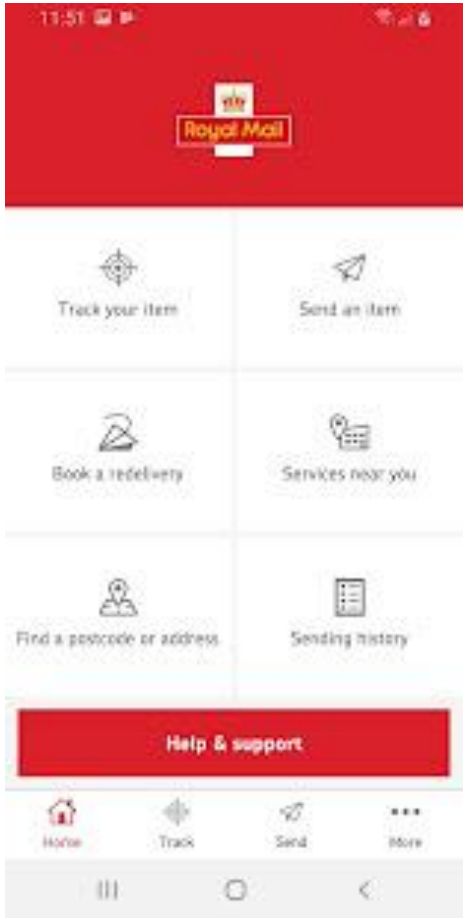
Mail handling methods refer to the processes and procedures used for sorting, organising, and delivering physical mail, such as letters and packages.
These methods can include manual sorting by postal workers, using automated sorting machines, and using technology such as barcode scanning and GPS tracking.
The goal of these methods is to efficiently and accurately deliver mail to its intended recipients.

Example: Royal Mail mobile app

It can be used to **track items** to see how far away they are.

It can be used to **buy postage** which allows customers print shipping labels.

You can **book a collection** for a specific date which fits around your schedule.



You can find **local drop-off points** which are useful when you know nobody will be at home to receive the delivery.

You can **measure the size of the parcel** to ensure you pay the correct amount of postage.

1.1.3 1.1.3 Services in IT
IT18 – E-commerce services

What is a registration system?

- A registration system is a software application or process used to manage and track the enrolment or participation of individuals in events, courses, programs, or membership.
- It typically involves the collection of information, payment processing, and the creation of records for each participant.

Examples:

- Many public services such as schools and doctors use electronic registration systems over paper-based systems.
- It can be used to enrol students and patients respectively.
- Its also common for businesses to use similar registration systems.

Benefits to using a registration system:

Keep track of users and their information.

Collect and store data on users for future reference.

Control who has access to what resources.

Verify the identity of users.

Provide personalised experiences to users.

Use collected data for marketing purposes.

Enhance security by tracking user activity.

Keep track of resources and users in an organised manner.

1.1.3 1.1.3 Services in IT IT19 – Assistive technologies

What is meant by accessibility?

In the context of technology, accessibility refers to the ability of a device, application, or website to be used by individuals with disabilities.

Why is accessibility important?

- Accessibility through technology ensures that individuals with disabilities have equal access to information, services, and resources, regardless of their abilities.
- This technology can be referred to as assistive technology.

Devices and tools	Benefits
Tools: • Alternate text • Captions • Text readability • Contrasting colours • Flexible input • Mobile device accessibility • Screen size and orientation adjustments	Increased independence
	Enhanced communication
	Increased employment prospects
	Greater access to online content.
Devices: • Screen readers • Voice recognition software • Text-to-speech • Speech-to-text • Alternative keyboards • Braille displays • Electronic magnifiers	Improved accessibility
	Better education
	Better quality of life.

1.1.3 1.1.3 Services in IT IT20 – Emerging technologies

What is meant by accessibility?

Emerging technology refers to any new or rapidly developing technology that is expected to have a significant impact on society, the economy, or a particular industry.

Examples:

- Artificial intelligence (AI)
- Virtual reality (VR) and Augmented reality (AR)
- Blockchain technology
- Internet of Things (IoT)

Blockchain technology	Internet of Things (IoT)
Description: Blockchain technology is a decentralised and distributed to record transactions across many computers. Each block in the chain contains a cryptographic hash of the previous block, a timestamp, and transaction data.	**Description:** Internet of Things involve devices connected to a giant network that collect and share information such as how they're used and the environment in which they operate in.
Decentralised and not stored on one single location.	More efficient because tasks can be automated/scheduled.
Highly secure because each block stores data with a hash.	Reduce the consumption of energy.
More trustworthy as data cannot be tampered with.	Devices can be managed remotely.

1.2.1 1.2.1 Why data must be fit for purpose Quality of data

Data

Data is raw facts and figures such as 12:00

Information

Information is to add context to the data. For example, the time is 12:00

Knowledge

Knowledge is when it's understood by the user for example, the time at the moment is 12:00 and my lesson started at 11.30 so I'm late.

Encoding data

Encoding of data refers to the process of transforming collected data into a set of meaningful, cohesive categories. (e.g. Airport Codes)

Pros to encoding data:

- Fewer data errors.
- Less time spent on data entry.
- Greater data consistency.
- Less memory required.

Cons to encoding data:

- Data does not always fit into a particular category.
- Subjective judgements which makes it hard to measure.

Garbage In – Garbage Out (GIGO)

- This concept is common when data lacks quality.
- For example, a user completes a form incorrectly and the data becomes erroneous.
- The internet will include content that is not always accurate and up-to-date such as fake news.

1.2.1 1.2.1 Why data must be fit for purpose File properties

What is a property of a file?

A property is information about the file itself. It can also be referred to as metadata. Different types of files will store different properties.

Images

- File format
- Dimensions (Height and Width)
- Resolution
- Colour depth
- Timestamp
- Location

Text

- File format
- Pages
- Word count
- Line count
- Character count

Audio

- File format
- Duration
- Bit rate
- Sample rate
- Channels

Video

- File format
- Duration
- Frame rate
- Bit rate
- Sample rate
- Channels

File formats (types)

The file format is the structure of a file that tells a program how to display its contents. It's also known as file types. Here are a few examples below.

Word processing software	.doc
Spreadsheet software	.xls
Database software	.db
Graphics software	.jpg, .png, .tiff, .pdf
Video editing software	.mp4, .mov, .avi
Audio editing software	.mp3, .flac, .wav
Desktop publishing software	.pub

1.2.1 1.2.1 Why data must be fit for purpose Compression

Why is compression used?
In some cases, documents my be too big and therefore can't be stored on a local drive, loaded onto a webpage or even emailed to someone else.
Compression reduces the file size to allow documents to be used in these ways.
There are two types of compression.

Lossy compression

- Lossy compression will permanently remove data.
- This can significantly reduce the size of a file.
- The compromise of reducing the file size is that is can have an impact on the quality.
- The file also becomes irreversible which means it cannot be changed.

Lossless compression

- Lossless compression uses an algorithm to temporarily group data together so it can be restored into it's original form.
- This means the quality of the file can be maintained.
- The file is reversible which means you can continue to make changes to it.

Lossless compression example:
Run-length encoding

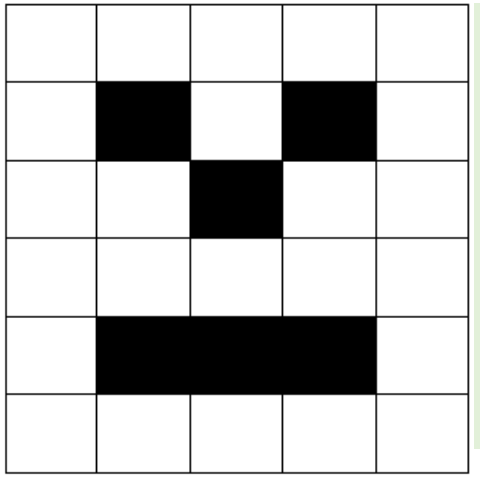


Image 1: Worked example
Row 1 – 5
Row 2 – 1,1,1,1,1
Row 3 – 2,1,2
Row 4 – 5
Row 5 – 1,3,1
Row 6 - 5

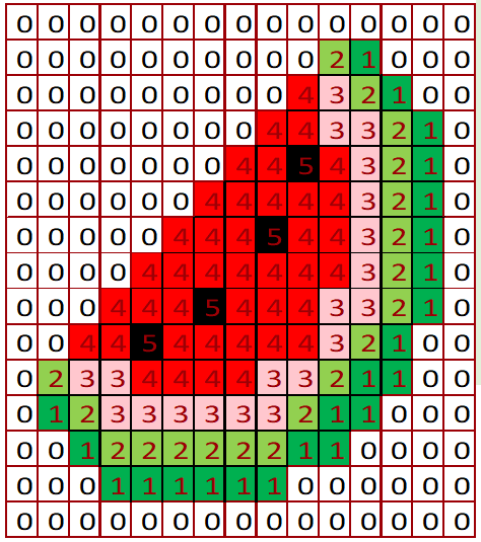


Image 2

Row 1 – 15
Row 2 – 10,1,1,3
Row 3 – 9,1,1,1,1,2
Row 4 – 8,2,2,1,1,1
Row 5 – 7,2,1,1,1,1,1,1

1.2.2 1.2.1 Why data must be fit for purpose Sources of errors

General input error

- This could be a customer entering data on a form incorrectly.
- Forms mistakenly lost.
- Problems with automatic data collection devices such as bar code readers.

Transcription error

- This could occur when a data entry clerk enters incorrect data. In particular, when data is being copied down via a telephone conversation.
- Entering a date of birth of misspelling a surname or address name.

Processing error

- This could be down to the way the program is written. Some mathematical calculations might be incorrect which causes a logic error.
- This means the system will work, but not the way it's intended to.

Transmission error

- This could occur when data is being transferred from one computer to another over a network.
- It could be loss of, or poor connection.

1.2.2 1.2.1 Why data must be fit for purpose
Data verification

What is data verification?

This checks the data entered is accurate and data can be checked in many different methods:

Traditional methods

Manual proofreading

This would involve somebody checking the data has been entered correctly. However, this manual process can be very time consuming.

Double entry

This requires data to be entered twice. However, this is a time consuming and costly process.

New methods

Enter password twice

The user might be encouraged to enter their password in twice to double check they entered it correctly in the first place.

CAPTCHA

This uses an image that users must identify. It helps to identify whether it's human or bot entering the data. Bots are unable to recognise images.

Two-factor authentication

When logging onto an account of making a payment. A text can be sent to your mobile phone with a passcode to enter.

Memorable information

For online banking, you need to log in by knowing the specific order of the characters in your memorable word. For example, what are the 2nd, 3rd and 9th character.

1.2.2 1.2.1 Why data must be fit for purpose
Data validation

What is data validation?

Data validation is a check performed by a computer to check that the data entered is reasonable and appropriate. It does not however, check the accuracy of the data – that is what data verification is for.

Format check

This checks that data entered has been done so using the correct format. For example, the format of a national insurance number is LL NN NN NN L.

Range check

This checks the data entered is within a certain set criteria. This could be entering a page on a web form for example.

Presence check

This checks that data has been entered in that field. On forms you make a field a 'required field' which doesn't allow the user to go any further until they've completed that field.

Length check

This checks the length of the characters entered. It's possible to set a minimum or maximum number of characters. This is found on forms where passwords must be at least 8 characters in length for example.

Lookup table

This looks up acceptable values within a table. This is usually provides users with a pop up calendar to select the date and this removes the need for a manual entry and removes errors.

Type check

This checks that data has been entered in that field using a particular data type. For example, quantities can only be entered numerically.

1.3 1.3.1 Networks and topologies Network types

What is a network?

A network is a group of interconnected devices that share an internet connection.

How is a networked computer different to a stand alone computer?

A stand-alone computer is a device that is not connected to a network.

Network types:

- LAN (Local Area Network)
- WAN (Wide Area Network)

LAN	WAN
What does it stand for? Local Area Network	**What does it stand for?** Wide Area Network
How does it work? It's a network that covers a small geographical area.	**How does it work?** It's a network that covers a large geographical area.
Infrastructure It uses network hardware and cables owned by the individual/organisation	**Infrastructure** It uses additional transmission media owned by other companies such as telephone lines.
Who uses a LAN? Schools, homes and any business that works in a small building or site.	**Who uses a WAN?** It can be a collection of different LAN's. The best example is the Internet.

1.3 1.3.1 Networks and topologies Network models

Network models:

- Client-server network
- Peer-to-peer network.

Factors that affect network performance:

- Number of users using the network. It uses more bandwidth.
- Distance from the router.
- Interference from physical objects.
- Choice of transmission cable (e.g. fibre optic)
- Streaming videos in HD.
- The use of a VPN (Virtual Private Network)
- Wi-Fi frequency may need to be changed.

Client-server	Peer-to-peer
Where are files stored? In a centralised location such as the server.	**Where are the file stored?** It's decentralised. Stored on the individuals computer.
Backing up data All data is backed up in a centralised location. (i.e. a server)	**Backing up data** Peer-to-peer may need to perform their own backups.
Updates/Installation Upgrades can be done centrally and not on individual computers.	**Updates/Installation** Upgrades would need to be performed on each computer.
Hardware File servers to store/retrieve files. Web servers to access the world wide web.	**Hardware** Router to connect to the network and access the internet,

1.3 1.2.3 How data transfers over different types of network
Network hardware

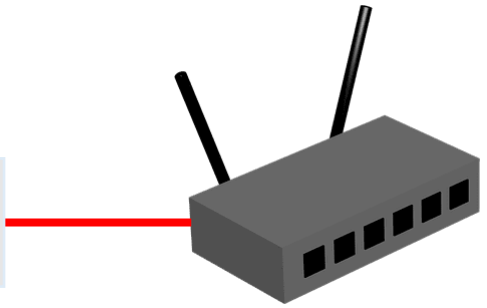
Switch	Router
Creates networks	Connects to other networks
Inspects MAC addresses	Inspects IP addresses
Re-broadcasts data packets to the correct recipient.	Forwards data packets onto the intended recipient once IP address have been inspected.
Reduces security issues and unnecessary traffic.	It can exchange data outside of it's own network.
Can connect LAN's together using a bridge.	Can connect LAN with a WAN using a gateway.

Different types of network hardware

Switch
Network hardware that allows you to create networks is responsible for re-directing data packets to the intended recipient.

Router
Hardware that allows you to connect to other networks by inspecting the IP address.

1.3 1.2.3 How data transfers over different types of network Network hardware



Different types of network hardware

What is a Repeater?
Hardware that relays data from a wired network to a wireless device. It's used to extend the coverage of a network so users can access the network from longer distances.

Network interface controller
A chip that allows the computer to connect to a network. Each NIC contains a MAC address.

What is a Modem?
A modem is used to connect a network to the internet. It converts digital signals from the computer into analogue signals that can be transferred to a modem at the receiving location where it performs the reverse process.

MAC address	IP address
It uses hexadecimal numbers and 6 bytes long.	It uses denary numbers and is 4 bytes long.
MAC address is fixed to one device and doesn't change.	Can be changed / are allocated as needed
Configured in hardware.	Configured in software.
Uniquely identifies a device on a network.	Not unique to one individual device or network.
MAC addresses are only used within the LAN	Used for routing across a WAN / internet

1.2.3 1.2.3 How data transfers over different types of network Star network

What is a star network?

- It consists of a central device, typically a switch for all other nodes in the network.
- Each node in the network is connected directly to the central switch.
- This means that every node has a dedicated point-to-point connection to the central switch.

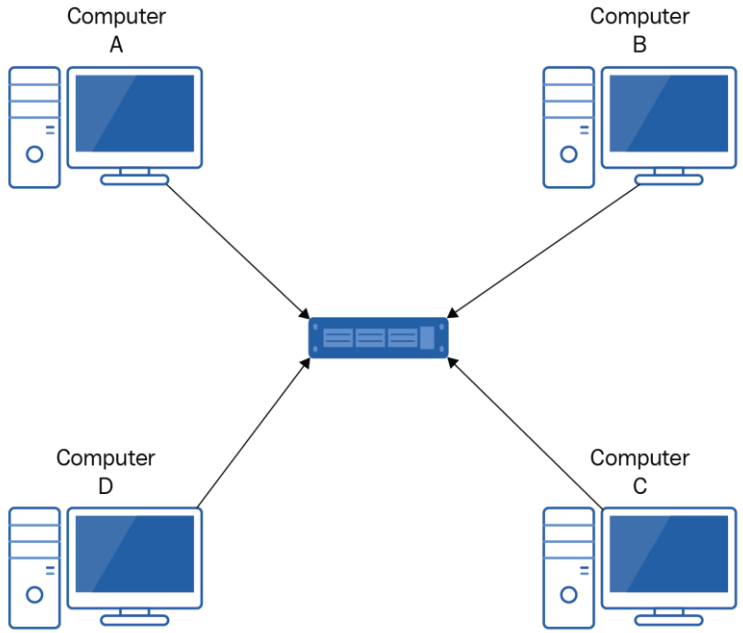
Advantages

All connected to central switch

Easy to add new devices

Easy to troubleshoot and isolate faults

Network continues to run if one device fails.



Disadvantages

Higher latency - data must pass through the central switch, causing delay.

Limited cable length

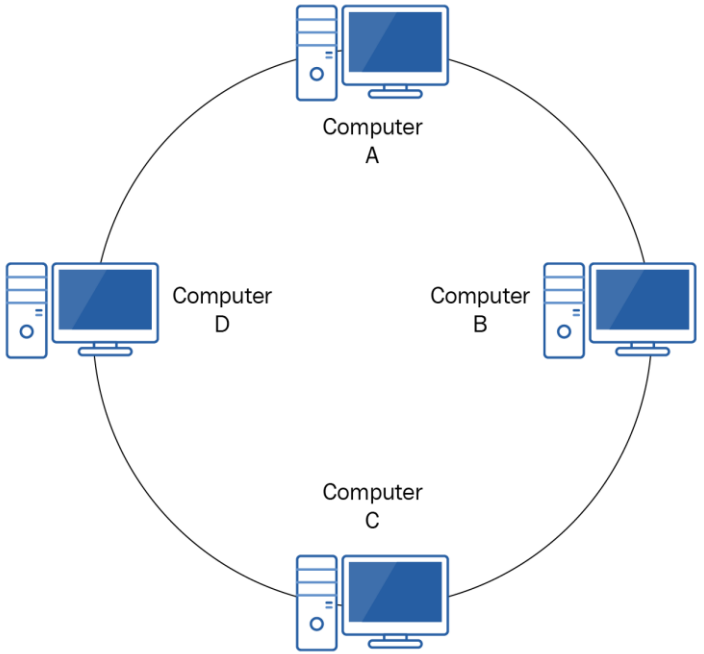
More expensive due to the more hardware needed.

Single point of failure - if the central switch fails, the entire network is down.

1.2.3 1.2.3 How data transfers over different types of network Ring network

What is a ring network?

- Each device on the network is connected to exactly two other devices, forming a circular loop or "ring."
- Data is transmitted in one direction around the ring, with each device passing the data along to the next device until it reaches its destination.



Advantages

Data is transmitted in a sequential and organised way, which makes it an efficient method of data transmission.

Increased performance and reliability because one device is allowed to transmit at a time.

Disadvantages

Ring networks can become slow and congested as the number of devices increases, which can limit their scalability.

The entire network can fail if one device or connection fails

1.2.3 1.2.3 How data transfers over different types of network Bus network

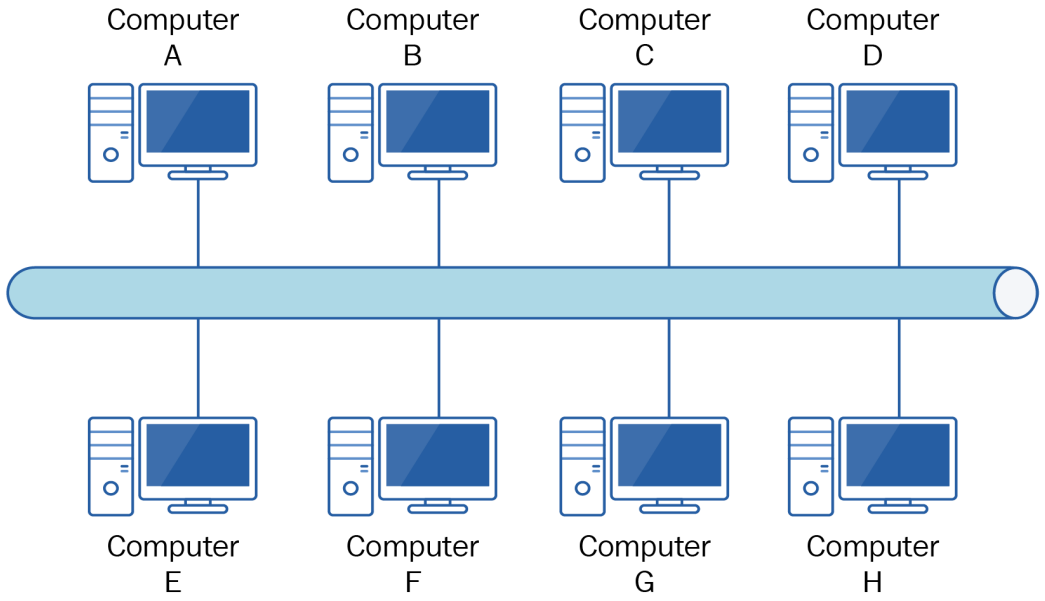
What is a bus network?

- All devices on the network are connected to a single cable, known as the "bus" or backbone.
- Data is transmitted in both directions along the bus.
- Each device on the network listens to the data being transmitted, but only the device that is addressed will accept and process the data.

Advantages

Adding new devices to a bus network is straightforward. All you need to do is connect them to the bus cable.

Inexpensive to install and maintain, making it an ideal choice for small businesses and home networks.



Disadvantages

The bus cable is a single point of failure. If the cable fails, the entire network goes down.

The scalability of a bus network is limited. As more devices are added.

1.2.3 1.2.3 How data transfers over different types of network Mesh network

What is a mesh network?

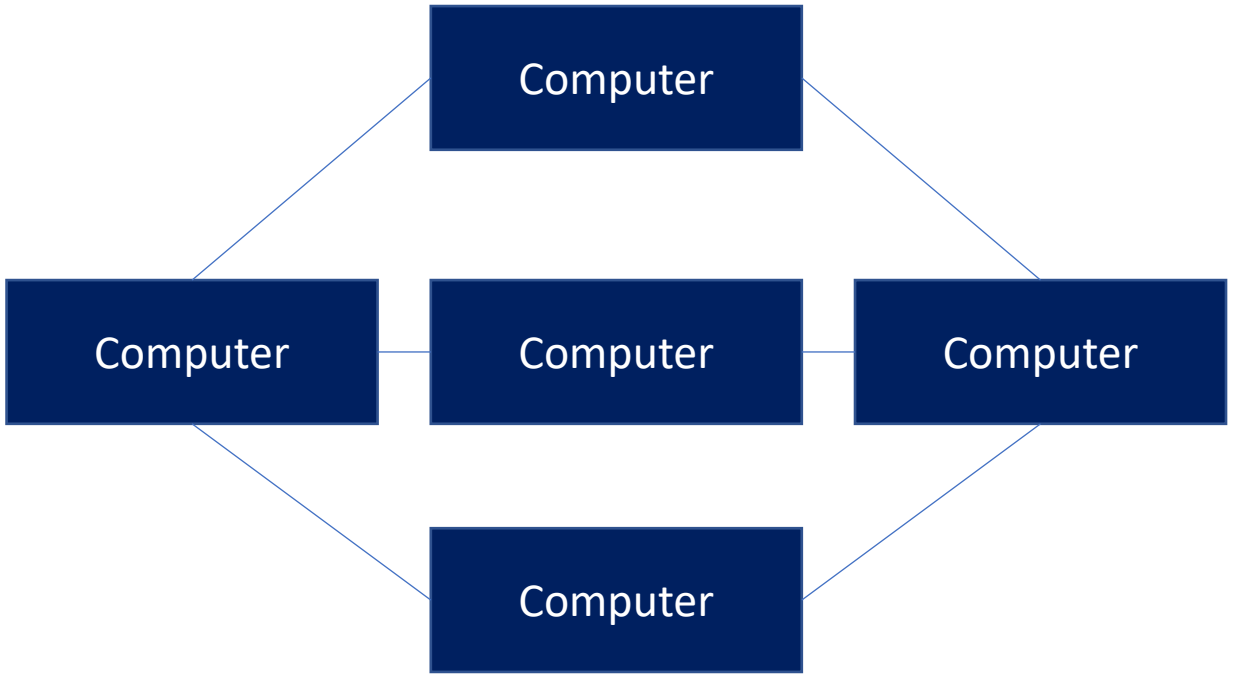
- Each node in the network acts as a router, forwarding data packets to other nodes in the network.
- When a node sends data, it selects the best path to the destination node based on factors such as network congestion, signal strength, and node availability.

Advantages

Data can be transmitted more effectively because every node acts as a router.

If one node fails, data can still be transmitted through alternative paths.

New nodes can be added to a mesh network without disruption.



Disadvantages

Increased network latency because using multiple paths is complex.

The bandwidth available to each node may be limited, which can impact performance.

1.2.3 1.2.3 How data transfers over different types of network
The internet

What is the internet?

The Internet is a global network of networks while the Web, also referred formally as World Wide Web (www) is collection of information which is accessed via the Internet. The internet is an example of a WAN (Wide Area Network)

Intranet and Extranet

- **Intranet** is a connected private network that only gives users of that organisation access to data. This is usually done by providing each user with a secure login.
- **Extranet** is a connected public network that can be accessed by an organisation and external users such as customers. For example, an e-commerce site.

What is meant by DNS?

It contains a database of domain names that allows users to look the IP address and its associated domain name.

The DNS process

Step 1: User enters the domain name into the web browser.

Step 2: Client contacts DNS to find domain name.

Step 3: If the domain name doesn't exist, it will try a second server.

Step 4: The second server finds the domain name and returns to first server.

Step 5: The server returns the IP address to client.

Step 6: Client contacts the host using the IP address.

1.2.3 1.2.3 How data transfers over different types of network The internet

What is meant by cloud computing?

Cloud computing allows users to store files and collaborate remotely as long as there is an internet connection.

What is meant by hosting?

A web hosting service is a provider that is able to host a users (client) website through their own server.

Why is hosting used?

- They offer facilities to create and maintain a website.
- It manages security and any updates.
- Users can host websites from their own broadband but if they gain high network traffic then it would struggle to cope, servers provided by hosts hold more capacity.

Pros and cons to cloud computing

Pros	Cons
Lower set up costs	Internet connection required.
Can add more capacity over time.	Technical issues can cause downtime.
Files/documents can be accessed anywhere within an internet connection.	Security risks/vulnerable to hacking.
Encourages collaborative working.	Increased costs when more storage is required.
Data is backed up remotely at another site.	

1.2.3 1.2.3 How data transfers over different types of network The internet

What is an in-house server?

An in-house server is a computer system managed and maintained on the premises, as opposed to being hosted by a third-party service provider.

Who uses in-house servers?

Large corporations with a significant amount of data and computing needs, such as financial institutions, healthcare providers, or technology companies.
Government agencies that handle sensitive information and require strict control over their IT infrastructure.
Small and medium-sized businesses that require specialised software or customized applications that are not available in cloud-based solutions.

Pros and cons to in-house servers

Pros	Cons
Complete control and ownership of data	Up front costs in purchasing the server.
Customised to meet needs of the business/user.	Maintenance and upgrades
Faster access to data because it's located on site.	Security risks from internal networks.
Lower long-term costs	Limited scalability of organisation wants to expand network.

1.2.3 How data transfers over different types of network
Network protocols

What is a standard?

We communicate with each other in our native language and this is exactly how computers communicate with each other and this is known as standards.

What is a network protocol?

- When standards are used by computers to communicate over a network, it has to follow a number of protocols.
- Each protocol is responsible for transmitting data in a different way.

Network protocols

HTTP
Used to access web pages.

HTTP
Used to access web pages that require communications to be encrypted.

FTP
Used to transfer files between client and server.

TCP
Breaking down data into packets ready to be transmitted.

IP
Identifying the IP address of the source and the receiver of the data packets.

SMTP
Used to send email messages over a network.

IMAP
Used to receive emails that are stored on the server.

POP
Used to receive emails that are stored on a device, deleted from the server.

1.2.3 1.2.3 How data transfers over different types of network Network protocols

Packet switching process

Step 1: Request processed by web server.

Step 2: Request put into packets.

Step 3: Packets given address & number.

Step 4: Packets sent across the network

Step 5: Packets received by host server.

Step 6: Have all packets arrived?

Step 7: If not – back to Step 4.

Step 8: If yes, packets put in order.

Packet sniffers

This involves the use of packet analysers (packet sniffers) These are used to intercept data packets on a network which are then analysed. Sensitive data such as login names, passwords and credit card numbers can be stolen.

1.2.3 1.2.3 How data transfers over different types of network Emerging technologies (Part 2)

Virtual networks

- A software-defined network that allows multiple virtual machines (VMs) or other virtualised resources, such as containers, to communicate with each other as if they were connected to the same physical network.
- For example, you could use all the network resources from one physical site from any other location provided your connected to that network.

5G networks

- 5G is the next generation of mobile internet connection.
- 5G is significantly faster than 4G
- 5G has more capacity than 4G
- 5G has significantly lower latency than 4G.
- 5G is better placed to deal with the wave of IoT devices.
- 5G can support immersive experiences such as VR and AR with faster, lower latency, and lower cost-per-bit.

Edge computing

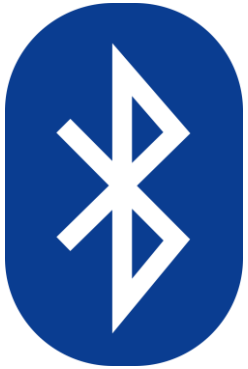
- Edge computing enables the processing and analysis of data closer to the source, which can reduce network latency and improve application performance.
- This technology is becoming increasingly important with the rise of IoT devices, which generate vast amounts of data that need to be processed in real-time.

1.2.4 1.2.4 Different types of connectivity

Connectivity methods

Wi-Fi enables devices to connect to the internet or other local networks without the need for physical cables.

NFC allows two devices to communicate with each other over a short range, typically up to a few centimetres. For example, making a contactless payment.



Bluetooth enables data transfer between devices over short distances.

RFID uses radio waves to read and transmit data between a reader and an RFID tag. The RFID tag contains a small microchip and antenna, which can be attached to or embedded in an object, such as a product.

1.2.4 1.2.4 Different types of connectivity
Connectivity methods

Mobile data is a medium range wireless connection which works by transmitting data between cellular networks and a mobile device. Examples include: 3G, 4G, and 5G.

Ethernet is a standard protocol for wired local area networks (LANs). It allows devices on the same network to exchange data packets with each other.

Satellite is a long range wireless connection which works by connected to a satellite position in orbit above earth. Commonly used to connect remote areas or regions where communication is limited.

USB which is a standard interface used to connect peripheral devices, such as printers, keyboards, mice, and storage devices, to a computer or other host device. This has further evolved into Micro USB and USB-C which fits into the port both ways.

1.3.1 1.3.1 Risks to information held on computers Social engineering

What is social engineering?

Social engineering refers to the use of manipulation by an individual or group to trick individuals into disclosing confidential information.

Why use social engineering?

For some attackers it's an easier way to gather sensitive information because no technical knowledge is required and some people can be considered as the 'weak point' due to their lack of knowledge.

Social engineering techniques	Prevention methods
Blagging - a form of social engineering that involves the use of deception or false pretences to obtain confidential information or access to restricted areas.	• Be cautious of unexpected calls or emails. • Verify the identity of the individual.
Phishing - a fake email or website that looks legitimate, but is used to steal personal information such as passwords or credit card numbers.	• Block the sender • Report to anti-phishing • Don't open any suspicious links. • Check the email address.
Shouldering - a type of social engineering technique that involves physically standing behind someone or looking over their shoulder in order to gain information.	• Be aware of your surroundings. • Use your hand the block the view.

1.3.1 1.3.1 Risks to information held on computers
IT32: Malware

Virus

A type of malware that can copy itself and spread to other users by attaching itself to other files.

Trojan

Enter users computer as a normal file or program and once downloaded, will perform malicious tasks.

Adware

This is designed to provide users with advertisements in the form of pop-ups that redirect them elsewhere.

Worm

This needs user actions to spread it and as a result, can continue to spread, exploiting the network and consuming bandwidth.

Rootkit

Created to provide remote access to a computer without detection. This can allow it to modify system settings and even install other types of malware.

Ransomware

Encrypts the user personal data using strong encryption methods and will demand a ransom to decrypt. This ransom will usually be in the form of a fee.

Spyware

Used to track users activity without their knowledge and might use key loggers to monitor actions taken by the user and gain personal information.

Bot

An automated type of malware used to perform DDOS attacks to get access to servers

1.3.1 1.3.1 Risks to information held on computers
IT32: Hacking

White hat	Black hat	Grey hat
Also known as 'ethical hackers'	Support criminal acts through their hacking skills.	Do not have malicious intentions
Given legal permission to test an organisations security system.	Illegally attack computer systems for personal gains and ransom.	Try to gain something for their own findings.
Find vulnerabilities that can cause security to be compromised.	Using malware to gain access to sensitive information.	Reports back findings and asking them to fix it for a fee.
Conduct penetration testing	Intention to steal data and corrupt files.	May compromise organisations systems without permission.

1.3 1.3.1 Risks to information held on computers
Network threats

Brute force attack

This method of attack requires very little 'specialist knowledge'. Hackers will use automated software to try millions of different password combinations.
Therefore this can be referred to as a 'trial and error method'.

SQL injection

This attack is used to interfere with queries that an application makes to its database in order to gain unauthorised access to users data.

Data interception and theft

Packet sniffers - This involves the use of packet analysers These are used to intercept data packets on a network which are then analysed. Sensitive data such as login names, passwords and credit card numbers can be stolen.
Unauthorised access – The use of social engineering techniques to find out login credentials.

Denial of service attack

This method overloads the network by using bots to send useless requests to servers to a point in which is becomes flooded and unresponsive. These bots can be designed to perform malicious tasks such as stealing data.

1.3 1.3.1 Risks to information held on computers Identification and prevention strategies

Penetration testing

This used to test a computer system or a network to find vulnerabilities. Ethical hackers are employed to assess security and test users own awareness of security.

Anti-malware software

A computer program used to prevent, detect, and remove malware that could infect files on a computer system or gain unauthorised access to personal information.

Physical security

Use of doors, locks and other physical measures to keep computer equipment safe and secure. This could involve fitting alarms, using locks, keypads, biometric or CCTV.

Encryption

Scrambling data to make it unreadable and harder for hackers to intercept.

User access levels

User access levels to determine the rights users have with regards to the data they have access to. (e.g. some files might only be read-only for certain users)

Strong passwords

A strong password would consist of upper and lower case letters, numbers and symbols.

1.3 1.3.1 Risks to information held on computers Emerging threats

Quantum computing

Quantum computers could potentially break encryption algorithms, compromising the confidentiality and integrity of sensitive data.

Synthetic identify fraud

Synthetic identity fraud involves creating new identities by combining real and fake information to commit fraud and open accounts

Cyber physical attacks

The use of digital and physical systems in critical infrastructure, such as power grids, transportation systems, and medical equipment and industrial control systems.

Deepfake technology

Deepfake technology uses artificial intelligence to create convincing fake videos or audio recordings to conduct social engineering attacks by impersonating someone else.

1.3 1.3.2 The impact of data loss, theft or manipulation on individuals and businesses

Data loss, theft and manipulation

Moral implications

- Competitors lose their advantage because their idea is stolen.
- Open to blackmail

Legal implications

- Breach of GDPR
- Loss of intellectual property (Unable to copyright material)

Financial implications

- Loss of revenue/sales
- Loss of service/reputation
- Fines to regulators, compensation to customers.

How can data be lost?

Data can be lost in different ways; it can be lost accidentally or there could be more malicious motive such as data theft.

Accidental loss of data:

1. Hardware failure
2. Natural disasters
3. Misplaced equipment (i.e., leaving laptop on the train)
4. Failed backups
5. Human error.

Malicious attempts to steal data:

1. Hacking
2. Social engineering
3. Physical theft
4. Disgruntled employees disclosing data.
5. Data interception (i.e., packet sniffers)

1.3 1.3.3 Methods used to protect information
Protection methods

Logical protection

This is a computer-based method of protecting data which is normally implementing using software.

- **Access levels** – Determine level of permissions each user has.
- **Authentication** – Methods used to prove the identity of a user.
- **Firewall** – Monitors the incoming and outgoing network traffic.
- **Encryption** – Uses an algorithm to scramble data to make it unreadable.
- **Anti-malware** – Software design to identity/detect malware in a computer system.
- **Password protection** – A string of characters that enables access to an account.

Physical protection

This involves tangible ways of keeping data secure and safe.

- **Locks –** Locks on doors so they cannot be opened unless you have a key.
- **CCTV** – Monitor the premises 24/7 without any supervising on site.
- **Security guards** – Employing security staff to protect sensitive data stored in buildings.
- **Backup systems** – Backing up data in another location.
- **Location of hardware** – Placing hardware away from risks of floods and fires.
- **Biometrics** – Scanning data through facial recognition, iris recognition or a thumb print.

1.3 1.3.3 Methods used to protect information
Security policies

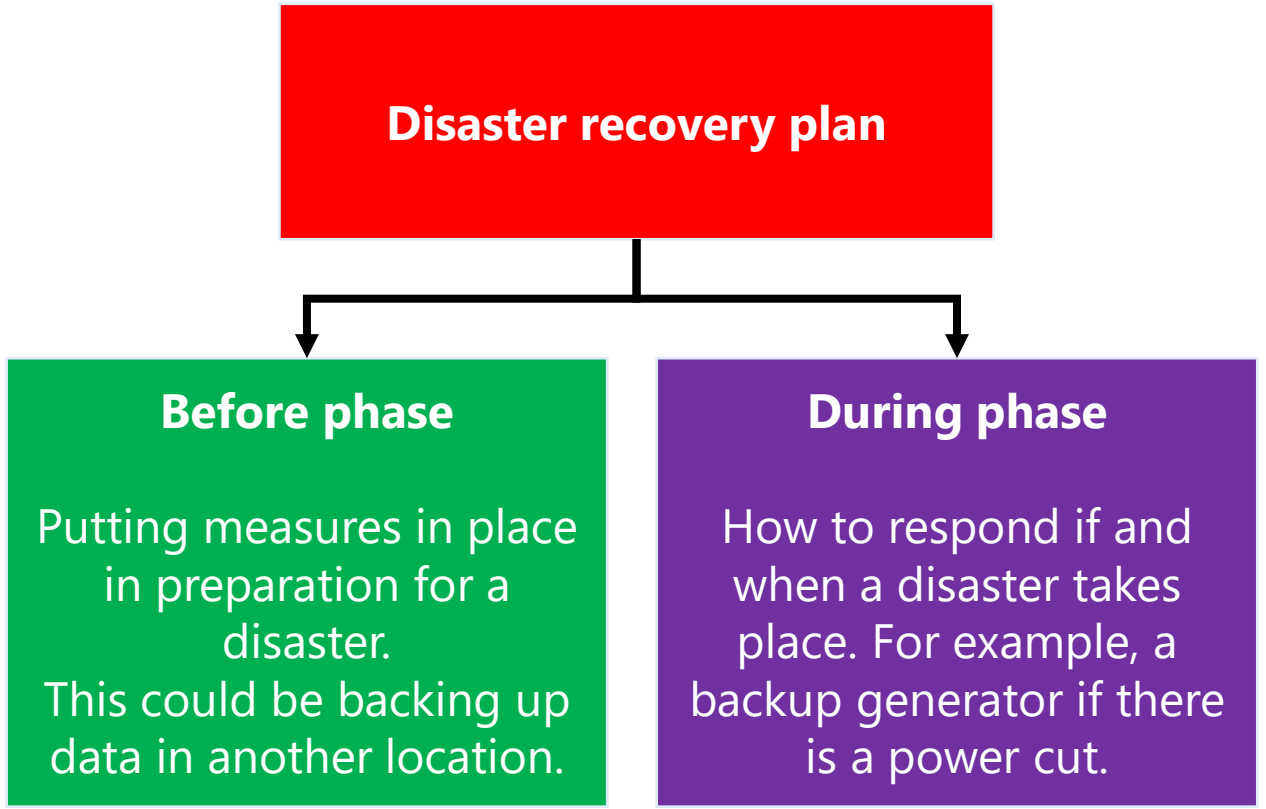
Security policies

Acceptable Use Policy:
A set of rules that tells users how to use the network. Your school will have their own acceptable use policy.

Staff training/responsibilities:
The expectation on staff is to be more responsible when using data and a big part of this is to train staff to become aware of external threats and how best to manage these.

Disaster recovery plan:
A document that outlines how an organisation responds to a cyber-attack, natural disasters or power-cuts.

Disaster recovery plan



1.3 1.3.3 Methods used to protect information Emerging technologies

What is confidential computing?

Confidential computing is an emerging technology used for storing data more securely.
It's a cloud computing technology that isolates sensitive data in a protected hardware-based environment such as the devices we use.

Protection at rest

Encrypt data before storing it

Protection in transit

Use end-to-end encryption to secure communications.

Protection in use

Encrypt data while it's being used in the RAM.

1.3 1.3.4 How moral and ethical issues affect computer users
IT38: Ethical issues

What is the difference between ethical and moral?
Moral is what is considered as right or wrong whereas Ethical is what is considered right by a group of people.

Example
- For example, animal testing is seen as morally wrong by some groups because of the harm it has on animals.
- The companies who create these products see it as ethical because they're testing on animals to ensure its safe to be consumed by humans.

Context
- The concept of morals and ethics can be applied to how we and other use technology and what they use it for.

Ethical issues

Privacy and security

The storage of data by organisations who are legallty bound to keep it secure.

Cookies

Small text files designed to remember information such as certain items that are in your checkout.

Monitoring of individuals

The use of software to monitor employees and what they do or the use of facial recognition cameras.

Impact of data loss or damage

The impact this has on the organisation's reputation or individuals' sales/revenue.

1.3 1.3.5 How legal issues protect computer users
IT39: Legal issues

Legislation types

Copyright, Designs and Patents Act
- This act is designed to protect original creators and their ideas.
- These ideas could be books, films, music and software for example.

Communications Act
- This act sets out how people can access and use television, make calls and browse the internet.
- It's an offence to send malicious messages over social media.

Computer Misuse Act
- This act is to prevent unauthorised access to computer material.
- This includes the intent to commit/facilitate a crime or modify for other purposes.

Regulation of Investigatory Powers Act
- This act covers surveillance of communications by public bodies.
- It covers person-to-person, person-to-machine, machine-to-person and machine-to-machine.

Data Protection Act (GDPR)
- This act is designed to protect users' data and ensure its accurate, relevant, up-to-date and secure.

Health and Safety legislation
- The display screen equipment regulation in 1992 relates to the use of computer equipment safely.

1.3 1.3.6 The cultural, personal and environmental impact of ICT
IT40: Environmental issues

What is meant by environmental issues?
It's the way we measure the impact technology is having on the environment.

Other environmental issues:
- Recycling – The use of e-waste to recycle and re-use (i.e., refurbished mobile phones)
- Global production lines – The use of other countries to produce electronic products that are cheaper. However, can create concerns over low-paid work.

Impact	
Positive	**Negative**
Internet of Things (IoT) Use of IoT devices to regulate use of energy in households and businesses.	**E-Waste (Electronic Waste)** The disposal of obsolete devices and rare earth element mining
Green IT Technology that is designed so use less energy. (e.g., low power mode on a smartphone)	**Energy Consumption** The increased use of electricity to charge our devices and reliance on data centres.
Digital downloads Many developers are creating digital copies of software to reduce the use of packaging such as plastic as well as fuel for transportation.	**Pollution** The manufacturing and operation of technology products contribute to pollution.

1.3 1.3.6 The cultural, personal and environmental impact of ICT
IT41: Cultural issues

What is meant by culture?
Culture refers to the ideas, customs, and social behaviour of a particular people or society and technology is playing a significant role in how we live our everyday lives.

Digital divide
Digital divide refers to the gap between people who has access technology to those that don't. Factors such as affordability, location and cultural factors can cause a divide.

Social media
Websites that allow users to connect with each other by posting messages and sharing videos/images, share content and an effective advertising tool for businesses.

Fake news
The spread of misinformation using online communications. It's important to consider the source, the author, the date and check as to whether this article can be found elsewhere.

Cyberbullying
Sending unkind messages to other people using digital communications which can impact people's mental health.

Addiction
The increased accessibility of the internet has created unhealthy habits such as playing video games for a long period of time.

Net neutrality
The user is in control in what they see and do online. All users should have access to websites provided by their ISP.

1.3 1.3.6 The cultural, personal and environmental impact of ICT
IT42: Employment patterns

Employment patterns
- Automation is being used to allow robots to perform tasks such as assembling different parts of car.
- Technology is being used to complete tasks that could typically be done by a human such as ATMs at banks.
- It can lead to unemployment and the workers replaced by technology may need to re-train.

Hot-desking
- Hot-desking is when an employee doesn't have a regular space to work.
- This is common with employees who work part-time or have flexible working contract.
- It means businesses don't have to invest in extra office space and ensure any vacated desks can be used up.

Teleworking
- Employees that work away from the office using WAN (Wide Area Network)
- Teleworking doesn't always necessarily mean employees will always work from home.
- They might work in a café or any other location that has an internet connection.

Collaboration
- Groups of people working together on a task or project.
- Technology makes it easier to collaborate because cloud services can be used to share work,.
- Video calls can be used communicate ideas in a meeting.

Homeworking
- This involves employees choosing to work from home.
- This become the common method of working during the COVID-19 pandemic.
- Technology now makes it easier to people to work from home.

Video conferencing
- A technology-enabled communication method to conduct real-time audio and video meetings or discussions.
- Commonly used by businesses to conduct meetings that would normally take place in the office.

1.3 1.3.6 The cultural, personal and environmental impact of ICT
IT43: New media

What is media?
- Media is the format used to communicate information to others. There are two media industries: traditional media and new media.
- Traditional media is media that existed before the World Wide Web.
- New media is media that has evolved since the creation of the World Wide Web.

Impact of technology
- New media has been driven by the advancements of technology which have changed the way users consume media.
- The introduction of black box technology such as smartphones and tablet devices has created the need to stream and download content wherever we want, whenever we want via websites and apps.

Examples

Social media
Most platforms allow you to stream content. YouTube is the popular platform for steaming videos.

Video on Demand (VoD)
Platforms that allow you to watch what you when you want. (e.g. Netflix, Amazon Prime, Disney +)

Music streaming
Platforms that allow you to hand pick music and create your own playlists (e.g. Spotify)

Live Radio/DAB
Digital audio that enables you to listen to radio stations via a mobile app.

Digital publishing
Most print media types such as newspapers, magazines and books are available in electronic form such as e-books.

1.3 1.3.6 How a digital footprint can impact computer users
IT44: Digital footprint

What is a digital footprint?
- The information about a particular person that exists on the internet as a result of their online activity.
- Anything you post has the potential to be stored online for an infinite amount of time.

Active and Passive footprint
- Active footprint means to submit data intentionally submitted online via blogs, apps, websites and social media actions. On the other hand, a passive footprint is data collected without the user's knowledge.

Examples
- Active footprint could include posting on social media platforms and sharing posts.
- Passive footprint could be recording your IP address and web browser history.

Online identity
- The representation of an individual or groups personality, characteristics and activities in a digital world.
- Information that helps to represent someone's identity includes name, interests, friends, relationships, age etc..

Identify theft
- When someone uses your information without permission and pretends to be you.
- Identities can be stolen in the following ways:
  - Phishing
  - Blagging
  - Malware
  - Dumpster diving
  - Shouldering

ICT

End of Core Knowledge

for Unit 1