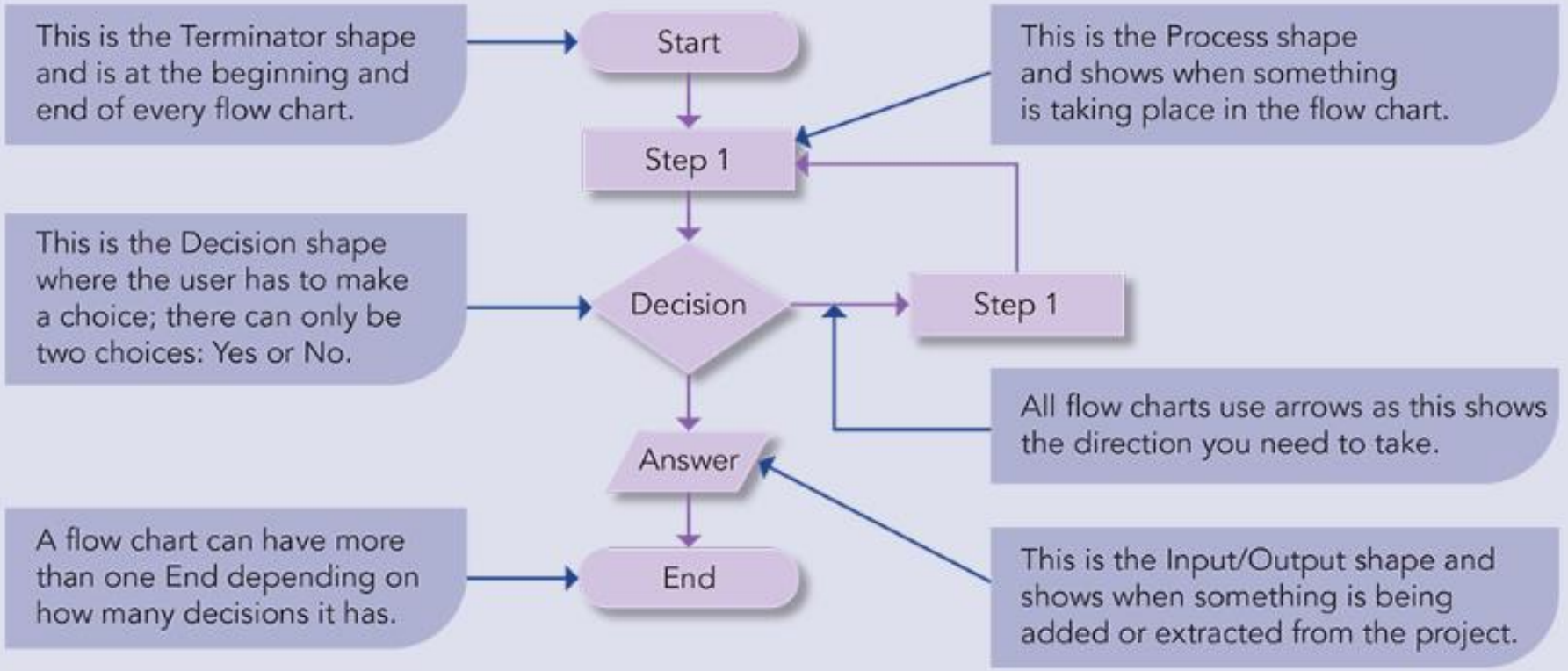
Flow chart

This is often used to show processes, workflows and decisions. Different shapes are used to identify various points in the process.

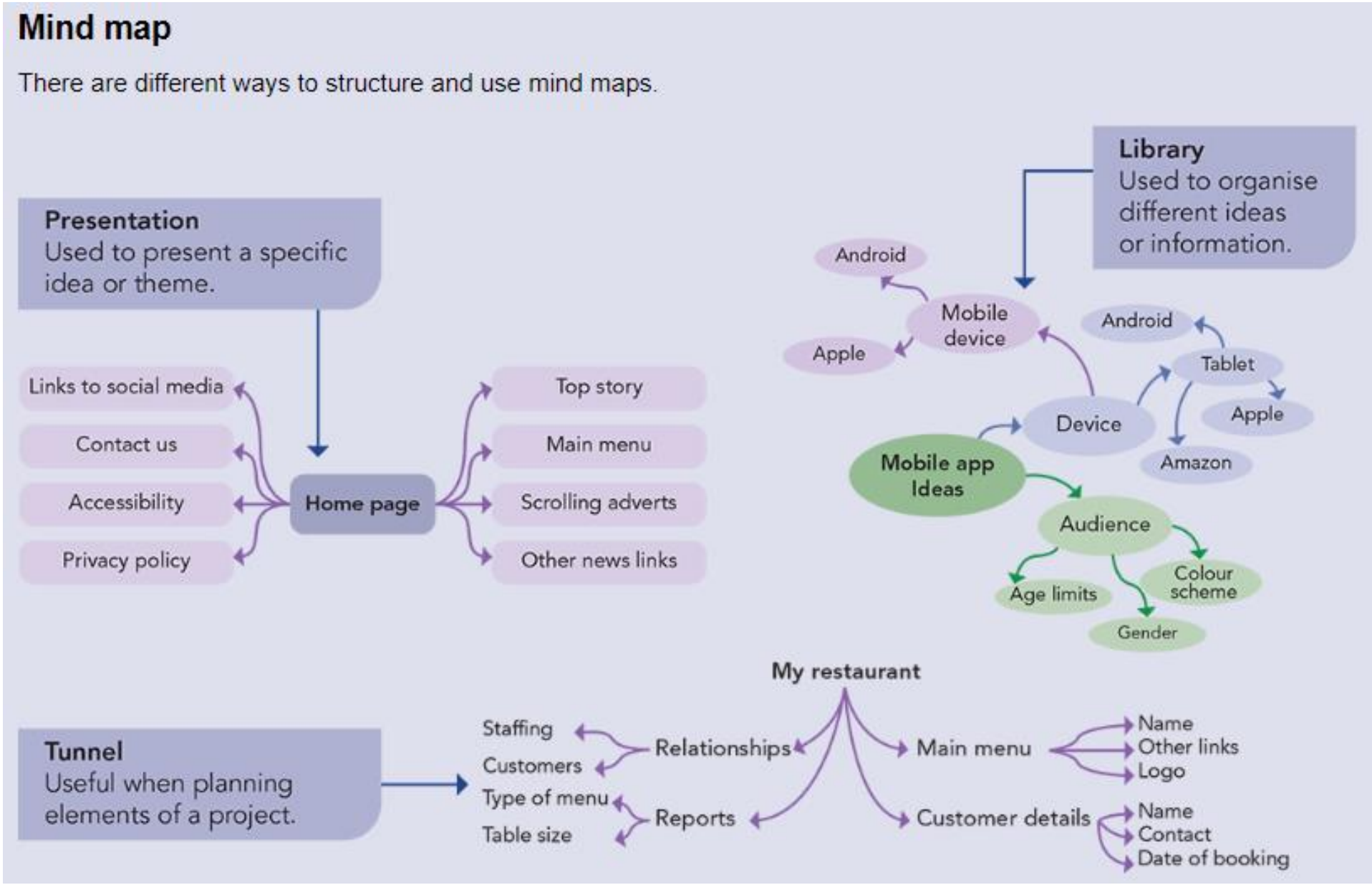


Advantages	Disadvantages
• It is good at showing a clear route of how you are going to create your product. • It helps with organisation as it is logical.	• Too many options make it complicated and difficult to understand.

TA1 - Design Tools

Mind map

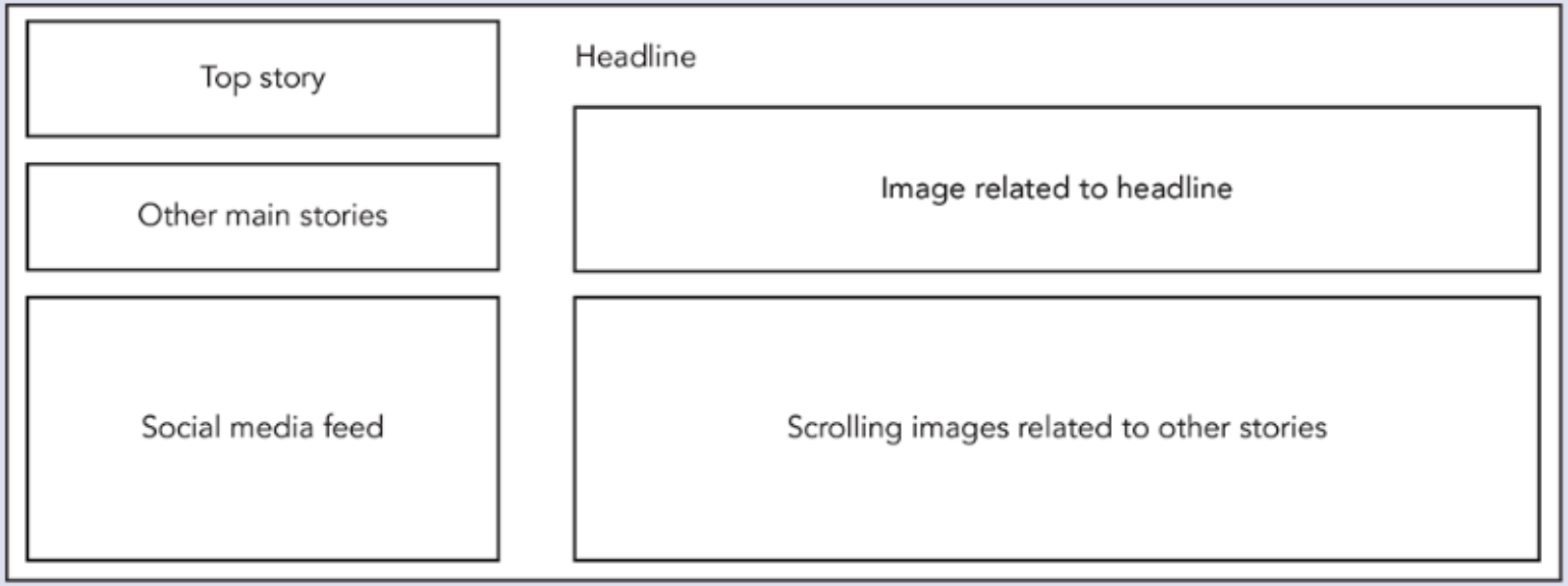
There are different ways to structure and use mind maps.



TA1 - Design Tools

Wireframe

This is a simple plan of a wireframe for a news page on a website. It focuses on the structure of the finished product, such as layout of pages or where the links go to on a website.



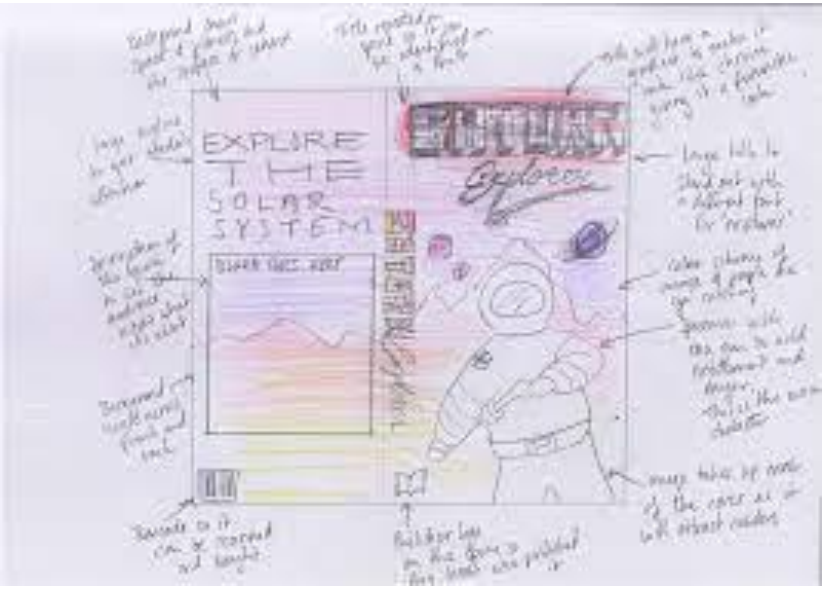
Annotations are only needed for basic style information and **navigation**. For example, they might cover fonts, colour coding and how to move between pages.

Advantages	Disadvantages
• It is clear to see what will be created. • It can help you see where there might be an issue in the later creation stages. • It is easy to edit, which is useful following design feedback.	• It doesn't focus on any technical details, so the plan might not work in practice. • It is not suitable for use with a project that involves a timeline. • Too much time can be spent on the small details and therefore it can become too heavily designed.

TA1 - Design Tools

Visualisation diagram

This mock-up focuses on the layout of the product, such as where text and images might be placed. Annotations explain details such as colour, font type or font size as well some design decisions.





Advantages	Disadvantages
• It is simple to understand, especially with annotation. • It is easy to edit, which is good for acting upon feedback. • You can comment on common patterns/trends to avoid repetition.	• It cannot be used if the product involves a timeline. • It is open to interpretation, meaning each viewer could interpret it differently. • It is not always suitable for large projects.

TA2 - HCI

An HCI focuses on how a person uses or interacts with a computer. This is so that information can be exchanged or instructions provided. Different ways to interact are provided by the **operating system**.

Application area	Banking	Embedded systems	Entertainment
			
Description	The user has access to a menu to pay for an item or access their account. For example, a cash machine uses menus to display the choices you have for your account, such as withdraw money or check your balance.	The HCI is part of a bigger system. It is there to allow the user to control the system it is built into. For example, you can control the central heating in your home through an HCI to set the temperature or the time that it comes on.	You can watch TV or play content on a console by selecting your choice from a menu. This might be an image rather than text. For example, streaming TV menus are updated with suggestions based on what you have watched and also allow you to set up your own choices.
Advantages	Using an HCI is more secure and there is less chance of mistakes being made.	The HCI is cheap to build and it doesn't require a lot of **processing power**. Some can run on batteries.	The HCI can be customised for the user. It enables wider choice and quick, **portable** access to content.
Disadvantages	The bank must think about user accessibility for people who have sight or hearing difficulties and the cost of maintenance and software updates, since the devices are constantly in use.	You are not always able to update the software or fix the HCI if there is a problem.	There is a cost to access the content and it is dependent on a reliable **internet** connection.

Remember it!

- The majority of HCIs are menu-driven in some way as this helps the users to access the software.
- The purpose of an HCI is to allow the user to interact with the computer system.
- The HCI is reliant on the operating system.

Application area	Fitness	Home appliances	Retail
			
Description	An HCI combines the use of **sensors** and touchscreens which can then track progress. For example, a smart watch can provide health information such as heart rate.	To use a range of appliances, we rely on an HCI to be able to control that device. For example, the HCI on a washing machine allows you to select what program to use and warns you if there is a problem.	An HCI can be used by both the customer and the business. For example, in major supermarkets stock is scanned and added into the system as it enters the store and removed from stock when a purchase is made. The manager is notified when stock levels for a specific product are low and reports can be generated about weekly/monthly sales of a specific product.
Advantages	Devices can be versatile and can be used in a variety of situations. A touchscreen is easier to use than trying to press a button especially when exercising.	An HCI makes it safer to control the appliance as well as making it easy to use and to resolve any problems.	It allows notifications when stock needs reordering or it can automatically reorder the necessary stock. It also prevents staff from making errors when entering information.
Disadvantages	There is usually a cost, especially if it's part of a subscription service.	Software cannot be easily updated and appliances need replacing regularly.	An HCI in retail can be expensive. It also takes time to set up and/or update. Mistakes can be made when setting up the software.

TA2 – Hardware Considerations

Resources for an HCI

Memory

- The more memory an HCI has, the more tasks it can remember to do.
- For example, a **smart TV** might have 8GB of memory, whereas a microwave might have 150MB.



Processing power

- The more processing power an HCI has, the more complex tasks it can do.
- For example, a games console can download and install updates for a game whilst you are playing something else.



Displaying an HCI

- Size is important – a computer screen might be 24" (61 cm) whereas the HCI of a card payment machine might be 2.4" (6 cm). The smaller the display, the more limited the choices or functions are for the user as you can only display a certain amount of text. The user might need more time to select their option on a small screen.
- An HCI display is either **LED** or **LCD**, whichever is the most durable for the device it is going to be used with.



Advantages	Disadvantages
• Long-lasting and reliable. • Light and thin as often portable.	• HCI hardware can be expensive as the technology develops and updates.

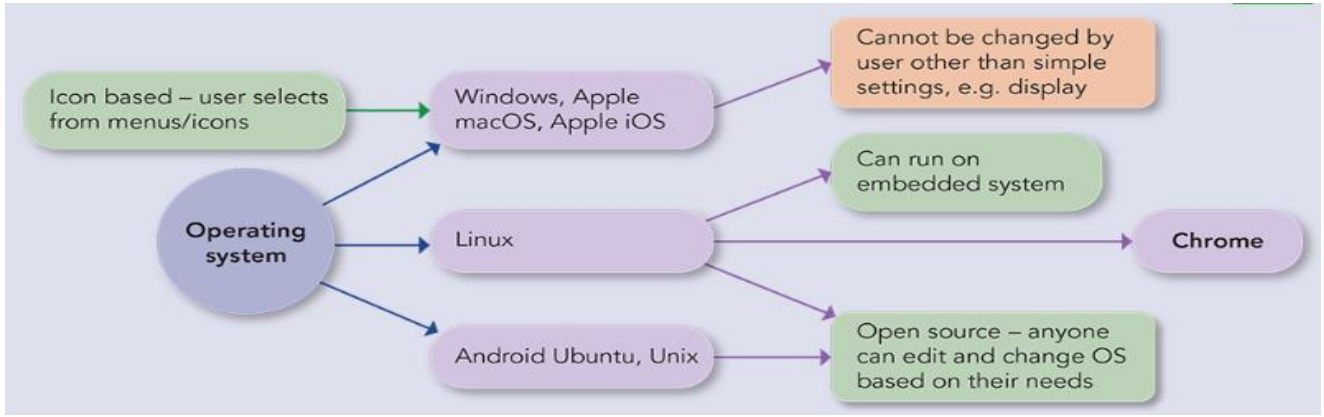
Remember it!

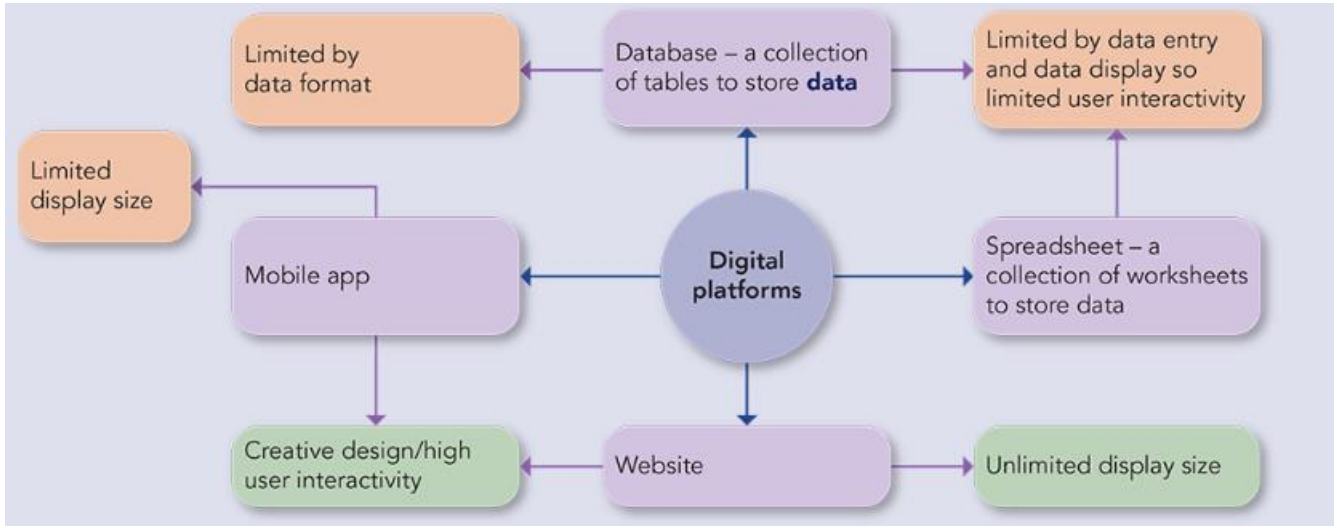
- The smaller the HCI, the more limitations it has.
- More memory = more tasks.
- More processing power = more complex tasks.

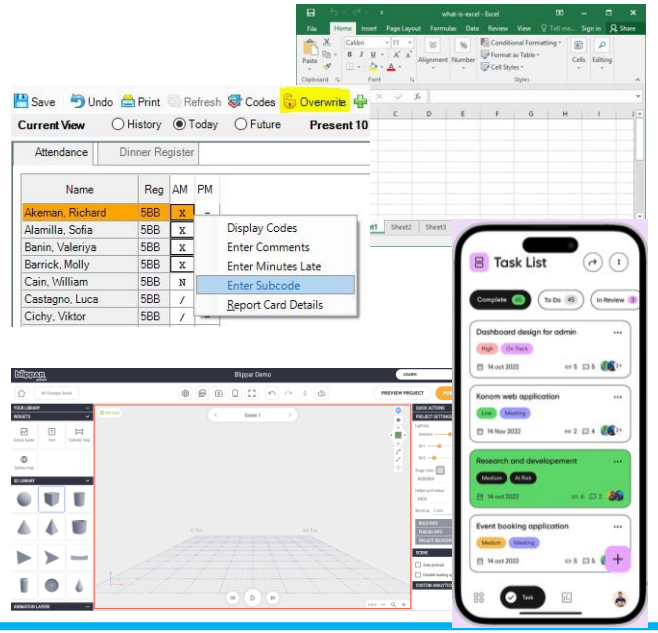
TA2 – Software Considerations











TA2 – Interaction Methods

Remember it!

- The five methods of interaction are: gesture, keyboard, mouse, touch, voice.
- The purpose of any interaction method is to enter data or instructions.
- Designing with accessibility for everyone in mind is good practice.

Interaction method	Description	Advantages	Disadvantages
Gesture 	Uses a body motion such as waving at a sensor to open a door.	Feels natural.	The user might not be able to perform the gesture and it is not suitable for all audiences.
Keyboard 	Manually input information through a keyboard (on-screen or attached).	User confidence, more freedom and the use of shortcuts.	It takes time and not all users can freely use a keyboard.
Mouse 	A handheld device for moving a cursor on-screen.	Accuracy and a high rate of task completion.	It is reliant on a specific device.
Touch 	Selecting on-screen items by touching a specific area.	Ease of use and speed of selection.	Cost, sensitivity of screen, accuracy and the size of the screen.
Voice 	Spoken commands rather than manual entry.	Quicker than typing and hands-free.	Dialects might not be understood and background noise might cause interference.

TA3 – Information & Data

Data

Data is facts or figures that have no meaning or link.

Information

Information is where data is given some meaning, so that you understand what it is about.

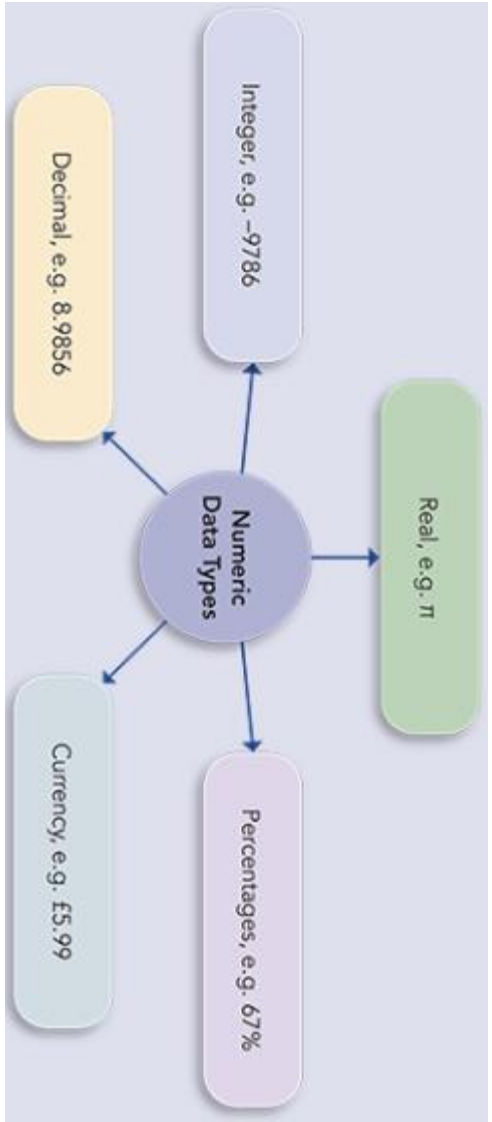
For example, a travel agent may have a list of airport codes for destinations where it has special offers. The codes are all 3 letters long. LIN is Milan Linate.



Relationship formula

To remember the relationship between data and information, use this formula:

Information = data + [structure] + [context]

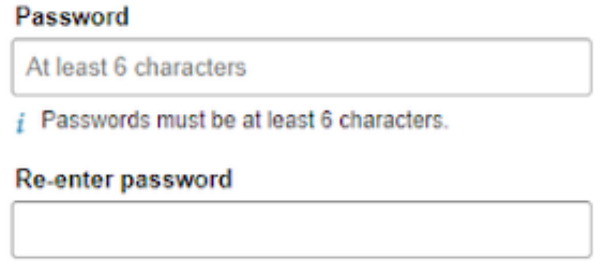


Common data types		
Name	**Brief description**	**Example**
Alphanumeric	Combination of letters and numbers.	Password1
Boolean	Only has two responses.	Yes
Date/Time	Stores a range of date and time formats.	24/12/2024
Text	Stores any possible character.	Password1P*£
Numeric	Stores a number in a variety of ways.	£20,000

TA3 – Validation & Verification

Verification

This checks that the data that is entered *matches the original data*. It does *not* check that the data is correct, for example, that a road name is spelt correctly in an address. It is often completed through double entry or by manually checking what has been entered. For example, when filling in an online form you might be asked to enter your email address twice. Double entry is a more common form of verification than manual checking as a computer is less likely to make mistakes comparing entries than a user.



Validation

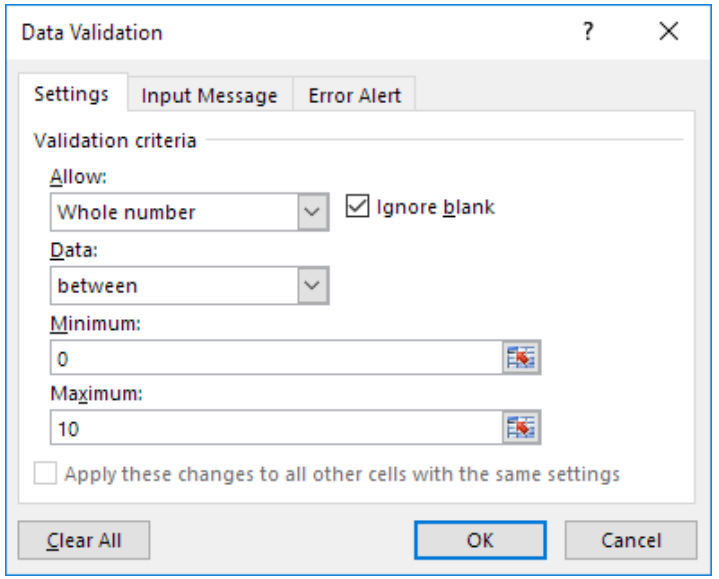
This checks that the data entered is *sensible*, for example, a date is entered that is in the future rather than in the past.

It also checks that it is *reasonable*, for example, an amount entered is £100 rather than £100 000.

If the data entered does not meet either of these checks then an error message appears. It does *not* check that the data is correct.

For example, if you are trying to reserve a table in a restaurant, you are only allowed to book a table in the future rather than in the past.

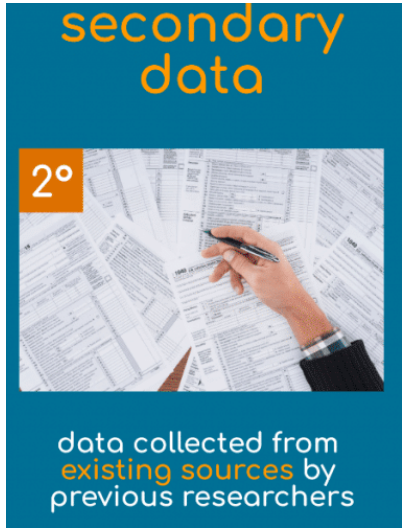
Different validation tools		
Tool	**What is it checking?**	**Example**
Data type check	Is the data entered using the correct data type?	A Boolean data type will not accept 'X'.
Format check	Is the data entered in the expected format?	If it is a date, does it look like dd/mm/yy?
Input mask	Is the data being entered in the expected way?	Most postcodes look like LLNN NLL. Input masks help input the data into the correct format.
Length check	Is the data the expected minimum length?	A mobile number is 11 digits long. A length check can have a set length or a minimum or maximum amount.
Limited choice	Is the data you want to enter on the list provided?	There might be a choice of drinks you can choose from.
Lookup	Is the data an accepted value?	When inputting your postcode.
Presence check	Has the data been entered?	Have you entered a date?
Range check	Is the data within a specific range?	Is the date between 11/12/2022 and 11/12/2023?



TA3 – Data Collection Methods



Method	Description	Advantages	Disadvantages
Email	Sending an interactive form or link to a survey. There could also be questions within the email itself.	• No limit on the number of people. • Results collated automatically – low risk of human error. • Qualitative feedback.	• Might be sent to wrong address or put in the junk folder. • Not everyone has an email address. • Emails might not be checked frequently. • Reliant on an internet connection. • Harder to analyse.
Interview	A dialogue between two people, asking **open questions** in person.	• Questions answered more honestly between **interviewer** and **interviewee**. • Questions can be adapted and answers clarified.	• Costs time and money. • Inconvenient for a large number of people. • Poor interview leads to poor questions.
Online questionnaire and survey	Specific set of open and/or **closed questions**.	• No limit on the number of people. • Simple to analyse. • Often cheap to conduct.	• Depends on internet access. • Inaccurate results if an unintended audience respond. • Results depend on well-designed questions.

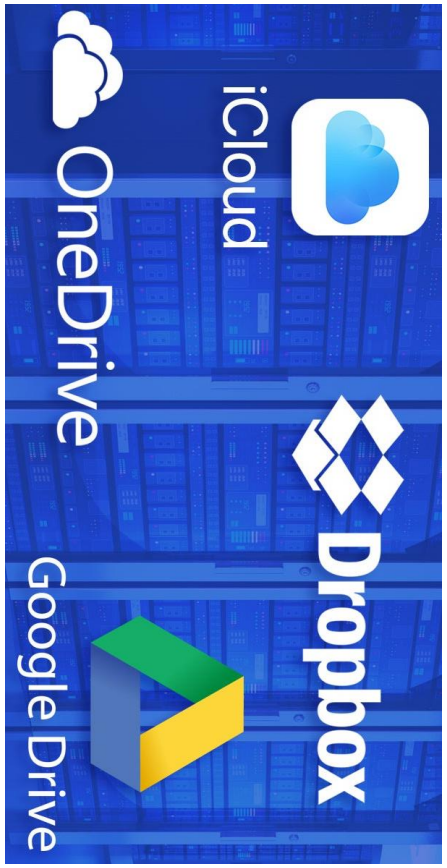


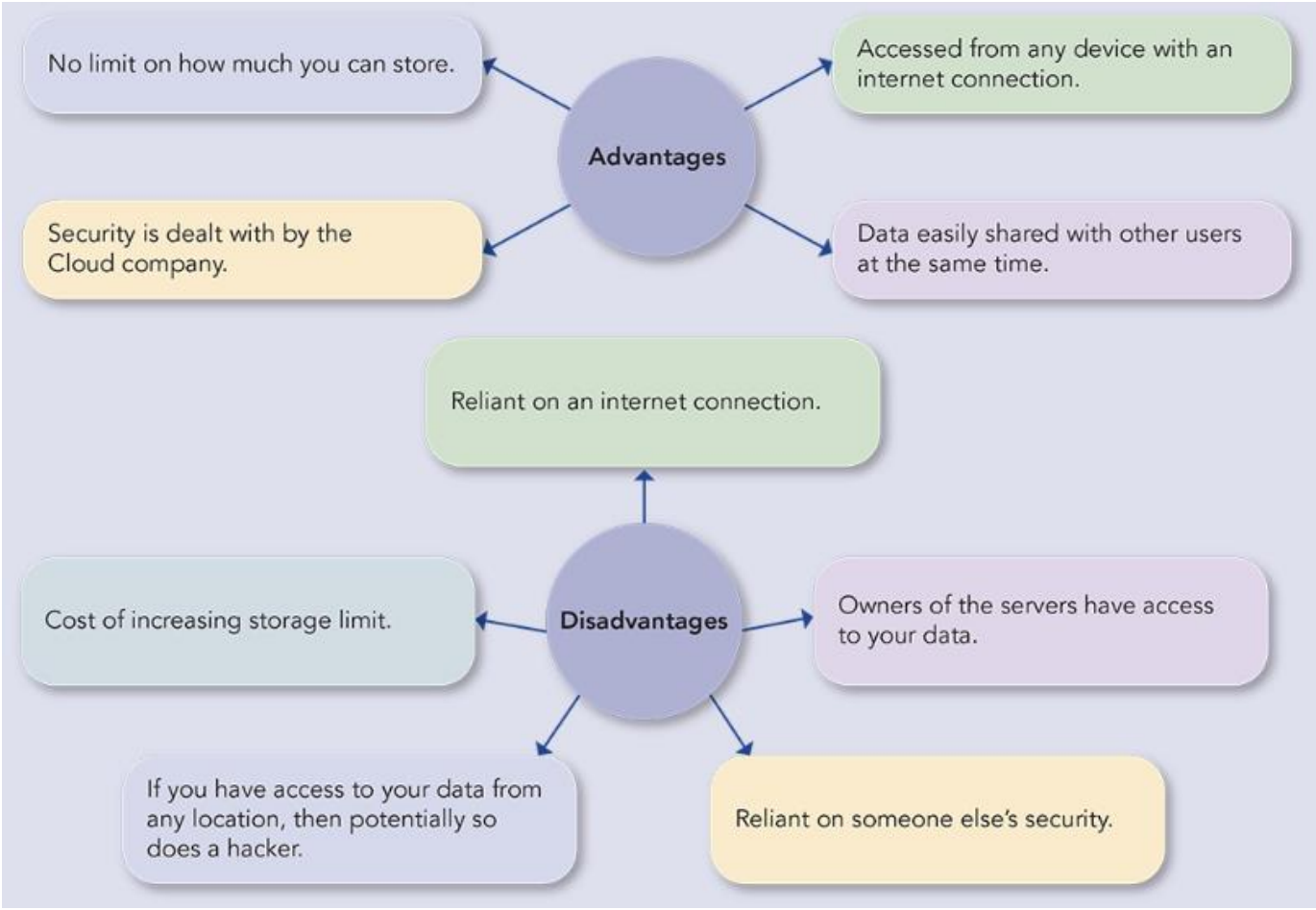
Method	Description	Advantages	Disadvantages
Book	Written by a specialist on a specific topic.	• Author knows the topic. • References to the data being collected.	• Might be out of date. • Author bias.
Government statistics	Data collected and analysed by the Government.	• Large sample size. • Unbiased.	• Not focused on a specific area. • Age of data.
Magazine	Published on a specific topic.	• Author usually knowledgeable. • Data and information up to date.	• Data and information could be presented in a biased manner.
Website	Published online about a specific topic.	• Data updated quickly and frequently. • Simple and quick to search.	• Not clear how and by whom the data was collected. • Specialism of the author.

TA4 – Logical Data Storage

What is the Cloud?

This is a general term for storage that can be remotely accessed through the internet. Location of the data is not important but rather that the data is stored on a server that is connected to the internet.

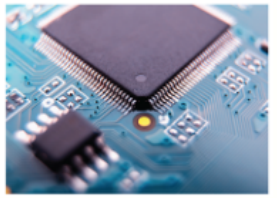




TA4 – Physical Storage

Internal Storage

Storage that is part of the device of network the device is connected to

Type of drive	Description	Advantages	Disadvantages
Primary hard drive 	Storage that is built into a device; only the user of the device can access the data in order to create, edit or delete files.	• Large storage amount. • Low cost. • Not reliant on any external connections for access. • Access to the data is limited to the users.	• User responsible for security and back-ups. • Limited accessibility via the device. • Storage space not easily extended. • If the device breaks, the data could be irreplaceable.
Network drive 	Storage accessed via a series of servers within the same location as the device.	• Accessible from multiple devices within the same location. • Other users can access the same data. • Remote access is possible. • The company knows exactly where the data and information are stored.	• Users have limited access. • User responsible for security. • Both setting up and security can be costly. • Need to have specialist knowledge. • If security is weak then hackers can still access the data and information.

External Storage

Storage that is separate to the device but connected to it

Type of drive	Description	Advantages	Disadvantages
Portable external hard disk drive (HDD)	Storage similar to a primary hard drive. It has its own casing and is connected via USB.	• Increases storage of connected device. • Useful as a back-up device. • Can improve performance of the main device.	• Easy to damage with a low chance of recovering data. • Vulnerable to damage from natural sources such as heat, sunlight. • Not automatically secure.
Portable solid-state drive (SSD)	Storage similar to a portable hard drive. It has no moving parts.	• Faster accessibility. • Lighter and therefore more convenient. • Robust and not as noisy.	• Expensive. • Hard to restore data if it's deleted or the device is damaged. • Not automatically secure.
Network-attached storage (NAS) device	Storage device connected to a network, usually in a central location for stored data.	• Remote access. • Set user permissions for security. • Easy to set up and install.	• Too many users can make it slow. • Specialist needed if there is a problem. • Stored in same location so off-site back-up needed.
Portable USB flash drive	Small device that connects via USB port.	• Can be used with many devices. • User has control of security and back-up. • Provides remote access when used with internet.	• Limited storage space. • Small in size so easy to lose. • Needs additional security adding.
Portable wireless drive	Connects via **Bluetooth** or Wi-Fi to most mobile devices.	• Useful as a back-up. • Battery powered.	• Limited security. • Small, so easy to lose.



Test plan example

Thing being tested

How you will test it eg; what you will click on or type in

What should happen

What DID happen

Print screen ID number

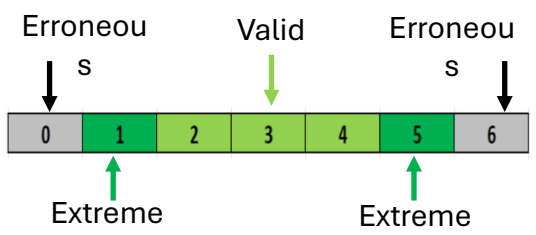
If not working, how did you fix?

Testing

Test Number	Test Description	Test Data	Expected Result	Actual Result	Evidence	Remedial Action (if required)	Evidence of Retesting required
8	List displays the correct data, as planned	Number of classes attended is 4 for each dog	The list will display the names of the owners if the dog has attended in each of the four weeks	The list displayed all the owners even if the dog had not attended 4 classes	8a	Filter on Total classes not set to 4	8b

Purpose of testing	
• To check that it works. • To check that the finished product meets the needs of the client/brief.	
Advantages	**Disadvantages**
• Saves time and money, especially if you test as you make it. • Confidence in the finished product. • Product will work as expected. • Allows you to find and solve problems as the product is created.	• Takes time to test. • It can be costly to test a product. • Length of project needs to include testing time. • Testing needs to be planned. • Not all problems might be found in testing.

User must enter an age below 6

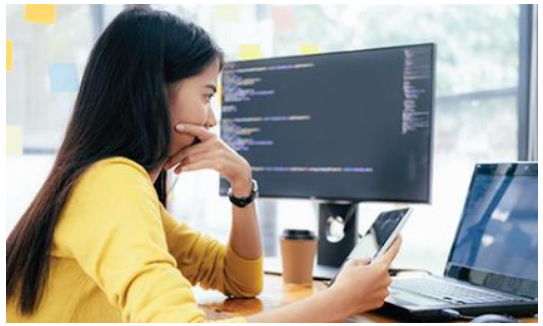


Types of test data		
Type	**Description**	**Example**
Invalid/Erroneous data	Data that is incorrect and the product should reject automatically.	If you are asked to input a date in the future but you add one from last week.
Extreme data	Data that is close to being correct but isn't and should still be rejected.	If you are asked to input a date in the future but you add today's date.
Valid data	Data that is correct and should be accepted by the product.	If you are asked to input a date in the future and you add one for next month.

TA4 – Types of Testing

Technical Testing

Advantages	Disadvantages
• Spots any errors early in development. • Helps measure progress. • Identifies any risks so a solution can be found.	• Takes time to test. • Problems can delay the project.



- To check that the product works overall.
- To check that the product meets the specifications from the client.
- To test that each command works as expected.

Examples of technical testing include:

- Checking links and navigational elements on websites.
- Checking that apps behave appropriately on different device formats.
- Checking that macros in spreadsheets produce expected results.



- To check the product from the viewpoint of the intended user.
- To check that the product is user friendly.
- To test that the user can complete necessary tasks.

Examples of user testing include:

- Asking users to find information within pages or sections of a website.
- Ensuring users can navigate to specific information within a given number of clicks or swipes.
- Asking users to rate the readability of text on small screen sizes.

User Testing

Advantages	Disadvantages
• User feedback helps develop a product. • No specific workspace is needed. • Can check how long it takes to complete specific tasks. • Can see how happy users are with the product.	• It takes time to test with a range of users and they will need to be paid. • Focus is on the quality of the product rather than the technical errors.

TA4 – Cyber Security

What is Hacking ?

The Process of attempting to gain or successfully gaining, unauthorized access to computer resources is called Hacking.





Black Hat Hackers: Bad hackers who use cyber attacks to gain money or to achieve another agenda.

These hackers penetrate systems without permission to exploit known or zero-day vulnerabilities.



White Hat Hackers: Ethical hackers who protect your systems from black hat hackers.

Penetrate the system with the owner's permission to find and fix security vulnerabilities and mitigate cyberattacks.



Grey Hat Hackers: Hackers who cruise the line between being good and bad. Penetrate systems without permission but typically don't cause harm.

Draw attention to vulnerabilities and often offer a solution to patch them by charging fees.

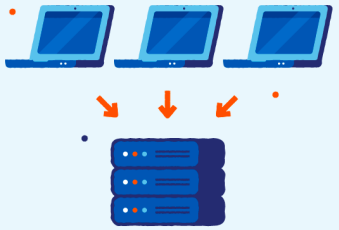
DoS Attacks

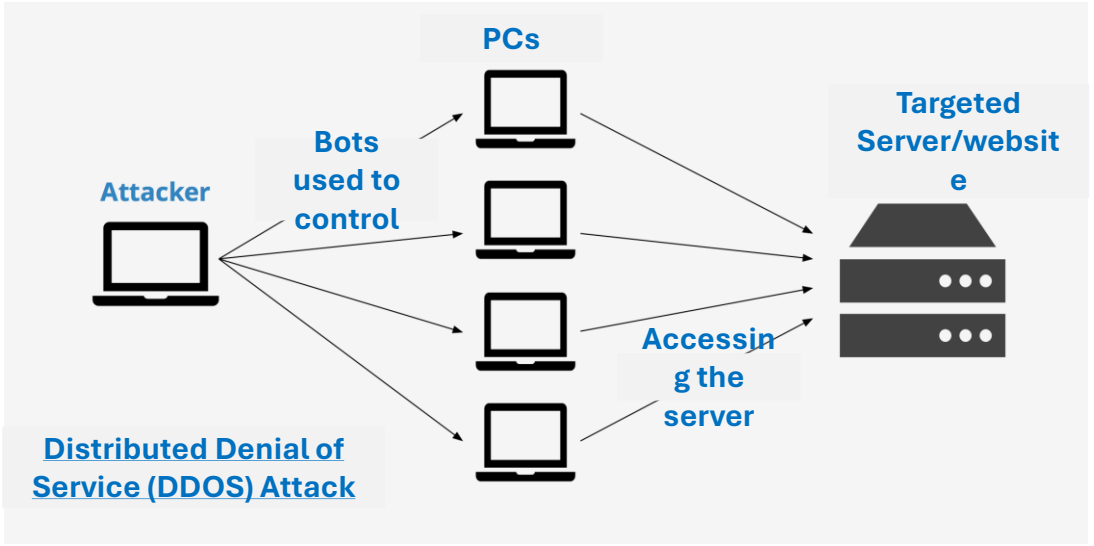
- Use single-sourced devices
- Create fake traffic
- Exhaust server resources
- Occur on a smaller scale



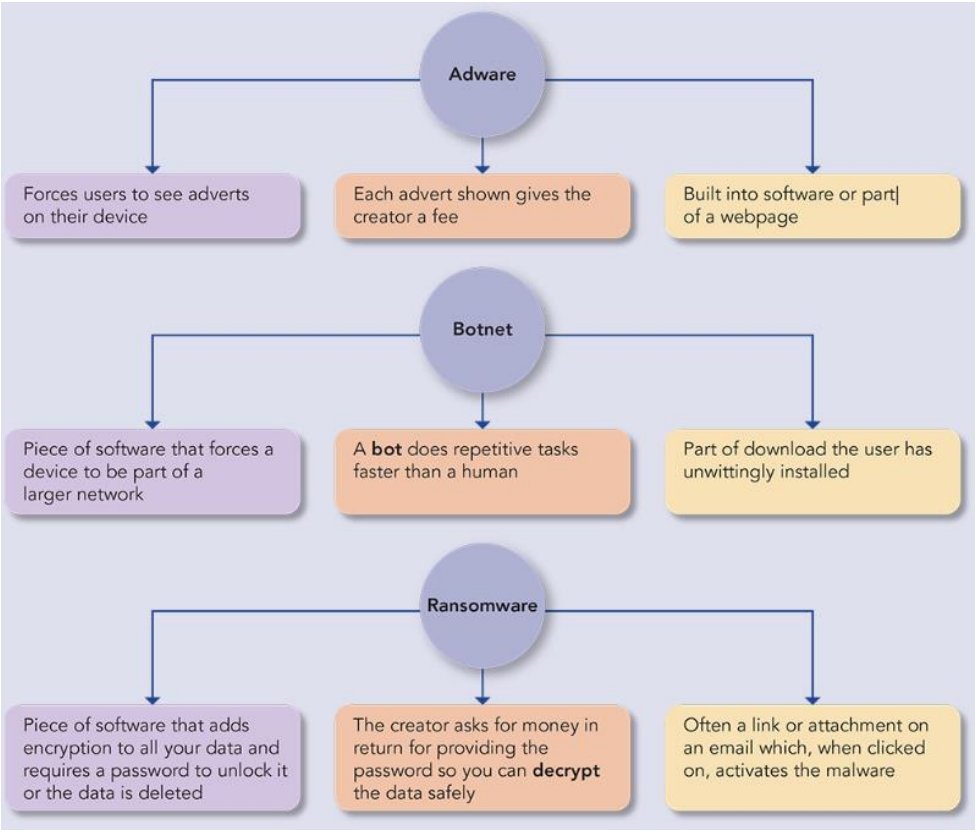
DDoS Attacks

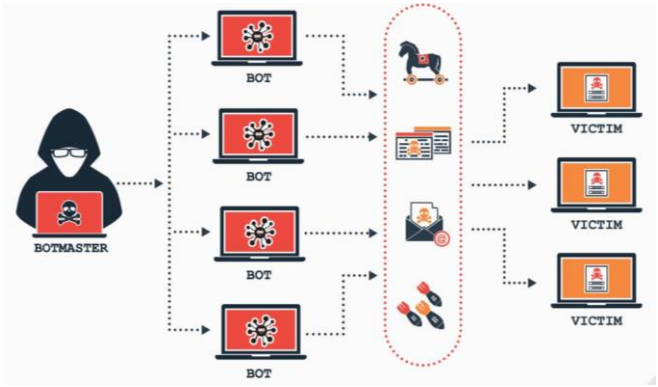
- Use botnets
- Manipulate real traffic
- Overwhelm a network with traffic requests
- Occur on a larger scale

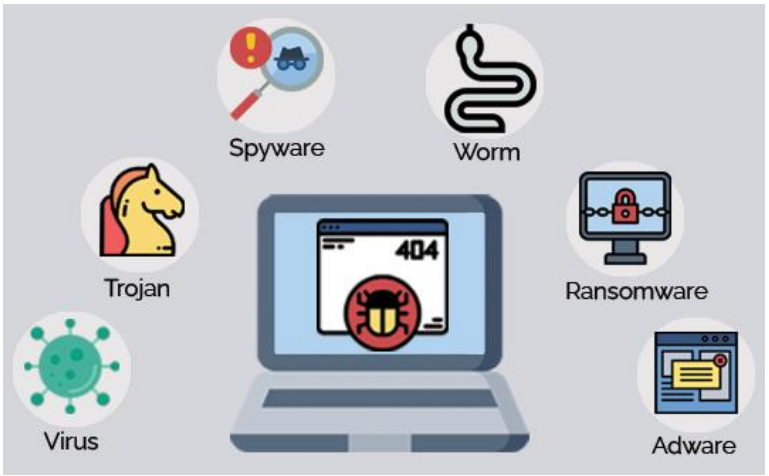


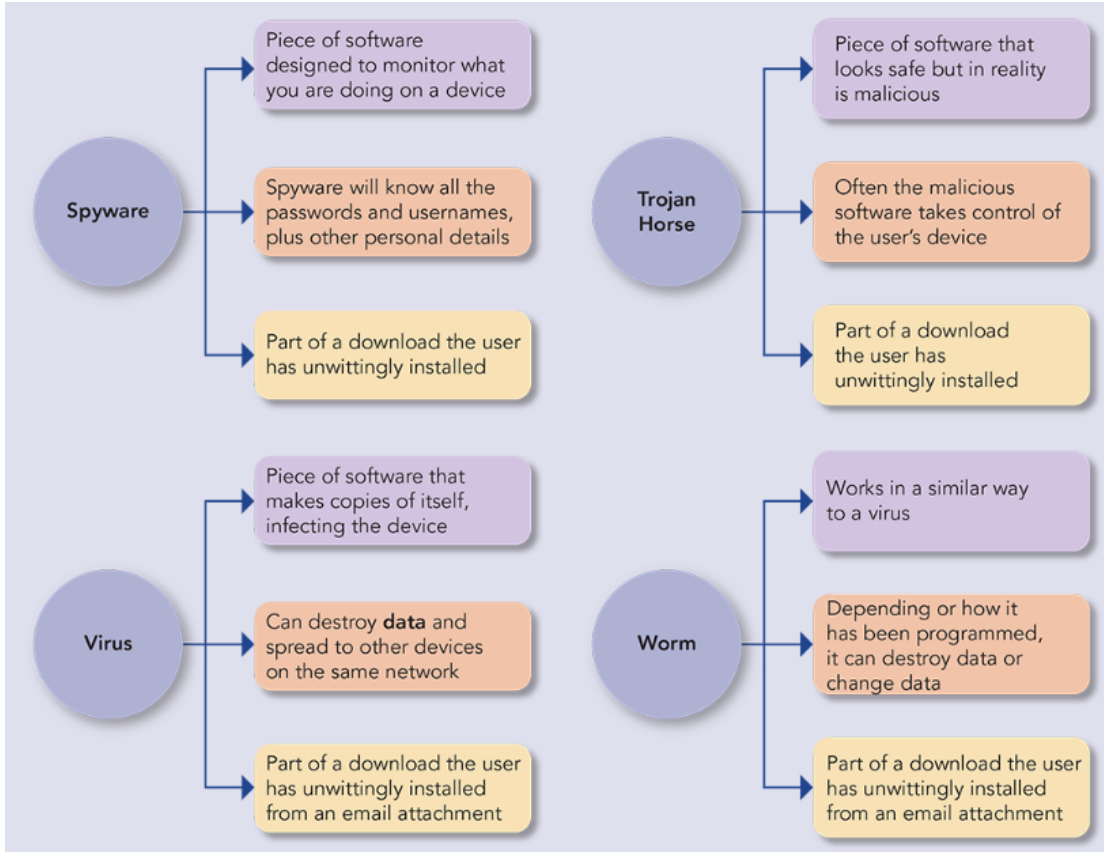


TA4 – Malware


Adware
Forces users to see adverts on their device
Each advert shown gives the creator a fee
Built into software or part of a webpage
Botnet
Piece of software that forces a device to be part of a larger network
A **bot** does repetitive tasks faster than a human
Part of download the user has unwittingly installed
Ransomware
Piece of software that adds encryption to all your data and requires a password to unlock it or the data is deleted
The creator asks for money in return for providing the password so you can **decrypt** the data safely
Often a link or attachment on an email which, when clicked on, activates the malware


BOTMASTER
BOT
BOT
BOT
BOT
VICTIM
VICTIM
VICTIM


Spyware
Worm
Trojan
404
Ransomware
Virus
Adware


Spyware
Piece of software designed to monitor what you are doing on a device
Spyware will know all the passwords and usernames, plus other personal details
Part of a download the user has unwittingly installed
Trojan Horse
Piece of software that looks safe but in reality is malicious
Often the malicious software takes control of the user's device
Part of a download the user has unwittingly installed
Virus
Piece of software that makes copies of itself, infecting the device
Can destroy **data** and spread to other devices on the same network
Part of a download the user has unwittingly installed from an email attachment
Worm
Works in a similar way to a virus
Depending or how it has been programmed, it can destroy data or change data
Part of a download the user has unwittingly installed from an email attachment

TA4 – Social Engineering

Social Engineering

The Art of Human Manipulation



Definition

Social engineering is the act of manipulating people into divulging sensitive information or performing acts that compromise security.

Techniques

Phishing, pretex

Targets

Employees, cust

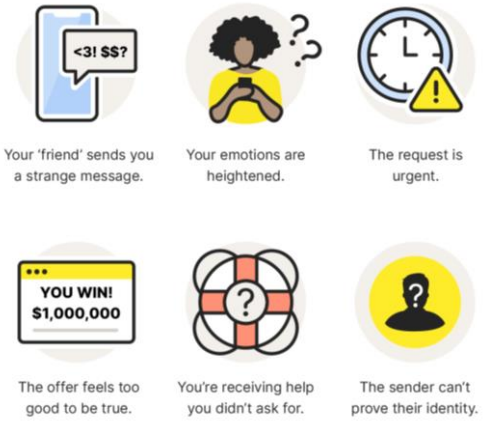
Goals

Targets

Employees, customers, and vendors

Goals

Obtain sensitive information, gain unauthorised access, or commit fraud



Social engineering method	Description	Example
Baiting	Baiting is where the victim is offered something appealing in exchange for information, such as their login details.	You might be offered an account upgrade if your provide your account details.
Phishing	Phishing is using a copy of a website that looks real and sending people a link to the fake site encouraging users to enter their details.	People might be sent a link to a bank's website which is fake in the hope they will enter their account details.
Pretexting	Pretexting is where someone tries to convince a user into giving them information or access to a service or system by pretending they need to confirm the individual's identity.	You might get a phonecall from a company claiming to be your phone company. They will ask you questions to prove your identity.
Quid pro quo	This is Latin meaning 'something for something' and works similarly to baiting.	A good example is when someone borrows your device and not only gains your password but also has the opportunity to install malware.
Scareware	This plays into users' concerns about security and convinces users to install what they think is anti-virus software but is in fact malware.	This occurs when users think they have an issue with their device and are convinced to install something that will solve the problem.
Shoulder surfing	This takes natural advantage of users accessing their devices in public spaces, where they can be seen entering their information.	An obvious example is when the user is at a cash machine. However, this now happens frequently in other spaces such as coffee shops, when users are accessing mobile devices.

TA4 – Impacts and effects of cyber-attack

Impact type	Impact on individual	Impact on organisation
Financial – Loss of money is often linked to any cyber attack.	In addition to losing money, individuals can be impacted in other ways. For example, in using their stolen data, the attackers could take out loans in their name.	Companies might not just have money stolen. If any customer data has been stolen they might have to pay compensation. They might also need to pay to update their system security.
Reputational impact – How you are viewed may change following a cyber attack.	This is commonly linked to identity fraud, where your reputation to others and companies suffers.	A cyber attack can have an impact on how customers view the safety of their data. They could as a result, they use a different company.
Safety – We are relying on digital systems to keep us safe.	Safety could be compromised as part of a bigger cyber attack, for example if the attack was on a hospital. Equally, in the home if an individual has elements of a smart home they could be at risk.	Most companies are reliant on IT systems to support their infrastructure which, if compromised, can impact the safety of their workers, for example in factories or production lines.

Data destruction	This is where the attacker destroys data on the device/network
Data manipulation	This is where the attacker changes data on the device/network such as the amount in a bank account
Data modification	This is similar to data manipulation but the data is changed for a different purpose
Data theft	This is where the attacker steals data on the device/network
Denial of service (DoS) to authorised users	This is where the attacker prevents users from being able to access the device/ network during the attack
Identity theft	This is where the attacker steals personal details with the aim of committing fraud

TA4 – Cyber-attack prevention methods

Physical Methods
hardware/RL

- **Biometric** devices
- Firewalls
- Keypads
- RFID
- Secure backups





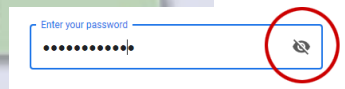
Logical Methods
software/digital

- Access rights and permissions
- Anti-virus/-malware software
- Two-factor authentication (2FA)
- Encryption
- Firewalls
- Secure back-ups
- Usernames and passwords

Secure Destruction of Data

- Data erasure
- Sanitation
- Magnetic wipe
- Physical destruction

Save over data



Magnet over disk



TA4 – IT Laws & Legislation 1

Computer Misuse Act



It is against the law to gain access to a system without permission in order to commit a crime, change the data or the system with the aim of causing damage or gain access to computer files without permission.

This is punishable by a large fine and/or prison. Most companies have a network user agreement in place, or a similar policy, which tells staff what they can/cannot do on the computer system.

Copyright, Designs and Patents Act



It is against the law for someone to copy your work (image, file or sound) without permission. As an individual or business, if you can prove they have copied your work then you can prosecute them under this law.

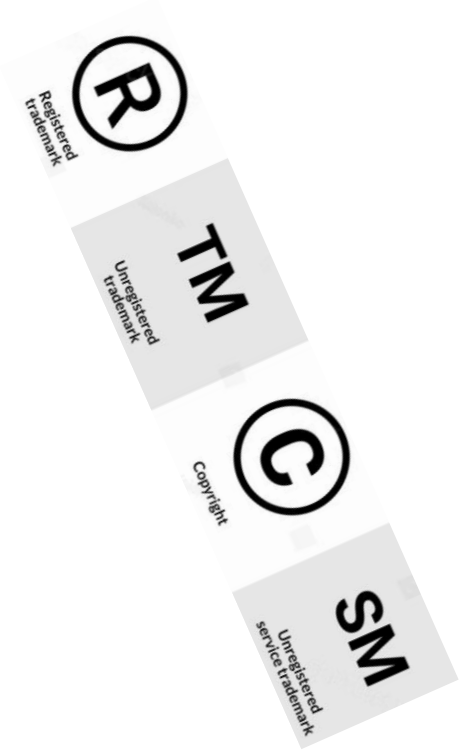
A common example of this is illegally copying and sharing media (music or films) or software.

Freedom of Information Act



This gives individuals or other organisations the right to ask to see specific information that is either held about them or about a specific activity. For example, the ambulance service could be asked a question about how much it costs to support a music festival and if they get any help towards these costs. An organisation can refuse to answer these requests if it is deemed unreasonable, for example if a specific question was asked about its security system.





TA4 – IT Laws & Legislation 2

Data Protection Act



This gives individuals some security about the data an organisation holds about them and how that data is accessed and stored. The Act lays out clear guidelines about what data can be collected, who can access it and how long it can be stored for. If these are not followed, then the organisation can be heavily fined.

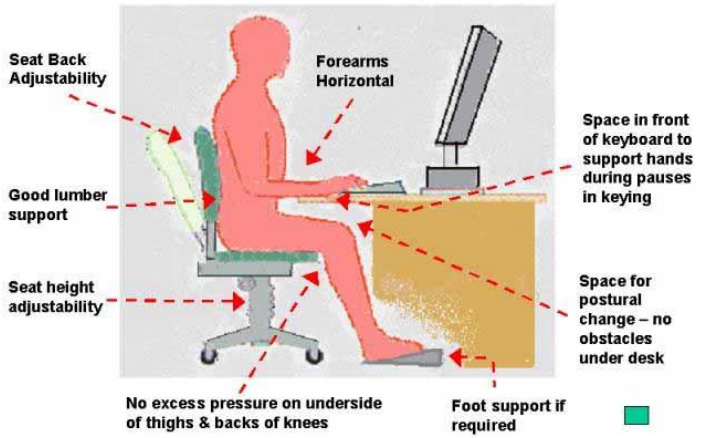
Breaches of the Data Protection Act have resulted in data being lost and compensation made to the affected individuals.

Health and Safety at Work Act

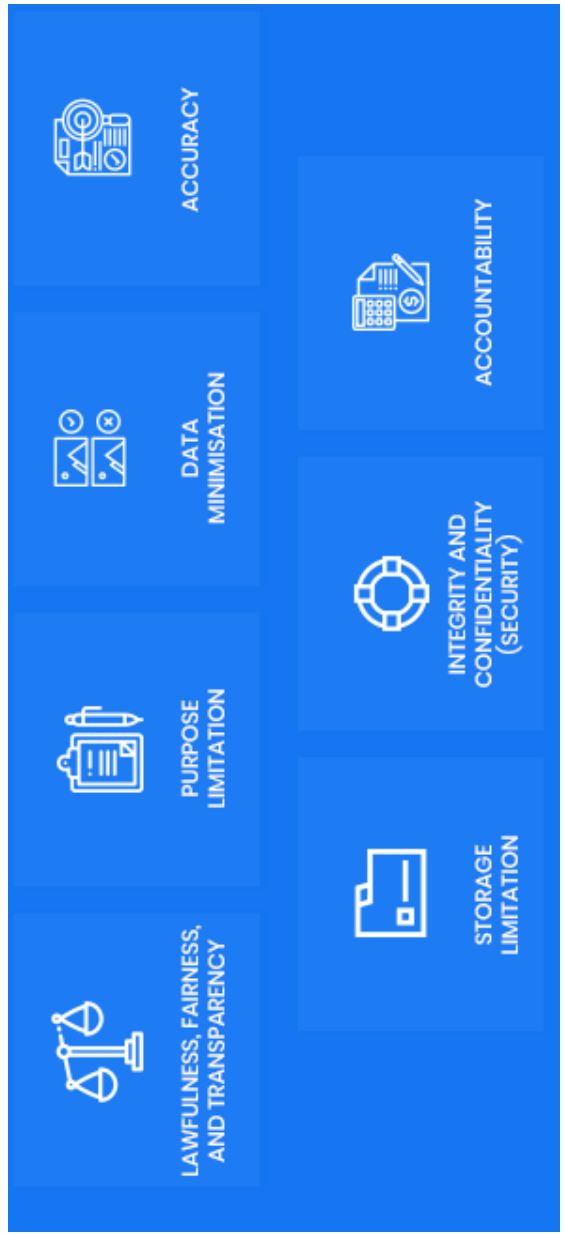


This Act focuses on keeping employees safe at work. This could include the safe use of IT equipment, such as appropriately sitting in front of a computer. It could also include ensuring that any IT-controlled systems do not risk workers' health if there was a cyber-attack. For example, the heating could be centrally controlled by an IT system.

Naturally, this has a cost implication for the business and there is a link to data protection if there was a data leak about staff.

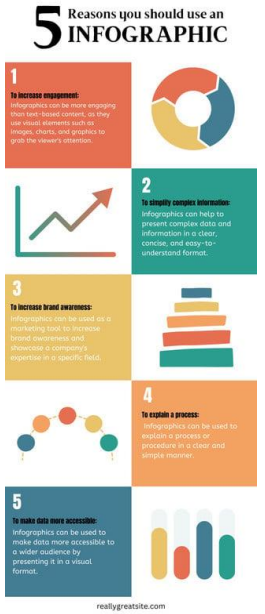


Data Protection Act Principles



TA5 – Types of Communication

Communication method	Advantages	Disadvantages
Audio: Communication using only sound, for example, podcasts.	• Information can be shared instantly and with multiple people. • Files can be copied for ease.	• Not interactive. • Dependent on audio quality. • Some people prefer having an image as a reference.
Collaboration tool: Multiple people can work on the same project at the same time, for example, Microsoft Teams.	• Time and costs are saved. • People are more productive.	• Relies on having an internet connection. • Can be isolating.
Leaflet: Popular method for sharing written and visual information.	• Cost-effective to create and distribute. • Can be tailored towards the intended audience. • Can contain both images and text.	• Leaflets do not have a long-term impact. • Can be ignored and disposed of.
Newsletter: A written or visual update about a specific topic, sent to interested readers either in print or electronically.	• Is adapted for the intended audience. • Can be cheap to create.	• Takes time to make. • Not always read.
Infographic: Collection of images, charts and textual data. Organised so the topic is clear to the audience and easily understood.	• Good at attracting attention. • Easily adjusted and shared with your audience. • No specific format or template – can be very creative.	• Takes time to create. • Information can be misinterpreted. • Information is not easily accessible by some audiences.









Communication method	Advantages	Disadvantages
Presentation: A simple and clear way of providing information to a large audience containing visual cues and minimal text.	• The contents and format can be adjusted to suit the audience.	• Limited by location, unless recorded or streamed live. • Only as effective as the presenter.
Report: A text-based format which provides an account or summary.	• Great for sharing detailed data. • Tailored to suit the intended audience.	• You may need to be a specialist to understand the contents.
Social media: An online platform to share ideas, thoughts and information.	• A global method that has no/low cost resulting in direct contact with a large audience.	• It is only accessible via the internet. • It is not always accurate.
Video: Clear verbal and non-verbal communication that uses a combination of images, motion, sound and text.	• Can combined with other communication tools. • Can be adapted for the audience. • Can be shared easily on a range of platforms.	• It can lack any personal elements. • It can be expensive to make especially if you want it to look professional. Whilst difficult, some could edit the video for other reasons.
Website: An online way of sharing other communication tools as well as images and text to a global audience.	• Adaptable and accessible to all.	• Reliant on an internet connection. • Information may be inaccurate, biased or out of date.
Voice-over Internet Protocol (VoIP): Rules that allow the user to make phone or video calls over the internet.	• Cheap. • Allows for group calls.	• Reliant on a strong internet connection and all participants having the same software.

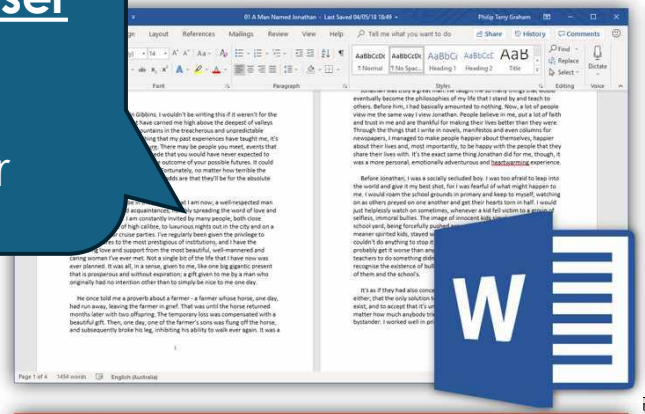
TA5 – Office Applications

Remember it!

- Most software will have similar tools for editing text, inserting images and so on.
- What makes each software different is how these tools are used to create the required documents.
- This software can be used on a range of devices including Macs, PCs and mobile devices.

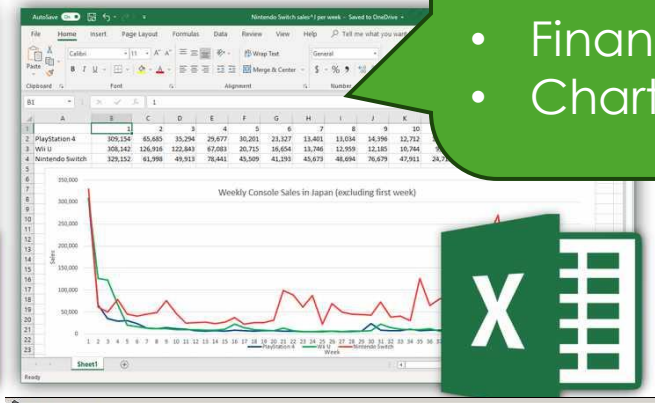
Word processer

- Letters
- Reports
- Newsletter



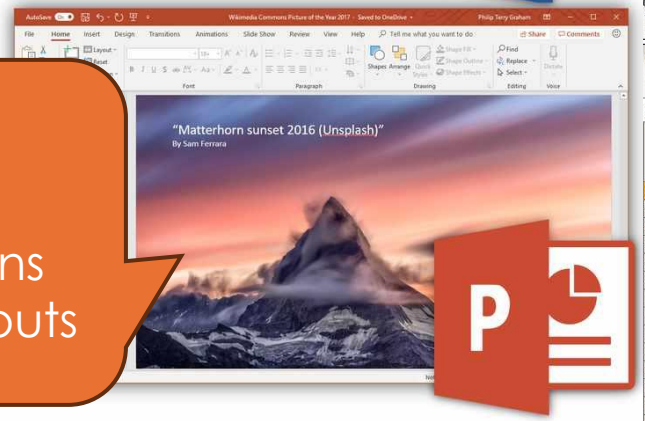
Spreadsheet Software

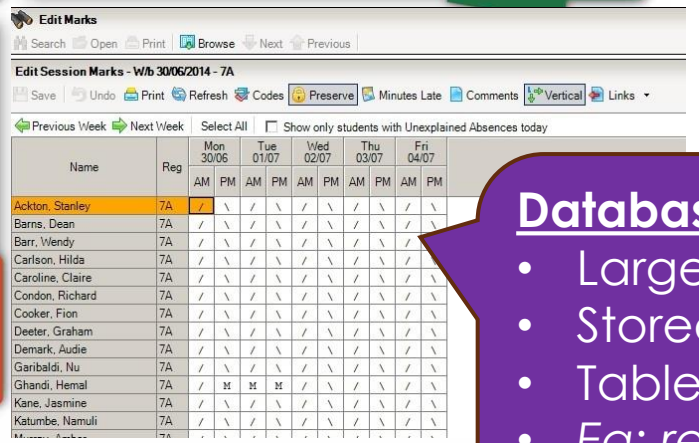
- Small amounts of data
- Calculating figures
- Finance
- Charts



Presentation Software

- Presentations
- Slide handouts





Database

- Large amounts of data
- Stored in tables
- Tables/data linked
- *Eg; registers linked to pupil address*

TA5 – Desk Top Publishing Software

Range of customisable font tools to edit and enhance the text.

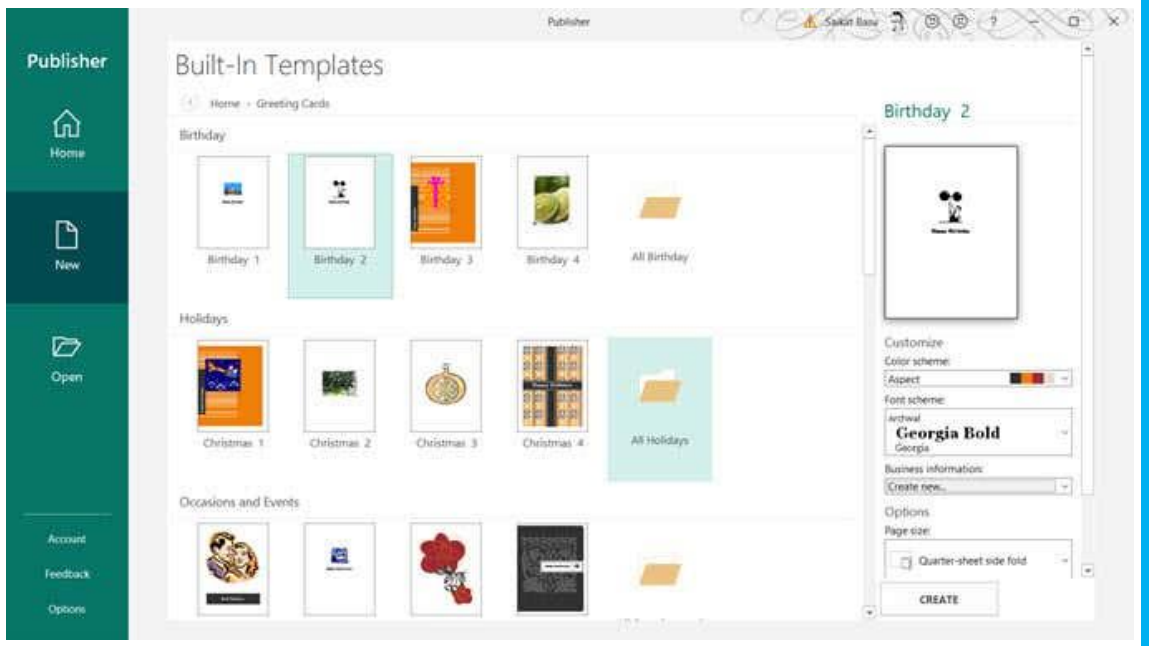
Objects such as tables and shapes can be inserted to improve the layout of the information. Objects can be easily moved around the page.



Organisation of pages – the order they appear, each clearly labelled.

Margins included so you know how close to the edge you can go before it won't print or to use to help divide up the page.

Wide variety of pre-designed and editable templates available to suit the type of document needed.



Remember it!

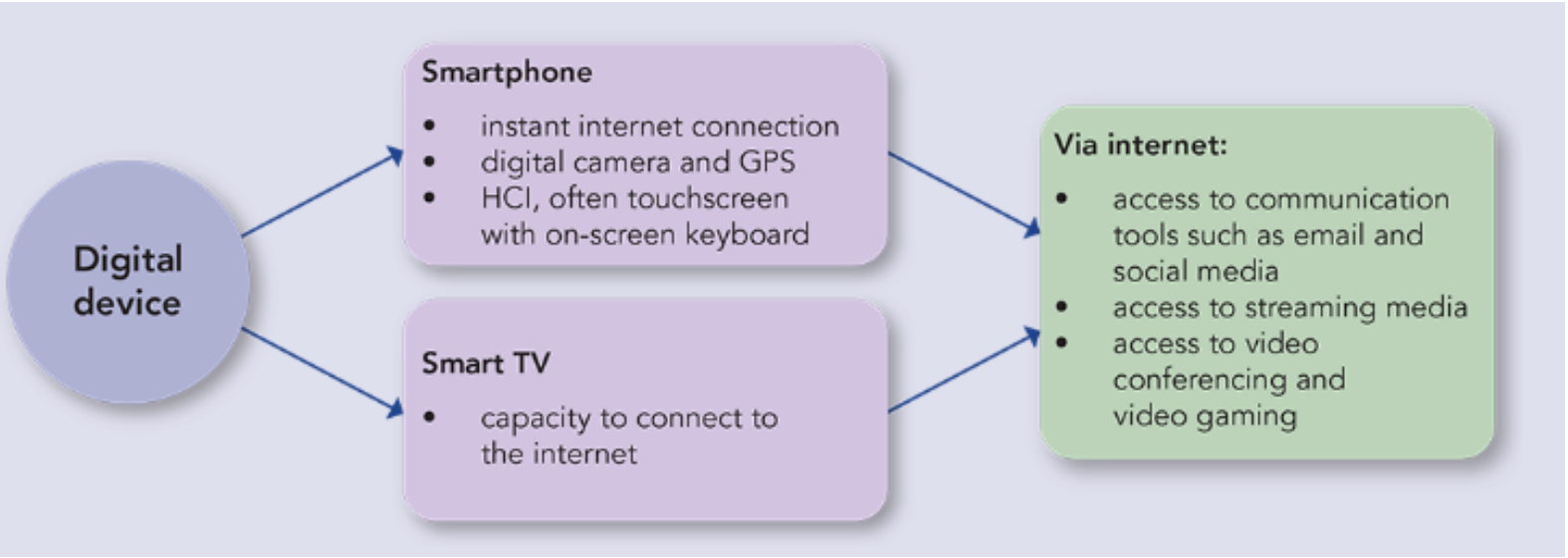
- Sometimes referred to as DTP.
- Key characteristic is the volume of pre-designed templates already available.

TA5 – Digital Devices









Device	Characteristics
Laptop/PC	• Internet connection available, wired and wirelessly. • Can connect a range of **peripheral devices**, including additional displays. • Can be enhanced by additional extras such as extra storage. • Can improve existing elements such as the graphics card.
Tablet	• Shares many characteristics with a **smartphone** and a laptop. • Seen as a handy alternative to a smartphone as it has a bigger screen but without the ability to make phone calls. It does however have the ability to use VoIP.
Smartboard	• Often seen in educational spaces. • Features enhance a presentation such as being able to write on screen and will convert the handwriting to text. • Features allow the user to interact with the presentation, as well as record and share the presentation at a later date.

TA5 – Distribution Channels



Description	Advantages	Disadvantages
Mobile app		
Provides a service or experience for either a work or social reason.	• Large range available. • Can be simple to create. • Quick to download and access. • Updated regularly.	• Needs internet to download. • Advertising can be irritating. • Can cause issues with time management and health. • Security risk as others could have access.
Multimedia		
Combines text, images, animation or video into a single element to provide content.	• Adaptable for any audience. • Author can be creative. • Content can make the topic realistic.	• Access reliant on file format. • Costly to create. • Time and skill needed to create content.
VoIP		
Primarily a method of distributing audio content over the internet.	• Global availability. • Can allow multiple users. • No specific hardware or software needed. • Low-cost.	• Reliant on an internet connection. • Issues if connection not strong enough.
Website		
A file hosted online that contains a range of different media.	• Low-cost. • Plenty of support available if inexperienced at creating one. • Global audience.	• Content must follow Copyright, Designs and Patents Act. • Needs to be secure so no one can edit the contents.

Description	Advantages	Disadvantages
Cloud		
Online storage of documents.	• Allows collaboration on documents from any location. • Multiple users can edit files with available support.	• Needs internet connection. • Not easy to access on some devices. • The provider of the cloud storage also has access.
Email		
Electronic messages that can be sent and received including attachments of necessary files.	• One message can be sent to multiple users. • Messages can be formatted. • Accessible on a variety of digital devices. • Automatic replies can be set up for when you are unavailable.	• Needs internet connection. • Can be used to spread malware. • No confidence the user has received or read the email.
Messaging		
Instant messages that can be sent/received. Can be multimedia not just text.	• Instantaneous. • Can be sent to a selected group. • Accessible on a variety of digital devices.	• Can be a security risk depending on messaging service. • Some can contain malware.



TA5 – Distribution Channels Connectivity



Bluetooth®



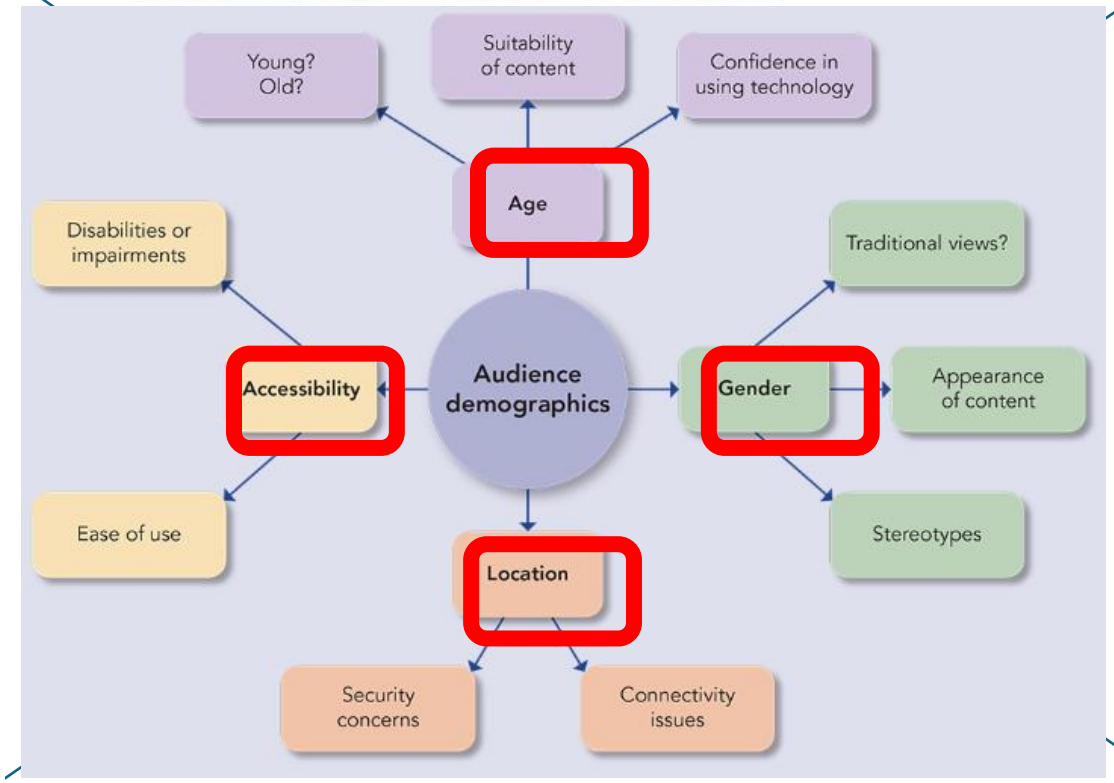
Method	Advantages	Disadvantages
4G/5G		
Uses the existing phone network to access internet without needing a Wi-Fi router.	• Connectivity available as you change location. • High speed and can handle a large amount of data transfer.	• Expensive if transferring a large amount of data. • Not all locations have suitable coverage.
Bluetooth		
Uses a specific radio frequency to transmit data over a short distance.	• Minimal interference. • Uses limited power. • Cheap and has no additional costs involved.	• Not very secure. • Only works over a limited distance. • Connectivity can vary depending on conditions.
Mobile Wi-Fi hotspots		
Often found in public places or by using your smartphone as a **hotspot**; relies on using 4G/5G signals.	• Allows you to be flexible in where you can access data.	• Not very secure, so unsuitable for accessing confidential data. • Can have additional costs. • Potentially slow speeds.
Wi-Fi		
Connectivity to the internet without using a cable; uses an access point or a router to create the connection.	• Security can be enhanced, especially if you control the Wi-Fi network. • Allows flexibility in accessing data.	• Has a limited range. • User can experience interference. • Not always secure.
Wired		
Direct connection to an access point or router using an ethernet cable; this is a direct internet connection.	• No interference to the internet connection. • Data transfer is quicker. • Data is more secure as it cannot be intercepted by an attacker.	• Cost of ethernet cabling. • Limits movement so not always convenient. • Not all devices support a wired connection.

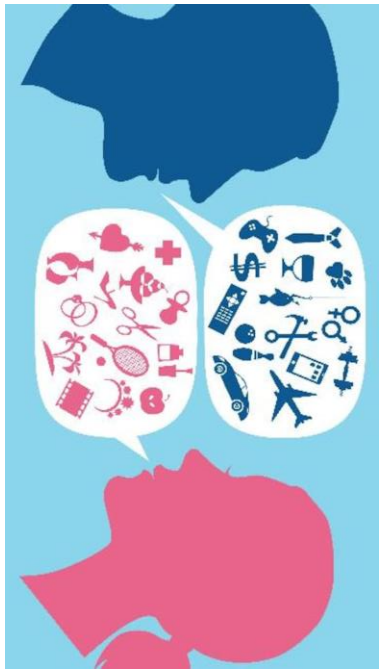
TA5 – Audience Demographics









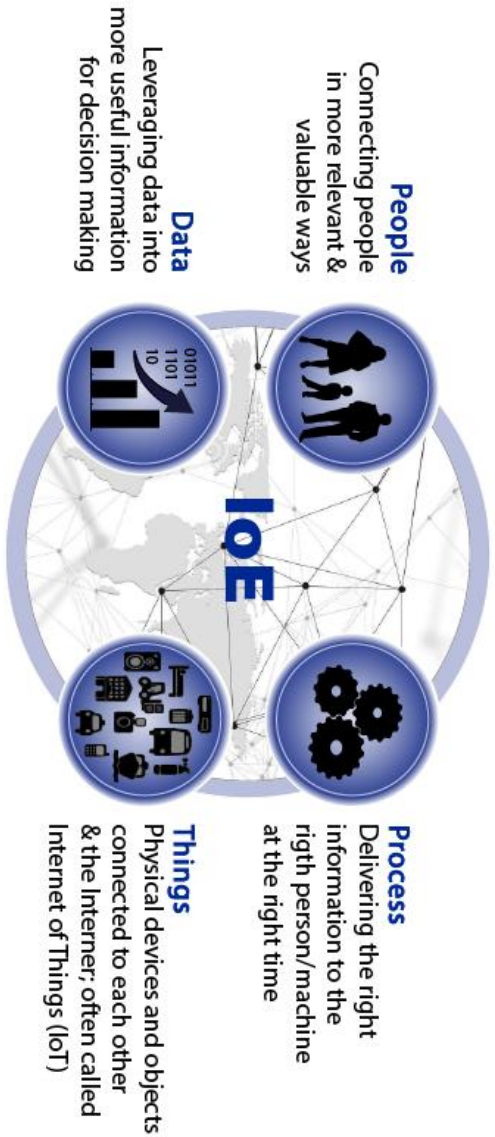






TA6 – Pillars of (IoE) Internet of Everything

- All four pillars are needed for the IoE to work.
- A good internet connection is needed.



Data

- Data is collected as people use their smart devices.
- Examples include: time of use, how long the device/app is used, health data, location data.
- Data is collected and then analysed (processed).
- There are concerns about security because of the amount of data collected, and the way it is collected.

People

- People use smart devices to connect with other people as well as applications.
- People are creators of the data and consumers of the information that is generated.
- People are wearing more technology such as watches, VR headsets and even glasses.
- Clothing is becoming smart as fabric becomes integrated with technology. For example, smart sportswear to help with airflow.
- There is a concern that we are becoming too reliant on smart technologies.

Process

- Process plays a key role in delivering the correct information to the right person or device at the required time.
- Data often needs to be processed in or near real time for it to be useful.
- Once data has been analysed, the analysis can be shared so that the technology can be improved.

Things

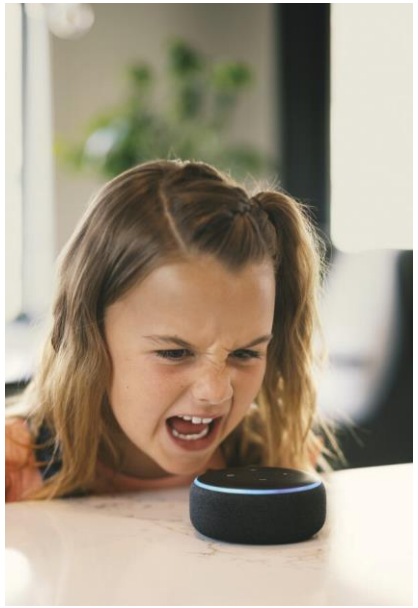
- This is the foundation pillar of the IoE, often referred to as the **Internet of Things**.
- These are the physical devices that are connected to each other through the internet.
- Each device will sense, record and gather data from the user.
- Not all smart devices are communication devices such as smartphones. A fridge or a washing machine can be a smart device.

TA6 – IoE Interaction



Device to device

When part of a network, digital devices communicate with each other. This is because they are sharing data with each other. For example, a series of smart speakers will communicate with a smart TV or other smart device in order to play audio.



Human to device

Users interact with digital devices in a variety of ways and give commands. The one thing the devices have in common is they all have a Human Computer Interface (HCI). This could be explicit through the device's HCI or it could be through a sensor. For example, smart-enabled gym equipment will use sensors to monitor and record the progress of the user.

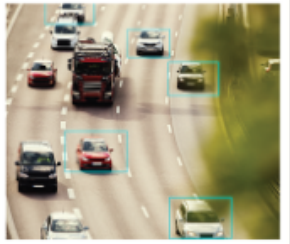


Tailoring digital devices

Most smart devices that are connected to the IoE can be tailored to meet the needs of the user. Without this tailoring, the appeal of the IoE reduces. For example, a smart heating system can be tailored to suit the homeowner's time spent at home so that the heating is on only when the owner is at home and/or below a specific temperature. A second example is how the devices are accessed and/or notified by the user. This can include naming the devices; personalising their appearance or sounds; personalising their response.

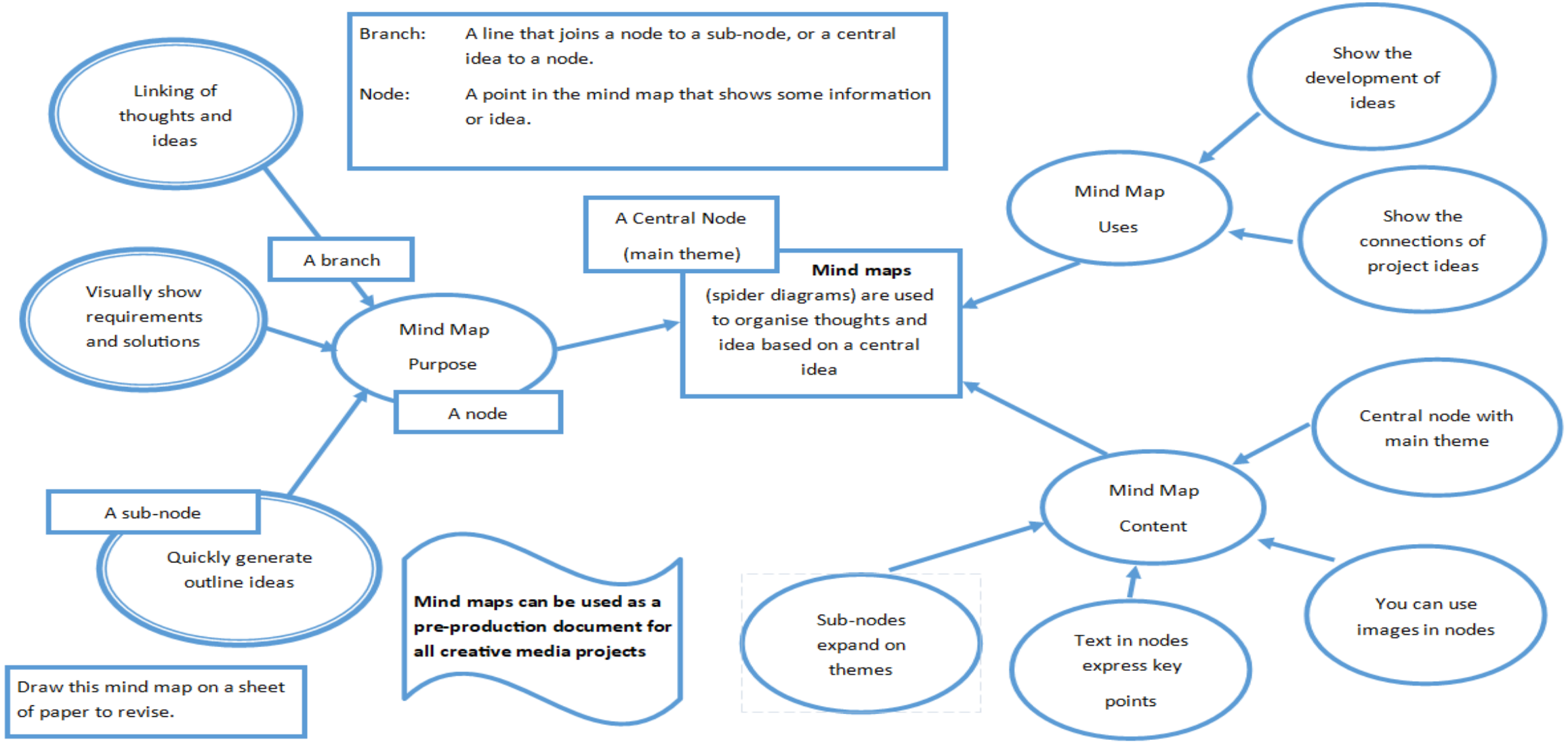
TA6 – IoE in Everyday Life

Application area	Description	Advantages	Disadvantages
Energy management 	Used in the home to monitor usage of gas and electricity; used across the country to ensure adequate supply available.	• Bills are more accurate and companies save money on not having to send out staff for meter readings.	• Not all companies use the same meter. This makes swapping provider tricky. • Some meters are hard to read/use, especially for older generations.
Health 	Used to monitor people's wellbeing such as heart rate or sugar levels; doctors are able to monitor a patient remotely in real time.	• Any issues can be noticed quickly and acted upon. • Reduction in patients needing to see a doctor as frequently as the doctor has real-time access to the information.	• Privacy of information a concern in case of a security breach. • Cost of medical equipment. • Strong internet access required at all times especially if it is life-saving equipment.
Manufacturing 	The IoE has already had a huge impact in this area by making manufacturing more effective and accurate, such as the ability to mass-produce items 24 hours a day.	• Deadlines are easily met. • Health and safety of the workers is improved. • Greater output of products with fewer quality concerns.	• Not everything can be manufactured by machine – some human input is needed. • Not all equipment can be used as part of the IoE. • Competitor spying is a concern.

Application area	Description	Advantages	Disadvantages
Military and emergency services 	The IoE makes it easier to respond to situations, especially with the use of location services such as GPS and greater connectivity.	• Quicker and more accurate response to emergency situations. • Greater availability of information about what is happening through CCTV and similar.	• Security risk not just in responding to an incident but also with the equipment involved. • Concern about the security of the information.
Smart devices (home, business, personal) 	Large range of devices designed to help in a number of ways from performing automated tasks to collecting data in order to improve customer service.	• Tasks can be performed hands-free. • Time and money can be saved by some tasks being done automatically. • Users can be more efficient, especially in their daily routine.	• Concerns about the devices always being active and therefore picking up information that is sensitive. • Smart devices can be expensive and not all are easily accessible.
Transport 	In using the IoE with transport, the aim is that routes can run more smoothly and on time. For example, aircraft landing and taking off at an airport or using smart motorways to control events on a busy route.	• More journeys can take place because of the controls. • Any incidents can be solved or traffic rerouted where appropriate. • Accurate travelling times.	• Security risks that could put lives in danger. • The infrastructure might not be suitable. • Not all modes of transport can join the IoE.

Year 11 – Cambridge National IT - Mindmap

You must be able to understand the purpose and use the content of different pre-production documents



Year 11 – Cambridge National IT - Visualisation Diagrams

You must be able to understand the purpose and use the content of different pre-production documents



Visualisation Diagrams

Visualisation diagrams are a rough drawing or sketch of what the final static image product is intended to look like. They will have annotations to describe the design ideas. Typically, a visualisation diagram is hand drawn, but it does not need any artistic skills to communicate ideas.

It is intended to demonstrate the layout and content of the product that is being illustrated

You might produce several drafts to demonstrate ideas to your client. Your client might choose the draft they like the most. There must be sufficient information in the visualisation diagram for the client to make a decision about their preferred design.

Visualisation diagrams are valid for static designs, that is an image that does not move. It is, therefore, relevant for designs such as a magazine cover, a DVD cover, or an image for a website. It would not be suitable for a video or an animation.



Look closely at the detail in the example visualisation diagram. Compare the concepts in the visualisation diagram and compare them to the final product that was produced. Do you notice the similarities and the differences.

Notice how the visualisation diagram was not modified as ideas developed in the pro-

Purpose:

- ⇒ Plan the layout of a static or still image in a visual manner
- ⇒ To show how a finished item might look like

Uses :

- ⇒ CD/DVD cover design
- ⇒ Poster, such as for a film, event, leaflet or advertisement
- ⇒ A single game scene of display of a single scene
- ⇒ Comic book page layout
- ⇒ Web page layout
- ⇒ Magazine front cover

Content:

- ⇒ Multiple images, layout and positions of items.
- ⇒ Colours and colour schemes
- ⇒ Position and styles of text
- ⇒ Fonts, font colours and size
- ⇒ Notes as annotations which provide

Year 11 – Cambridge National IT - Flowcharts

Key Vocabulary	
Algorithms	A set of rules or instructions to be followed.
Flowcharts	A graphical way of showing an algorithm.
Selection	Deciding what code to run based on a decision or answer to a question. E.g an IF statement.
Sequence	A set of instructions that are completed in the exact order that they are written.
Iteration	Where a set of instructions is repeated. E.g a while loop, for loop and repeat until loop.
Input	Data that is given to the computer or program to then use.
Output	Information that is provided by the computer or program.
Procedure	A group of instructions grouped together that can be used by the main program.
Variable	A name given to a value in a program that can change when the program is running.

Data Types

Real /Float
Number with decimal Point

Integer
Number without a decimal Point

String
A series of characters/TEXT

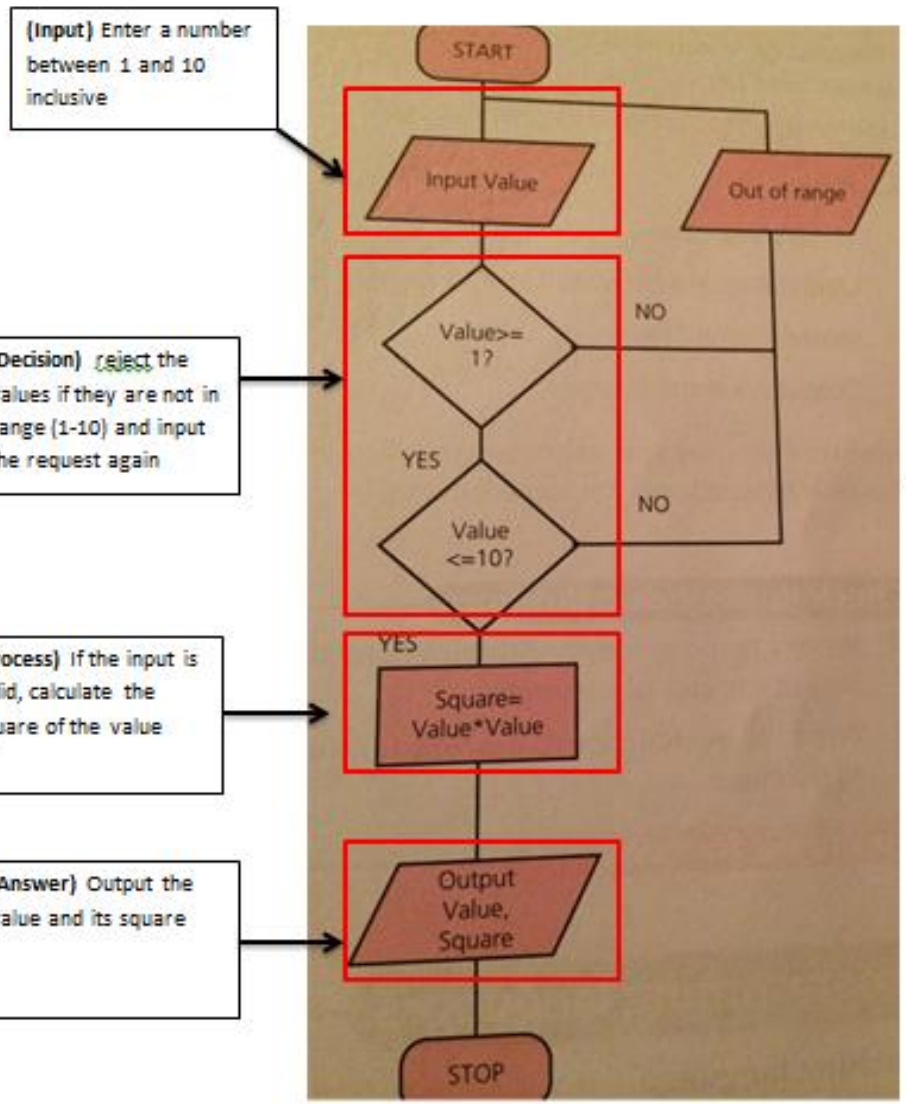
Character
A single letter or symbol

Date/Time
Date and Time in any format

Boolean
Yes no, true false value

Flowchart Symbols	
	Used at the start and end of a flowchart.
	Controls all the inputs and outputs.
	General instructions and calculations carried out by the computer.
	Where a question/decision is asked. Must have a 'Yes' and 'No' output.
	Used to connect flowchart symbols to show the direction of flow in the program.

Year 11 – Cambridge National IT - Flowcharts



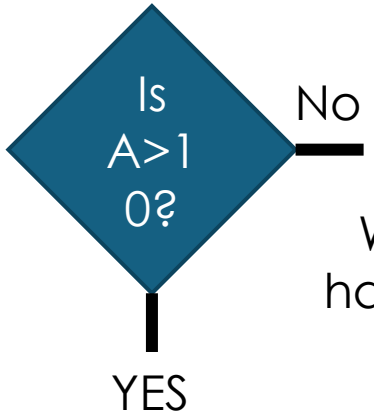
START/STOP

Always start and end with this

INPUT/OUTPUT

Use when there is an input or output required e.g. user inputs their name, program displays their name

Decision



When a **choice** has to be made in the program

SUB ROUTINE

Sequence that performs a specific task. You can use this within your flowchart to show more detail in a specific section

PROCESS

To do something in the program e.g a calculation



Flow lines – show the flow of information in the algorithm

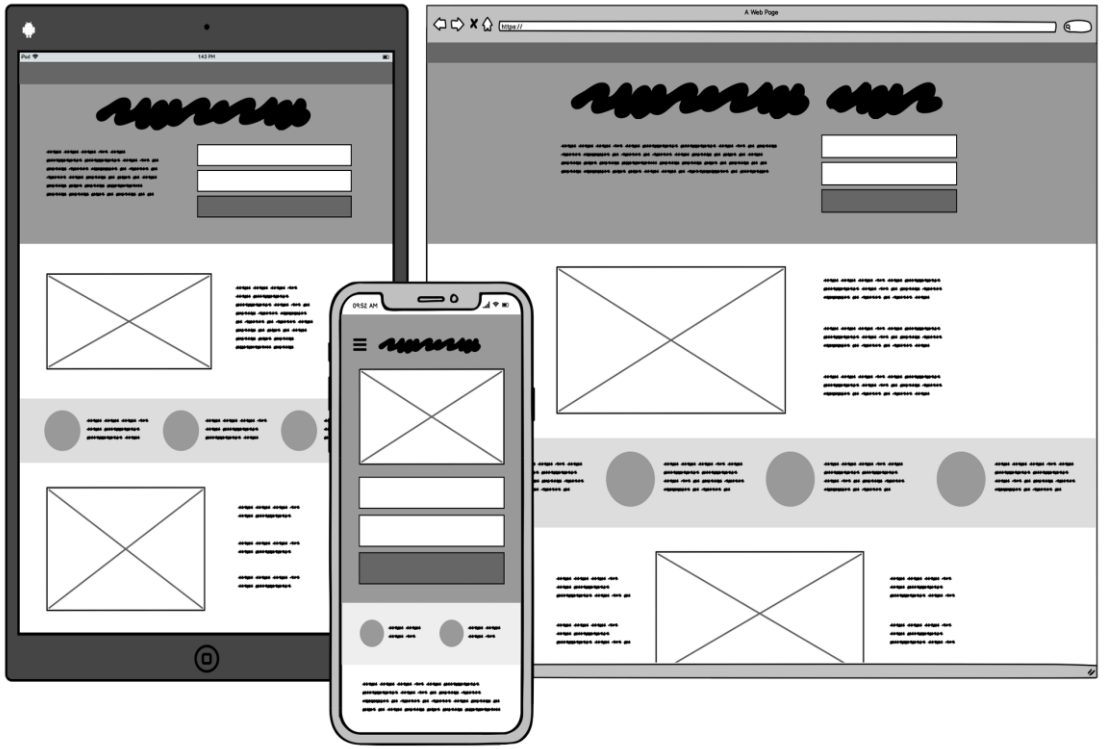
Year 11 – Cambridge National IT - Wireframe

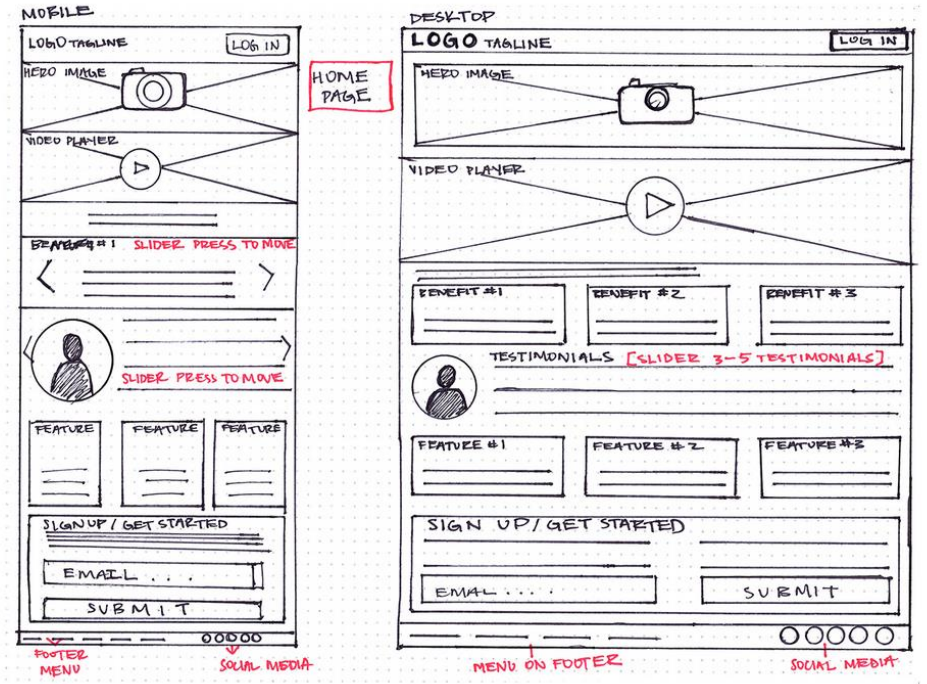
What is a wireframe?

A sketch or a guide before you build an actual form/document

A ‘skeleton graph’ that shows how the contents will be laid out.

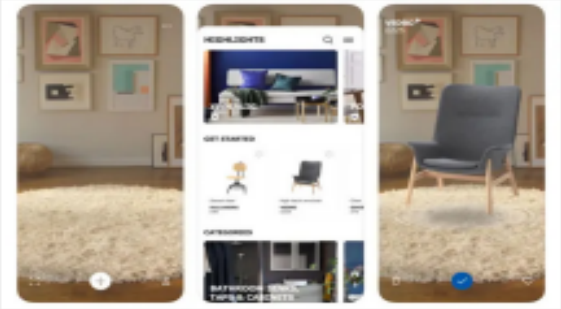
Frames with no colours, images or any graphics.





Year 10 – Cambridge National IT – Introduction to Augmented Reality

Augmented reality is a new technology where companies have developed software on a higher scale than ever for mobile phones and proprietary devices. This is in order to allow users to see the real world overlaying additional information onto the scene. For example, augmented reality allows users to see the real world with trees blowing in the breeze, dogs chasing after a ball, or children playing football, dogs playing with a digital version of themselves or children playing with an alien goalkeeper when scoring a goal.



With the latest developments in augmented reality, the technology is used regularly in shopping apps such as Argos and IKEA, as well as with product apps such trainers including Nike. This software allows the customer to see items of furniture in their rooms before making a purchase.

The most well-known use of augmented reality in the 2010s is *Pokémon Go*, where users searched for *Pokémon* in the real world by throwing *Pokéballs* at *Pokémon* in an augmented reality world. Between 2016 and 2020, the app has been downloaded 1.1 billion times making $4.34 billion in revenue during the same period.

Examples of augmented reality:

- Navigation systems use augmented reality to superimpose routes over a live view of the road.
- During football games, broadcasters use augmented reality to draw lines on the pitch to show and analyse movements and how the goal was scored.
- Military fighter pilots see an augmented reality projection of their height, speed, and other data on their helmet visor, which means that they do not need to waste focus looking down to see the information on their data panels.
- Sometimes, neurosurgeons use augmented reality projection of a 3D brain to assist them in performing surgery.
- At historical sites such as Rome in Italy, AR can be used to project scenes of ancient civilizations over today's ruins, bringing the past to life.
- Airport ground crew at Singapore's Changi airport wear AR glasses to see information on the goods being loaded into the hold, speeding up loading times.

Advantages and disadvantages of AR

Advantages	Disadvantages
The best of both worlds: combining the digital world with the real world.	Privacy and security concerns: collecting private and personal information about the users.
Virtual communication: improves digital communication by making it more immersive with virtual information.	Intrusiveness issues: the software records the world around the user which raises questions regarding taking photos of the public.
Supports business activities: retailers can use augmented reality to display their products.	Promotes dangerous behaviour: by focusing on augmented reality information accidents could happen in the real world.
Extends smart devices so they play an additional role in users' lives.	It can be expensive to install and maintain augmented reality software and hardware.

Year 10 – Cambridge National IT – Purpose of AR

What does augment mean?

- enhance
- alter
- make more effective.

What does real-world environment mean?

- our surroundings
- our planet
- our world.

What does reality mean?

- natural
- real.

The sectors where AR can be used in

- architecture
- education
- entertainment
- retail
- lifestyle.

The uses of AR:

- training
- virtual tours
- marketing
- visualisation of designs, interiors, and concepts



What is AR and what is its purpose?

- Technology:
  - overlay of computer-generated inputs:
    - text
    - graphics
    - photographs
    - audio
    - video.



Forms of reality

- Augmented reality:
  - the overlaying of computer-generated inputs onto a real-world environment.
- Mixed reality:
  - the interaction of computer-generated inputs with physical objects in the real-world environment.
- Extended reality:
  - a term used for all forms of real and virtual environments.
- Virtual reality:
  - a computer-generated simulated environment.

Year 10 – Cambridge National IT – Types of AR

Types of AR:

- object recognition/marker-based
- location-based/markerless
- superimposed (sometimes referred to as superimposition).

Types of augmented reality applications



Consideration when Designing Types of AR

- Questions to ask:
  - What content do we want to display on the live camera view?
  - Where should we place the content within the user's view?
- Answers dependent on:
  - AR software application being used – each require different user interaction.

Markerless

- More versatile than marker-based.
- More adaptable to a wider variety of functions/activities.
- The user decides where to place virtual object.
- It relies on device's hardware to gather information.
- An accelerometer detects the orientation of a smart device.
- A digital compass:
  - is a sensor that finds direction
  - uses Earth's magnetic fields
  - always finds North.
- GPS (global positioning system) uses satellites to establish the location of an object.

Object recognition/marker-based

This is the use of specifically designed markers to trigger augmented experience.

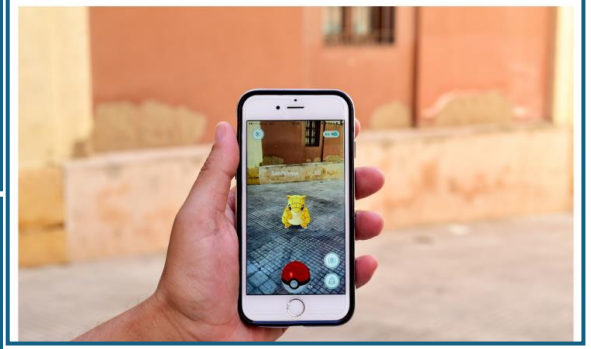
- Markers:
  - visual prompts
  - trigger virtual object/information
  - created using distinct patterns
  - act as anchors.
- Triggers:
  - activate AR experience.
- Anchors:
  - objects recognised by AR software.

Superimposed

- Uses object recognition.
- Replaces original image partially or fully.
- Used a lot in healthcare sector e.g. to superimpose x-ray onto patient's body.



Markerless



Location-based

- Digital content tied to specific location.
- Often used for navigation.



Year 10 – Cambridge National IT – AR interaction

Types of user interaction/layers

- static
- interactive.

Types of user interaction

- User interaction:
  - reflects the real user experience after an interaction with the user interface
  - experiences are generated by the user.
- Design consideration:
  - think about how the user is going to interact with the AR app
  - depends on the devices they are going to use.

Layers

- Layers contain information and/or objects laid on top the real world viewed by the user.
- Static:
  - digital content such as text, 3D models and visual cues
  - appearance does not change during user interaction
  - no display of continuous movement.
- Interactive:
  - digital content such as animation and videos
  - changes appearance during user interaction
  - changes continuously with time
  - displays flow of continuous movement.

User interaction for AR headsets

- Types of interaction:
  - gaze
  - hand gestures.
- Gaze:
  - gaze-based navigation
  - tracks where the user is looking
  - targets items in the environment.
- Hand gestures:
  - hand gestures used to interact with targeted item.

User interaction for AR headsets

- Important considerations:
  - user's hands must remain in the viewing area of the headset
  - will not function correctly if user's hands out of view of headset
  - user's should be notified if hands reach the boundaries of headset view
  - design must use hand gestures accepted by the headset
  - keep interactions simple.

AR headset



Video © Gorodenkoff/Shutterstock

User interaction for mobile devices

- Type of interaction:
  - hand gestures by touching the screen
  - interaction occurs in 3D (real-world) space.
- Hand gestures are based on touching the screen:
  - swipe
  - pinch
  - tap
  - rotate.
- Important considerations:
  - interactions should be kept simple
  - user should receive feedback when placing or interacting with an object.

Voice interaction

- Type of interaction:
  - voice control.
- Voice control considerations:
  - Commands should be kept simple and concise.
  - Commands must be able to be stopped, reversed, undone.
  - Do not use similar sounding commands.
  - Do not use commands that are pre-set system commands.

Voice interaction

- Additional important considerations:
  - User should receive feedback as with any other form of interaction.
  - Consider that users can have different dialects and access.
  - Test with different people.
  - Give the user prompts to use a command.

Year 10 – Cambridge National IT – Using AR to Present Information

Types of devices AR can be used on:

- mobile devices
- smart devices
- laptop/PC.

Categories of devices

Device	Mobile device	Smart device	Laptop/PC
Smartphone	X	X	X
Tablets/phablets	X	X	X
AR headsets	X	X	X
AR glasses	X	X	X
Kiosk systems/AR installations		X	X
Desktop computer			X
Laptops	X		X

Category: smart device

- A smart device is an interactive, electronic gadget.
- It can connect to, share with and be interactive with other devices and with users.
- Includes:
  - smartphones
  - tablets/phablets
  - AR headsets
  - AR glasses
  - AR kiosks
  - AR installations.

Category: smart device

- AR kiosks and installations:
  - greater computer power
  - higher graphic quality
  - user does not require any additional device, e.g. smartphone.

Category: laptop/PC

- Desktop AR creates an illusion of 3D objects floating in front of the screen.
- Users wear anaglyph glasses (red and blue) when using the AR app.
- They may use 3D monitors.
- There can be a better user experience using a laptop/PC.



Category: smart device

- AR headsets:
  - users can see images superimposed on real-world environment
  - are more immersive than AR glasses (cover the eyes completely)
  - work in a way that is similar to AR glasses.
- AR glasses:
  - use a front-facing camera
  - superimpose 3D images, animation and video on real-world environment
  - can retrieve information from other devices
  - support Wi-Fi, Bluetooth and GPS.

Category: mobile device

- A mobile device can be easily moved from one location to another.
- It can also be a smart device.
- Includes:
  - smartphones
  - tablets/phablets
  - laptops.
- Design considerations:
  - AR apps can be used anytime, anywhere (depending on their purpose)
  - tablets/phablets have greater computer power and larger screens (phablet: combination of a phone and a tablet – Phone + Table).

Year 10 – Cambridge National IT – AR – Content, Triggers, Assets and layers

Layers and user interaction

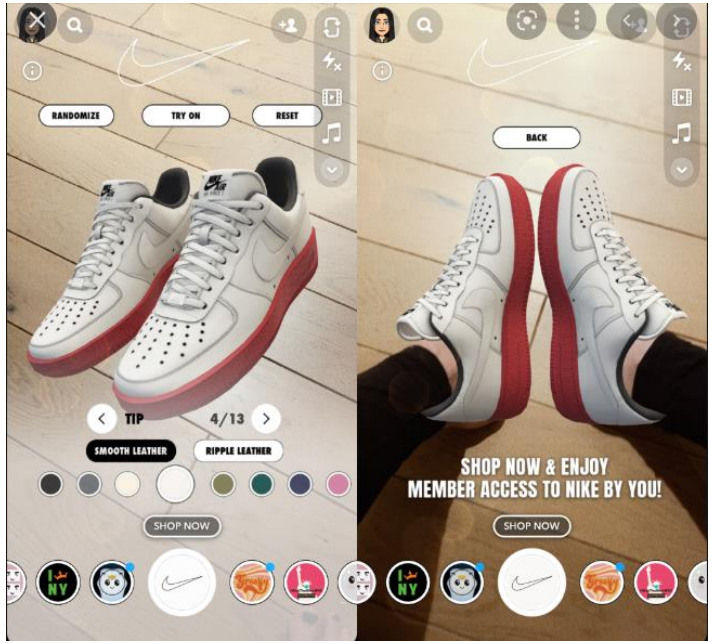
- Static:
  - Will the digital content change during the user interaction or remain the same?
  - Digital content that does not change is referred to as static.
- Interactive:
  - Will the digital content change during the user interaction or remain the same?
  - Digital content that changes is referred to as interactive

Layers and user interaction

- Layers:
  - information and/or objects laid on top the real world viewed by the user.
- User-interaction:
  - reflects the real user experience after an interaction with the user interface
  - experiences are generated by the user.
- Questions to ask
  - What content do you want to display on the user's live camera view?
  - Where do you want the content to be placed within the user's view?

Layers and user interaction

- Action flow:
  - How will the user interact with the AR app to move from one area to another?
  - Will there be multiple layers?
  - How will the action flow?



Triggers

- Triggers:
  - sometimes referred to as marker image
  - scanned by the device using the AR App
  - the scanned image 'triggers' the device to show the augmented digital content.
- Markers:
  - visual prompts
  - trigger virtual object/information
  - created using distinct patterns
  - act as anchors.

Triggers

- Location-based:
  - digital content tied to specific location
  - often used for navigation.
- Superimposed:
  - uses object recognition
  - replaces original image partially or fully
  - used a lot in healthcare sector, e.g. to superimpose x-ray onto patient's body.

Triggers

- Object recognition/marker-based:
  - use of specifically designed markers to trigger augmented experience.
- Markerless:
  - more versatile than marker-based
  - more adaptable to a wider variety of functions/activities
  - user decides where to place virtual object
  - relies on device's hardware to gather information.

Year 10 – Cambridge National IT – AR – Content, Triggers, Assets and layers

Planning and design considerations

- Four key principles
  - How will you represent the physical setting?
  - How will you anchor the content?
  - How will you format the content?
  - How will you source the content?

Planning and design considerations

- Physical setting
  - What is the physical environment like?
  - How will the computer vision detect flat surfaces, walls or surface planes?
- Anchoring the content
  - Devices and AR software must be able to recognise something in the real world.
  - Where and how will you place the augmented content (the anchor)?
  - Use anchors to trigger the AR experience.

Content and assets

- Considerations for audio
  - What is its purpose?
  - It must be clear and easily understood.
  - It can include sound effects, but must also be of good quality.

Content and assets

- Considerations for photographs/images:
  - must have high level of detail and contrast
  - must be unique
  - do not use logos as marker images
  - avoid using same images, symbols in the same design (use them only once)
  - must not be blurred.
- Considerations for text:
  - must remain legible even when user moves
  - must be legible even with different background colours
  - Helvetica is a popular font for AR.

Content and assets

- Considerations for video:
  - may or may not include sound (depends on the purpose)
  - if audio used with video, must be clear and easy to hear.
- Take your time!
  - Think carefully about what you are trying to achieve.
  - Spend time selecting the most suitable content.
  - Obtain good quality sources.

Content and assets

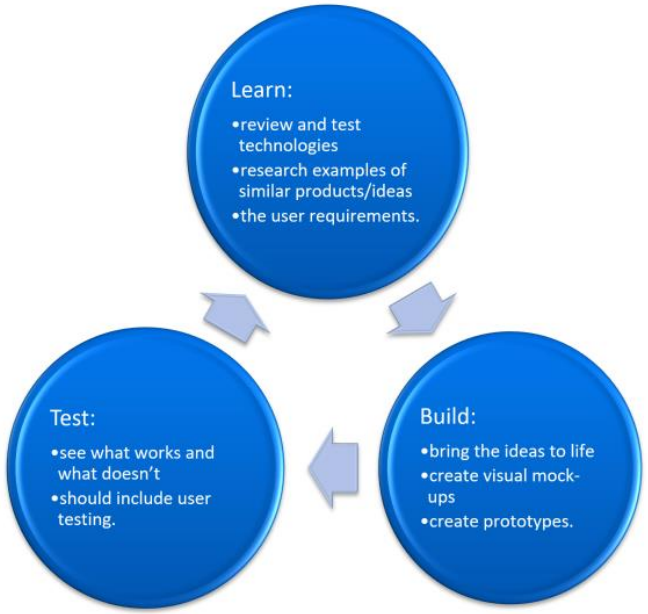
- Content:
  - can be displayed in many formats, e.g. text, images, video, sound, etc.
  - can come from a variety of sources
  - sources can be digital or paper-based
  - must comply with legislation, e.g. copyright and licensing laws.
- Assets:
  - digital content referred to as assets
  - can be: audio, video, graphics, photographs, text.

Content and assets

- Considerations for charts and graphs:
  - used to help explain and analyse data
  - must be appropriate for the data being presented
  - must be clearly and accurately labelled
  - must be of good quality and easy to read.
- Considerations for hyperlinks/weblinks:
  - Will the links be available for the lifetime of the AR app?
  - How will the user interact with the links (touch screen, voice control)?

Year 10 – Cambridge National IT – AR Prototype

The design process

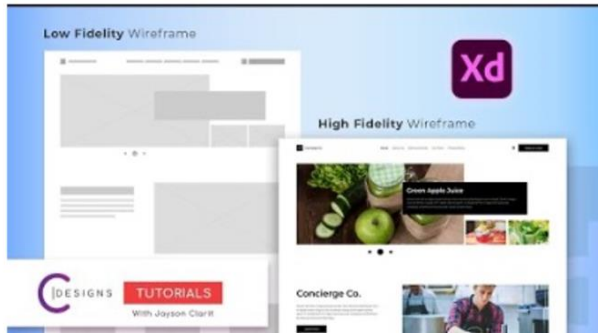


AR model prototype

- High-fidelity prototype:
  - looks real and simulates how the design will work
  - used to present ideas to clients and end-users
  - used to gather feedback from clients and end-users
  - allows user interaction
  - looks as close as possible to the final product.
- Live-data prototype:
  - has access to live data
  - should not have an impact on any process using the live data outside of the design.

AR model prototype

- High-fidelity prototype:



AR model prototype

- Feasibility prototype:
  - try out new technological/software-related ideas
  - aids understanding of technical risks associated with performance
  - used to test specific design elements/features.
- Low-fidelity prototype:
  - basically an interactive wireframe and does not look real
  - used to simulate processes to identify potential user issues
  - does not include user interaction, or includes minimal user interaction.

AR model prototype

Characteristics of prototypes:

- A prototype is not a full product.
- It confirms the functionality of, e.g., the HCI and how triggers and layers work.
- It shows how the product looks and feels to the user.
- It has access to real data.
- If the purpose of the app is to access and use real data (think of a SatNav), then the prototype must show that this can happen.

AR model prototype

- Feasibility prototype:



- Low-fidelity user prototype:



Year 10 – Cambridge National IT – Triggers

Characteristics

Triggers:

- sometimes referred to as a marker image
- scanned by the device using the AR app to 'trigger' the AR experience and display the augmented digital content
- one of the basic building blocks when creating an AR app.

Types

- Markerless:
  - scans a marker which triggers the AR experience.
- Superimposition:
  - partial or full replacement of the original view of an object with an augmented view of the same object
  - object recognition is used to identify the original object; once identified, the superimposition trigger takes over and replaces partially or in full the object with an augmented object.

A trigger image:

Should ...	Should not ...
be unique (different trigger images to trigger the different AR content)	contain anything reflective as it reduces the quality of the image, e.g. water, mirrors, white paper
contain plenty of detail	be moving
have good image size (to provide a recognisable view)	be something that is not flat
	contain blurred images (will not show sufficient detail if blurred)
	contain too much text
	contain too much white space

Types

- Remember the context!
- The type of trigger you use will depend on your reason for using the trigger so ask yourself:
  - Do I want to provide information on an object?
  - Do I want to overlay onto an object (e.g. street names on a street)?
  - Do I want the user to select where to place the virtual object?

Types

- Marker:
  - an image or an object that can be recognised by an AR enabled app, used to trigger the augmented reality features.
- Object recognition/marker-based
  - a specifically designed marker, used to trigger the augmented experience.
- Location-based:
  - triggers action based on the location of the device.

Year 10 – Cambridge National IT – Layers

Interactive access for the user

- Swipe:
  - think about the way you use a smartphone or tablet
  - dragging the finger across the screen to change views.
- Click/select:
  - click on an image or menu to select an action to be carried out.

Interactive access for the user

- Voice:
  - simple voice commands to tell the AR app the action to be carried out
  - voice commands must be able to be stopped or reversed
  - do not work well in noisy environments
  - must provide feedback to the user.

Layers

- Single layer:
  - One trigger is created and an AR asset is overlaid on the top of it.
  - Assets can be images, audio, video, photographs, charts/graphs, etc.
  - The user activates the trigger.
- Multiple layers:
  - One or more triggers are used to overlay multiple assets.
  - For example: https://youtu.be/w_lDI4ag5aQ

Access to layers

- Static:
  - has no view of continuous movement
  - does not change appearance with user interaction.
- Interactive:
  - shows continuous movement
  - appearance changes with user interaction
  - the user physically controls the layers of the AR app by using a variety of controls, e.g. swipe, click/select/voice.

Layers

Points to consider:

- Do not overcomplicate the layers – keep them simple.
- Think about the user interaction with the AR app when triggering the layers.
- Merge multiple layers together (link them into layers).
- Give layers names that indicate what they include, what they do and how they are organised.
- Layers use the triggers, so must be set up to use them.

Year 10 – Cambridge National IT – Testing

Types of test plans

- User testing:
  - sometimes referred to as usability testing
  - user testing carried out with several users from target audience
  - tests must include the different features, e.g., user interaction, action flow, etc.
  - tests are set on the test plan by the technical tester
  - results and feedback analysed to identify issues and potential improvements.

Types of test plans

- Technical testing:
  - used to test prototypes (and eventually full products)
  - tests the **functionality** of the prototype/product, e.g., user interaction, action flow, triggers, layers, information output
  - analysis of results and report written to confirm the issues that arose, that they were addressed and any potential improvements
  - tests are identified by the technical tester and a test plan developed.

Using a test plan

Content and use of a test plan:

- test number – all tests should have a test number
- what is being tested - brief statement of what is being tested (tests should **not** be grouped, e.g., testing triggers) and how it is being tested
- expected results –what you want to happen
- actual results – a short description of what actually happened (particularly important if there are issues)
- remedial action – if there was an issue, what you did to address it
- re-test!
- must be carried out iteratively (as you are developing the model prototype)

Test plans:

Purpose of a test plan:

- ensures that the AR model prototype (and eventually the final product), works as intended
- should be carried out iteratively (as you are creating the model prototype)
- allows users to physically use the prototype (easier to understand something that can be seen and used)
- showing prototypes of potential fully functional products and proving they work can attract investors
- a check against the original design to ensure it meets design priorities.