

BTEC Tech Award L1/L2 2022

Digital Information Technology Student Book

DRAFT

Second edition

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COMPONENT

01

Exploring User Interface Design Principles and Project Planning Techniques

Introduction

Digital technologies are used by individuals and organisations. However, have you ever wondered how hardware and software has been designed to allow humans to interact with their devices? Have you ever thought about why items appear onscreen in the way that they do? People often use their devices without realising the complex study that has gone into their design.

Digital technologies are constantly evolving. Each new development opens up a new project that needs to be completed. The ability to manage these projects effectively and develop devices that meet our ever-changing needs is crucial for hardware manufacturers to keep up with their competitors.

In this component you will learn the different principles that can be used to design effective user interfaces and apply appropriate project planning techniques to create a user interface that meets user requirements.

LEARNING OUTCOMES

In this component you will:

- | | |
|----------|---|
| A | Understand interface design for individuals and organisations |
| B | Be able to use project planning techniques to plan, design and develop a user interface |
| C | Be able to review a user interface. |



Introduction to user interfaces

GETTING STARTED

In pairs, identify what tasks the following users would carry out on their device.

- 1 A shop assistant who uses an electronic till to serve a customer.
- 2 An individual who is using a self-service ticket machine in a train station.

A **user interface** is the software that sits between humans and devices. It allows the user to operate a device to carry out tasks.

What is a user interface?

A user interface is the **software** that you can see when using a device. It allows you to respond to a device by entering information. This can include using a mouse, keyboard or touchscreen. You can now also use sound with some modern devices, where you enter commands by using your voice.



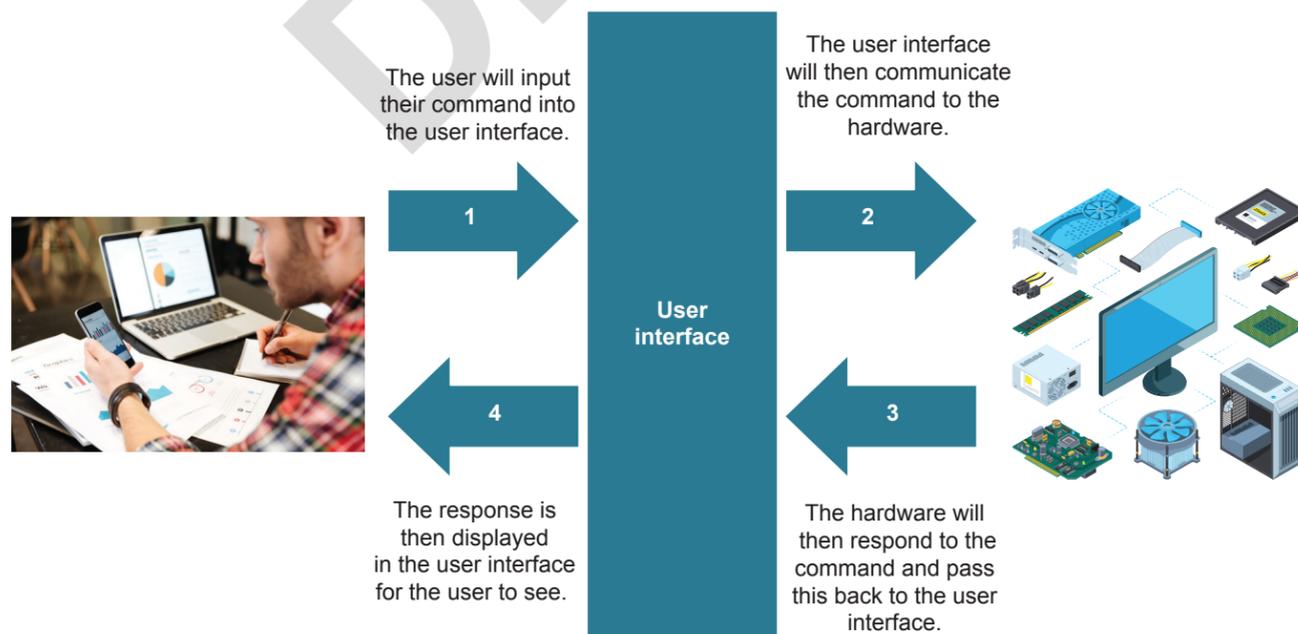
KEY TERMS

User interface is a piece of software that allows users to interact with their devices.

Software allows users to complete tasks or to create something. There are different types of software to control hardware and applications such as word processing.

Hardware is the name for physical components of a device that you can actually touch, such as the mouse and keyboard.

What user interfaces are you familiar with?



Can you apply the diagram above to a device that you regularly use?

Example uses of user interfaces

User interfaces are installed across a vast range of different devices. Table 1.1 gives some examples of devices with user interfaces.

Table 1.1: The different uses of user interfaces

Type of device	Definition	Example devices with a user interface
Computers	These are general computers that are used within the home or workplace. These usually have a monitor, mouse, keyboard, speakers and the actual computer.	<ul style="list-style-type: none"> • Desktop computers • Laptop computers
Handheld devices	These are small devices that are usually portable. All of the different components such as the screen, speakers are usually all integrated into the device.	<ul style="list-style-type: none"> • Smartphones • Tablets • Laptops • E-readers
Entertainment systems	These are devices that are often used in the home for leisure activities.	<ul style="list-style-type: none"> • Game consoles • Home theatre systems
Domestic appliances	These are devices that are used to complete household tasks. We usually have many domestic appliances in our homes and each one needs a user interface to be able to use it.	<ul style="list-style-type: none"> • Air conditioners • Dishwashers • Tumble dryers • Freezers • Washing machines • Microwave ovens
Controlling devices	These are devices that are used to control other devices automatically. These tend to be devices that sit in the background and we may only interact with them once or twice a day.	<ul style="list-style-type: none"> • Security lights • Central heating controllers
Embedded systems	These are much smaller computer systems that sit inside a larger system.	<ul style="list-style-type: none"> • Electronic parking meters • Traffic lights • Vending machines • Smartwatches/digital wristwatches • Robotic vacuum cleaners

ACTIVITY

- 1 Think of different devices that you often use. In pairs, discuss your experiences of using these devices. You should include:
 - what tasks you have carried out on the device
 - what methods you used to interact with the device
 - how successfully the device understood what you wanted to do.
- 2 Column 3 in Table 1.1 lists example devices with a user interface. In pairs, list other example devices for each row in the table.

CHECK MY LEARNING

What is meant by the term 'user interface'? Give three features of a user interface. Describe three different example interactions with a user interface.

Basic user interfaces

GETTING STARTED

Seven example commands follow. Give yourself 20 seconds to try and memorise as many as you can. Then try to write out the commands without looking.

Commands: ls, cd, mkdir, grep, chmod, passwd, symlink

How did you find this task?
How many commands did you manage to remember?
What might happen if you had hundreds of commands to remember?

DID YOU KNOW?

Microsoft Windows® has a text interface. It's known as the command prompt and has over 280 commands. An early version of this was developed in the 1980s as the only user interface until a graphical version of Windows was released in the early 1990s.

BEST PRACTICE

As an IT technician, you may prefer to use a text-based interface. This is because they are much faster, and it allows technicians to solve technical problems a lot faster than using graphical user interfaces.

KEY TERM

Form controls include buttons, tick boxes and option boxes to enable the user to enter information.

There are many different types of user interface. In this lesson you will explore text-, forms- and menu-based interfaces.

Text interfaces

A text interface works by the user entering specific commands with the keyboard. When these have been entered, the user interface will then respond with an output.

Features of text interfaces

- The user interface is made up of text and does not contain any graphics.
- The user enters commands with a keyboard. These commands need to be spelled correctly, otherwise the text interface will not understand them.
- The user interface will respond instantly with an output.
- Text interfaces do not require powerful hardware as they do not contain graphics.

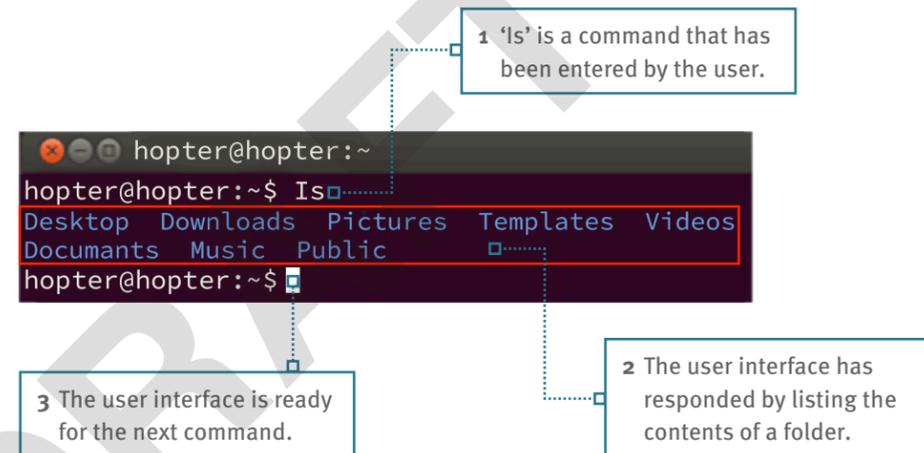


Figure 1.1: How would you feel if every device you used had a textual interface? What impact would that have?

When would text interfaces be used?

Text interfaces would be designed and used by experienced users who know all of the commands. They are often used by computer technicians when trying to solve problems with computer systems. This is because they are quick and can go directly to a specific location rather than going through lots of different menus.

Form interfaces

A form interface works by the user entering information using various **form controls**.

Features of form interfaces

- The user interface usually takes up a small part of the screen.
- It allows the user to enter information.
- It includes labels so the user knows what the different parts of the form mean.
- It uses form controls, such as buttons, tick boxes and drop-down lists, to enter information. These are often used to input data into a database.

When would form interfaces be used?

Form interfaces are used when you know what kind of data you want the user to enter. For example, if you want to add a friend to your contacts list, you will enter their first name, surname and telephone number. Form interfaces are also used when data needs to be inserted into a device in a specific order. For example, when buying a product online you select which product you want and then how many you want.

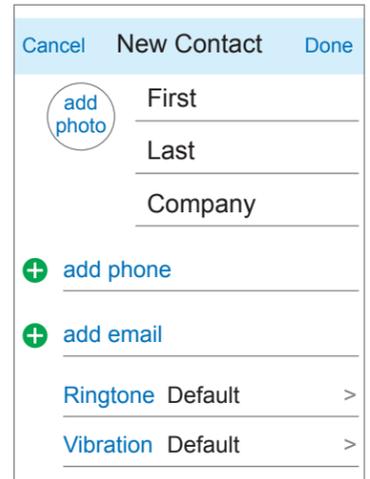


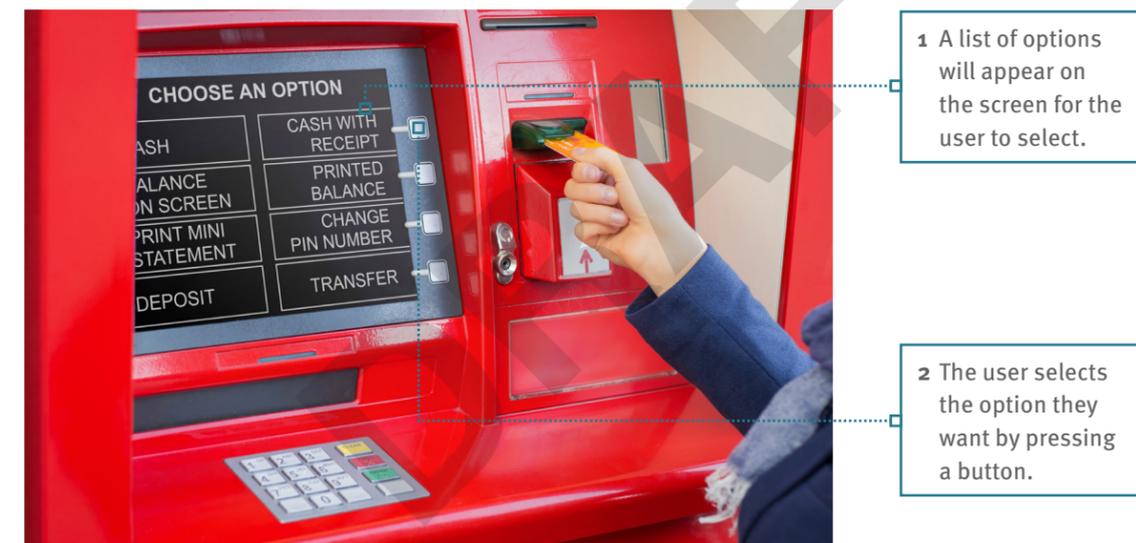
Figure 1.2: When was the last time you used a form interface? What was it for?

Menu interfaces

A menu interface is a way of selecting options by clicking on a graphic on the device screen.

Features of menu interfaces

- The user interface displays a list of options for the user to select. This can be by using the mouse cursor or by tapping on the screen.
- It can pop down, pop up, pop across or take up the whole screen.
- It can be cascading, which means when the user selects an item, another sub menu can appear.
- All options listed within a single menu are usually related to each other.



Why do cash machines use a menu rather than a text-based interface?

When would menu interfaces be used?

Menu interfaces are used when the user is either not experienced with using devices or is not expected to type in specific commands using a keyboard. Menu interfaces are also used when there is only a small range of options that the user can select.

ACTIVITY

- In pairs, find an example of a text, forms and menu-based user interface.
- 1 For each user interface, explain its suitability for the task it is being used for.
 - 2 Find four example uses of each type of user interface.
 - 3 Give three benefits and drawbacks of each type of user interface.

CHECK MY LEARNING

Poppy has bought a smartwatch. Would this have a text, forms or menu-based user interface? Discuss this with a partner and justify the reasons for your choice.

Complex user interfaces

GETTING STARTED

Your teacher will give you a specific task to complete using your computer or phone, for example to find a certain program/file or to change a specific setting. How well did you manage to achieve this? What strategy did you use to complete the task?

KEY TERM

Navigate/Navigation is how a user works their way around the software.

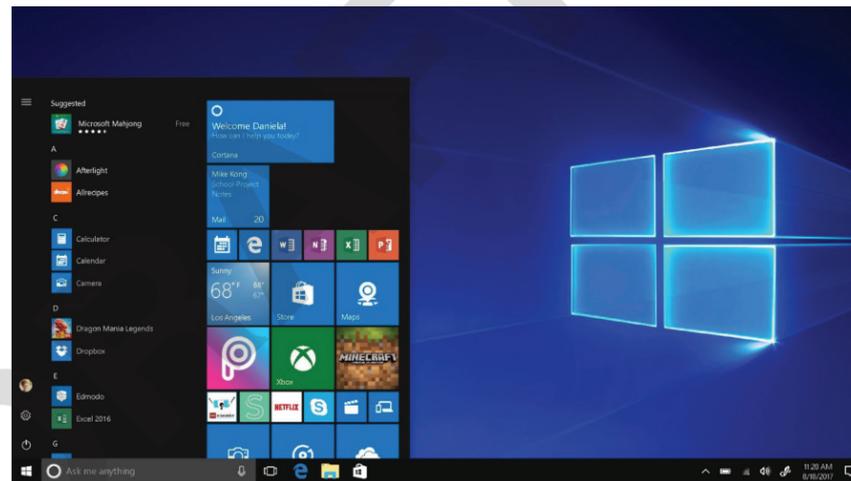
User interfaces that are easier to use are often complex because they need powerful hardware to make them work. This is because they have more features that allow users to interact easily with the device.

Graphical user interfaces

A graphical user interface allows users to interact with devices through windows, icons, menus and the mouse pointer.

Features of graphical user interfaces

- It's a visual interface and therefore made up of graphics.
- Users can **navigate** around the user interface logically.
- Contains different windows to show different tasks that are currently open.
- Contains icons for users to select with the mouse or touchscreen.
- Contains menus to display options for the users to select.
- Contains a mouse pointer that allows the user to select options including icons.



■ A graphical user interface used within Microsoft Windows. What other graphical user interfaces are you familiar with?

When would graphical interfaces be used?

Graphical user interfaces are common in everyday devices that have a wide range of uses, such as PCs and games consoles. They are used when the functions of a device cannot be limited to a menu. They are also used when the interface needs to be easy to use, therefore allowing users to interact with a device on their own.

Sensor interfaces

Sensor interfaces have commonly been used within the home, but this technology is increasingly used in our personal devices.

Features of sensor interfaces

- They have built-in **sensors** that are constantly monitoring what is happening around the device.

KEY TERM

Sensors detect and respond to the environment around them. They can be responsive to heat, light, sound, movement or patterns.

- When a certain condition has been met, the interface will automatically trigger something to happen. For example, an alarm may sound if the sensor has detected somebody inside a house.

When would sensor interfaces be used?

Sensor interfaces are used when actions performed by a device need to be automatic. For example, a smartphone may automatically unlock when it detects the correct facial features of the user. These types of interfaces have little physical human interaction.

Speech interfaces

Speech interfaces on devices are becoming increasingly popular in the home and respond directly to voices and sound.

Features of speech interfaces

- They allow users to input commands using their own voice.
- They use a built-in microphone that will listen for the user to say different commands.
- They often connect to the internet to find out information.
- They respond to the user through speakers.



■ Have you ever talked to a device? How well did it understand you?

When would speech interfaces be used?

There are many reasons why speech interfaces may be used. They can be used when users may not always be able to use the mouse or keyboard to enter commands. They are also increasingly being used to make the interactions between humans and devices feel more natural.

ACTIVITY

In pairs, find an example of a graphical, sensor and speech-based user interface.

- 1 For each user interface, explain its suitability for the task it is being used for.
- 2 Find four example uses of each type of user interface.
- 3 Give three benefits and drawbacks of each type of user interface.

CHECK MY LEARNING

Describe two ways that a self-service checkout in a supermarket could make use of a graphical, sensor and speech-based interface.

Choosing a user interface

GETTING STARTED

Visit an app store and find a smartphone app that will help you to revise GCSE Maths. Read some of the reviews that people have written. Which app would you pick based on the reviews and why?

When choosing a user interface for a device or task, it is important to consider carefully different factors to ensure the chosen user interface is suitable. In this lesson you will learn the different factors that you should consider before choosing or designing a user interface.

Performance

The performance of a user interface is important as you need to consider how quickly it allows you to complete tasks. For example, a restaurant will get busy around lunchtime and therefore the user interface will need to enable the restaurant staff to enter customer orders quickly. This means that they will be able to serve customers efficiently and make more profit.

KEY TERMS

Intuitive means easy to understand. In this context a user should be able to understand and interact with an interface instinctively using trial and error.

Ease of use

A user interface may be efficient at completing tasks; however, if the user is not able to operate the interface easily, then they may not engage with it. If the user interface is not easy to follow, then users may choose alternative programs. You need to consider if you will be able to operate the user interface and where you can get support if you need help. The user interface needs to be **intuitive**. This means even if someone has never used the interface before, they should be able to predict how it works and navigate it with ease.

User requirements

The primary reason for user interfaces is to allow the user to complete tasks using a device. Therefore, you need to consider what tasks you want to perform and then consider how well the user interface performs them. It's sometimes difficult to find a user interface that will meet all your requirements. You may need to consider which requirements are the most essential and consider which user interface best meets these requirements.

User experience

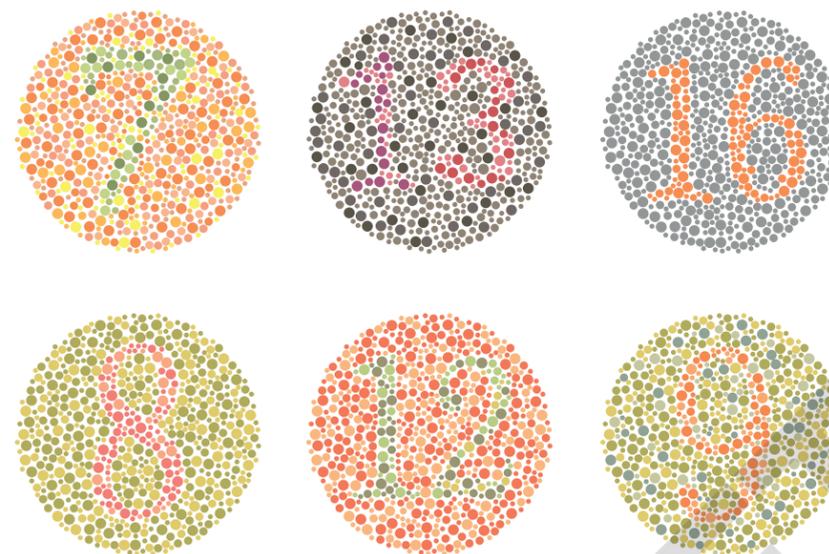
Different users will have varying levels of experience using devices. Therefore, when choosing a user interface, it is important to look at what features it has and determine how familiar features would be to users or where they could seek additional help from. A user may decide that an interface is appropriate for them if they can instantly recognise different items on the screen. Another user may decide an interface is right for them if there is a simple help menu to guide them when using new features.

Accessibility

Some users may have accessibility needs, including visual, hearing and speech needs. Developing a user interface that will meet the needs of all users is very difficult. You need to consider if the user interface already meets the user accessibility needs or if it is customisable to meet them. For example, a user may have sensitivity to screen brightness or have colour blindness.

ACTIVITY

Can you see the numbers in the circles below?



People who are colour blind may not be able to see some of the numbers. Research the different types of colour blindness to find out which colours you should avoid using together.

Storage space

The amount of storage space will often determine what type of user interface can be used and what features it will have. There needs to be a careful balance between storage space and ease of use.

- A graphical user interface is very easy to use but it requires a lot of storage space. This is because it tends to be more complex and has to store a lot of data.
- A speech-based user interface is easy to use but requires a lot of storage space as it has to store every possible human word with different pronunciations.
- A text-based interface, although not very easy to use, only takes up a very small amount of storage space.

ACTIVITY

- 1 123Laptops is a company that manufactures laptop computers. They have a helpline for customers and receive thousands of calls every day. The company has 100 members of staff and some of them have accessibility needs. In your groups, decide which four factors you consider to be the most important when choosing the user interface that all staff at 123Laptops will use. Justify why you have chosen each factor.
- 2 A doctor's surgery collects data about new patients. In your groups, discuss which four factors you consider to be the most important to the doctor's surgery when choosing a user interface. Why may they be different from the factors for 123Laptops?

CHECK MY LEARNING

Rank all the factors covered in this lesson in order from highest to lowest priority.

How hardware and software influence interfaces

GETTING STARTED

Have you ever used the same website on two different devices, such as on a desktop computer and a smartphone? Do they both have the same user interface and features? If not, why not?

Every device will have a set of hardware and software, which will impact on the type of user interface that can be used and what features it has.

Impacts of hardware and software on user interfaces

Operating system and platforms

Every device will have an **operating system** such as Microsoft Windows, Apple iOS, Android™ or Linux®. This is the software that allows you to use a device. The term **platform** is a method of running software on a computer.

As user interface is software, it has to be developed using programming code. The programming code that is created must be compatible with the operating system and platform. If you create programming code that the operating system does not understand, then it will not be able to run the code. For example, if you create a user interface for an app using Apple Developer then this will only be compatible with an Apple operating system, such as iOS, and therefore will not work on other platforms such as Android.

Display type and size

Almost all user interfaces need to make use of a display, also known as a screen. The size of the display affects the type of user interface that can be used. For example, a smartwatch screen will probably make use of a menu interface as there will not be enough space to display graphics.

The display type also affects how the user interacts with the interface. If the display has a touchscreen, then the user can use their finger to tap on the options that they want. However, some options, such as menu options, may need to be made bigger to allow the user to select them without accidentally selecting other options. If the display does not have a touchscreen, then the user will most likely use a mouse to select the options.

Types of user input

Different devices have different ways of allowing users to input commands. This will often depend on the size of the device. Larger devices such as desktop computers often have several ways of allowing the user to input commands. However, smaller and more portable devices such as smartwatches and smartphones may only have one method of allowing the user to input commands.

Table 1.2: The most common methods of user input

Input type	How it works
Keyboard	The user will use either a physical or onscreen keyboard to enter commands such as keyboard shortcuts .
Mouse	The user will move the mouse to control the cursor on the screen to select options, often using the mouse buttons.
Voice	The user will use their own voice to say what they want to do. These commands will be picked up using the device's in-built microphone.
Gesture	The user will carry out a gesture using their hand for the interface to react to. Gestures include tapping, pinching and swiping movements.



What are the challenges when designing a user interface for different devices?

Hardware resources available

Devices have internal components that process the user interface so that it can be used by the user. One main component is the **Central Processing Unit (CPU)**. Every time you interact with a user interface, the CPU processes what you have input and then responds back to you. Another key component is the amount of **random-access memory (RAM)** available. While a user interface is being run, it will be held in the computer's memory. The more memory you have, the more features a user interface can have.

The size of the device will influence how much processing power and memory you have available. Generally, bigger devices will have more powerful hardware compared to portable devices.

Emerging technologies

Our digital technologies are always changing. Traditionally, the main way that we interact with our devices is with physical keyboards and a mouse. These lend themselves to textual, menu, forms and graphical user interfaces. All these user interfaces have a visual screen and therefore different design principles have to be used to ensure its design is effective.

However, the way that we interact with our devices is changing as we make increased use of touchscreen technology and use onscreen keyboards and finger presses to select items. Touchscreen technology is not ideal for textual interfaces where the user has to enter commands. Hardware manufacturers are also now starting to make increased use of speech-based interfaces. With this type of user interface there is no visual screen as everything is done by voice.

KEY TERMS

Central Processing Unit (CPU) is central to every PC and device. It's the computer's brain and without it a PC cannot function.

Random-access memory (RAM) stores the files that the device has open and stores the information from any applications in use.

ACTIVITY

1 In pairs, recreate and complete the table below using word-processing software. Research the hardware of three different types of device and then complete the table.

Hardware	Desktop computer	Smartphone	Smartwatch
Operating system			
Size of screen			
Type of screen			
Method of user input			
Processing power			
Amount of RAM			

2 Discuss how the hardware and software differs between the three different devices.

3 Discuss how the hardware and software available on each device will impact on the type and design of user interface.

CHECK MY LEARNING

A device has a 5.5-inch touchscreen display. The amount of RAM available is 2 GB. The processor is a 2.5 GHz Quad Core. How will these components impact the user interface?

Audience needs

GETTING STARTED

Have you ever looked at the accessibility options on your smartphone or computer? Make a list of what options are available and why a user may choose them.

The word 'accessibility' refers to the design of a product for users who experience disabilities. Devices are built with accessibility options so that users can change the way that the user interface looks, feels and sounds to suit their needs.

Accessibility needs

There are many different user accessibility needs to consider when creating a user interface.

Visual needs

Users with visual needs may have limited vision or may be colour blind and not able to see certain colours.

Table 1.3: Dos and don'ts for users with visual needs

Dos	Don'ts
Use colours that effectively contrast with each other.	Don't use colours that clash or lack contrast with each other.
Have an option for the text on the screen to be read aloud.	Don't use decorative font styles that are difficult to read.
Ensure text is large enough to read.	Don't rely on colours alone to get across the importance of something.

LINK IT UP

To find out more about organisations and accessibility, go to lesson 'Accessibility and inclusivity' in Component 3, Section A.

BEST PRACTICE

If you are developing a user interface for a client, it is really important that you listen to their accessibility needs. If your client cannot use the user interface that you have developed for them then they may not pay for the system.

Hearing needs

Users with hearing needs may have limited hearing and may not be able to hear everything. They may also lipread when somebody is talking to them.

Table 1.4: Dos and don'ts for users with hearing needs

Dos	Don'ts
Use subtitles for when people are speaking in videos.	Don't rely on just sound without using other methods such as text or graphics.
Write in clear, plain English.	Don't make users read long blocks of text.

Speech needs

Users with speech needs may take longer to communicate when they are talking and may not be able to say or pronounce all words clearly.

Table 1.5: Dos and don'ts for users with speech needs

Dos	Don'ts
Allow alternative methods such as entering commands on the keyboard.	Don't rely fully on the user speaking without using other methods such as using the keyboard.
Allow the user many attempts to say a command.	Don't ask the user to keep saying the same words repeatedly.

Motor needs

Users with **motor needs** may not be able to move all their body. It may take them longer to move the mouse cursor across the screen or use the keyboard to enter text. They may not be able to use these tools at all.

Table 1.6: Dos and don'ts for users with motor needs

Dos	Don'ts
Make sure objects onscreen are large so the user can easily select them.	Don't demand users focus the cursor precisely on a small object.
Allow the user to use shortcuts to speed up tasks.	Don't require tasks to be completed quickly.
Allow the user to use their voice to input commands where possible.	Don't ask users to enter lots of text or click on a lot of objects.

Cognitive needs

Users with **cognitive needs** may need more time when they are completing tasks. They may not be able to spell or say all words.

Table 1.7: Dos and don'ts for users with cognitive needs

Dos	Don'ts
Provide a spell check so users can check their spelling.	Don't use lots of text that requires a lot of reading.
Have an option so the text on the screen can be read aloud.	Don't use complicated language.
Ensure the layout of each screen is consistent.	Don't require tasks to be completed quickly.

KEY TERMS

Motor needs relates to users who have limited function in their movement, muscle control or mobility.

Cognitive needs cover a wide range of disabilities, including developmental delays, learning disabilities, brain injuries and dementia.



What else do you need to think about when creating a user interface for people with motor and cognitive needs?

ACTIVITY

- 1 Research what the word 'inclusion' means. In pairs, discuss how a user may feel if they have a specific need and are not able to access all areas of the user interface. You will have read how user interfaces can be adapted for users with specific needs.
- 2 In pairs, think of other ways that user interfaces can be adapted to support each need. Use the internet to carry out some research.
- 3 In pairs, choose two programs that serve different purposes. Take screenshots of each program and annotate them to show where they make use of accessible features.
- 4 For each program, discuss how the accessibility features could be developed to better support users.

CHECK MY LEARNING

A local college has set up an online application form to allow learners to sign up to new courses. Describe how the user interface can be adapted for users with visual, hearing and speech accessibility needs.

Audience skills and demographics

GETTING STARTED

With a partner, discuss your digital skills and range of skills within your family. How do different age groups use devices? Place them in rank order of their expertise in using devices. What advice would you give to a developer to help them design an interface for the least skilled?

Users will have different skills based on their level of experience with different devices.

User skills

Different users will have different skills. These are summarised in Figure 1.3.

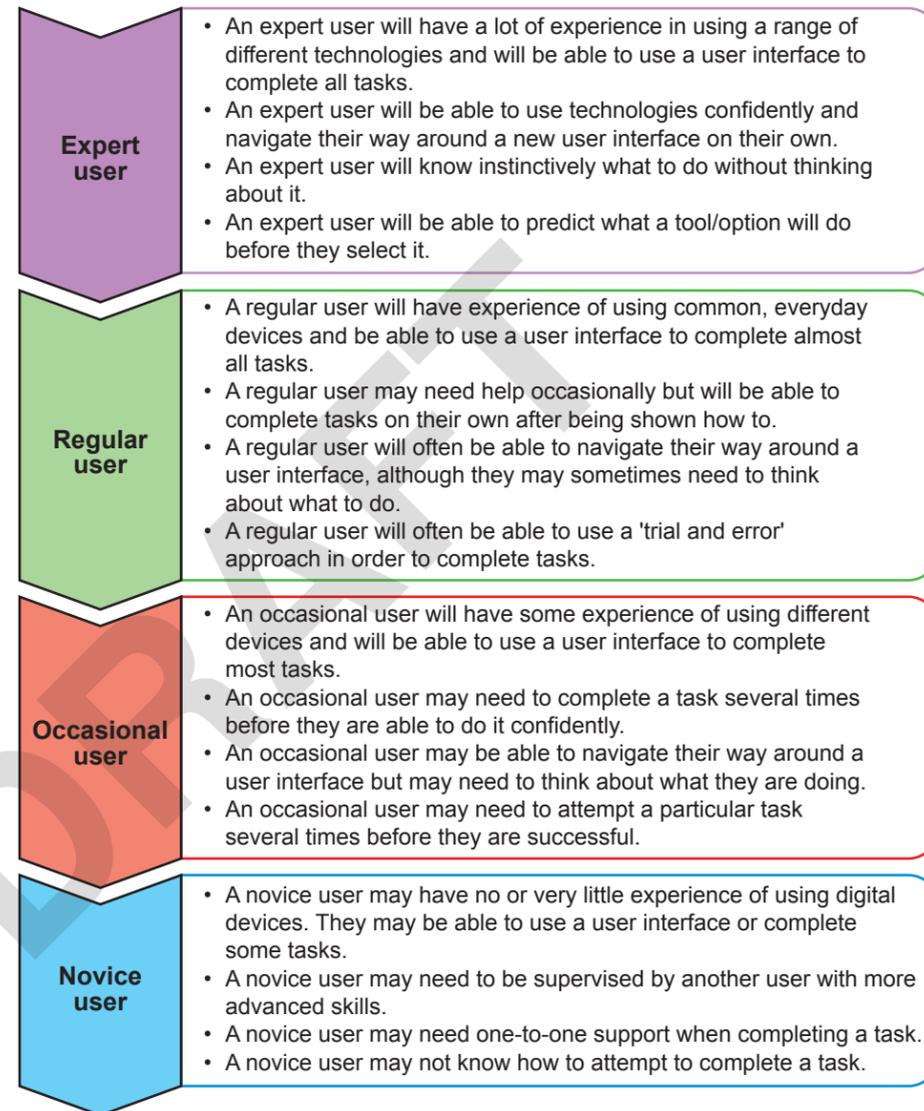


Figure 1.3: What is your skill level?

When thinking about the skill level of a user, it is worth noting that this varies between different devices and programs. For example, the user may be an expert user in one program but may only be a regular user in another program.

User demographics

You need to understand the characteristics of who will be using the device to best design an interface.

Age

The age of a person will be a big factor in determining how much experience and what skills a user will have. For example, a young child will have very little or no experience while an adult will have a lot more experience. Although this factor is changing, there is still a large percentage of older people who do not have the skills to use digital technologies. When you are designing a user interface, it is important to consider the age of the users to ensure that they will be able to access it.

Culture and beliefs

Someone's culture has a big influence on their beliefs and practices. This may be their nationality, their religion or the language they speak. These factors should be considered when designing the user interface. For example, if you are designing a speech-based interface then it needs to allow people to speak in many different languages, with different accents and different pronunciations of words.

Certain symbols have different meanings in different cultures – as do colours. A graphic that may be innocent to one group of people could be offensive to others from a different culture. The colour red equates to danger in Europe but is associated with good luck in Asia.

Past experiences

Users' past experiences will dictate what devices or programs they have used before and how much they have used them. When using a new interface for the first time, users will automatically try what they already know from their past experiences. Therefore, it is important to design user interfaces to match users' prior experience. As technology continues to change, it will open up new and exciting ways of interacting with our devices, for example, a virtual reality headset detecting eye movement and input commands dictated by the number of blinks. It is not always possible to keep the design of the user interface the same. However, it is important to keep any changes gradual to allow the user to adjust to the new changes.

ACTIVITY

When an organisation advertises a job, they will often specify what IT skills are required. Most jobs require employees to use some form of digital devices to carry out their jobs. For example:

- a receptionist in a doctor's surgery may use an electronic booking system to search and make appointments for patients
- a grocery shop manager may use software to create sales charts and graphs.

With a partner, research different jobs on the internet that would require an employee to have expert, regular, occasional and novice computer skills.

Imagine you want to create a program to encourage young people to lead a healthy and active lifestyle. You will create two versions of your program, for children aged 4–6 and teenagers aged 13–15.

- Discuss with your partner what experiences you think children and teenagers will have of using different devices.
- Discuss how these different experiences will impact on the design of the user interface.

CHECK MY LEARNING

Make a list of different programs and devices. Would you identify yourself as an expert, regular, occasional or novice user with those programs or devices? Explain your reasons to a partner.

Design principles: visual elements

GETTING STARTED

Look at some documents produced by your school. These might include a letter to parents, your school prospectus or parts of your school website. Do you notice any similarities between these items?

When designing a user interface, it is important to make use of different **design principles** to allow users to interact with their devices more effectively.

Use of colour

How you use colour in the design of your user interface can have practical and emotional implications for the user.

Don't use too many colours

You should always try to use as few colours as possible. As a rule, you should use two to three colours on a user interface. Having too many colours on the screen can be difficult to read and make it difficult for users to focus on one area.

Use the organisation house style colours

Each organisation will have their own **house style**. House styles ensure consistency so that customers can recognise the organisation. One element of the house style is what colours will be used. When designing a user interface, it is important to use the organisation's house style colours.



Figure 1.4: What three things are the same across these different screens?

Make sure colours don't clash

'Colour clash' is when two different but similar colours are placed on top of each other. When colours clash, one colour is more difficult to see.

Use textures

The word 'texture' is used to define how an object feels in your hand. Every object we touch has a different texture. Trying to create texture onscreen is more difficult; however, different colours can be used to create a certain feeling, mood or emotion. For example, glossy colours, which look smooth and shiny, are often used to make things look more professional, serious and calming.

We often describe a colour as being warm or cool. Every colour we use tends to lean towards being either a warm or cool colour. You should consider the type of mood that you want to set and then use colours that match that mood.



Figure 1.6: What effects might the use of warm or cool colours have?

Use of font styles and sizes

The font is the design of the text used. Your choice of font needs to be clear at all sizes.

Use appropriate font types

When choosing which font to use, it is important to pick the most suitable font for the purpose. There are many to choose from and they can usually be described as 'Serif' or 'Sans-serif'. Sans-serif fonts are a great choice for onscreen text. Serif fonts are better suited to printed text.

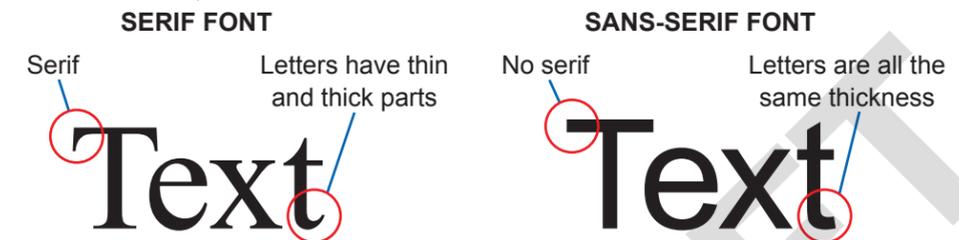


Figure 1.7: Why do you think sans-serif fonts are better suited to reading onscreen?

Avoid decorative fonts

Decorative fonts are usually serif fonts. They are used creatively and are generally designed for small amounts of large text. This is because they can be difficult to read. Some examples of decorative fonts are *Vladimir Script*, *Siggi*, *Edwardian Script ITC*.

Ensure the font style and font size are readable

As well as choosing a sans-serif font which is easier to read on a screen, it is important to ensure that the size of the font is readable. A font size that is clear to you may not be clear to other people. The font you pick should not be too big as this will reduce the amount of text you can fit onto the screen and may increase the amount of scrolling the user has to do.

KEY TERMS

Design principles are rules that should be followed when designing a product. This can include rules about colours, fonts and the language used.

House style refers to a set of rules that an organisation follows on all their documents to ensure they are all consistent.

ACTIVITY

When choosing colours you should use colours that are opposite each other on the colour wheel.

Research a colour wheel online and write down two pairs of opposite colours.

Good choice

Good choice

Bad choice

Bad choice

Figure 1.5: Do you agree with the colour selections shown here?

DID YOU KNOW?

When you read a word, you don't actually read each letter of the word. Instead your brain recognises the shape of the word. If the first letter and last letter of the word are correct, then you can still understand what the word is even if the rest of the word is spelled incorrectly.

ACTIVITY

The image below shows the initial design for a mobile phone app.



- 1 In pairs, discuss the extent to which the developer has made effective use of colours, font styles and font sizes. Give reasons for your opinion. Compare your answers with another pair. Do they agree?
- 2 Using appropriate software, recreate the design and improve the use of colours, font styles and font sizes.
- 3 Select a website of your choice. Take a screenshot of it and annotate it to show how it has made effective use of colours, text styles and text sizes.

CHECK MY LEARNING

Write a list of dos and don'ts when using colours and fonts in a user interface.

Design principles: text elements

GETTING STARTED

Your teacher will give you 20 words. You will then have 1 minute to try and remember as many words as possible. After 1 minute write down as many words as you can. How many did you manage to remember?

DID YOU KNOW?

On average, humans can only remember and process around seven pieces of information at once.

The human brain cannot cope with too much information at once. Therefore, it is important to consider how much information is placed on the screen at once.

Use of language

When you are designing a user interface, the language you use should be appropriate for the user's needs.

Use language appropriate for the user needs

When writing any text for a user interface, you should ensure that the language of the text can be understood by all users and consider the user's age and their relative experience. For example, a user interface designed for a child will probably have a few short sentences in simple language, while a user interface for an older person may have more text using more complex language.

Don't automatically assume that the user knows something. Users will learn at different paces and some users may forget easily. The language you use should be positive and should encourage users rather than making them feel fearful of using the user interface. For example, if you are designing a user interface that has several screens, don't assume that the user will know that they need to swipe their finger across the screen to move to a different screen.

Use language appropriate for the user skill level

Although it is not always possible, you should try to keep the amount of technical language to a minimum. The complexity of the language should match the user skill level. An expert user will be able to read and understand technical language, but a novice user may not. If the user does not understand the information they may not know what they need to do, which can cause frustration.

For example, here is an initial design for a search facility for a program.

The word 'parameter' may be difficult for some users to understand.

Enter search parameter

Search Clear

Here is an alternative design that uses simpler language that is easier to understand.

Click here and type in the word that you want to search for

Search Clear

Figure 1.8: Think of another way of writing these instructions that is easy to understand

Amount of information

Too much information onscreen can be difficult to read. Alternatively too little and the user may not understand what they need to do.

Use appropriate information for the task

A good idea is to only include information on the screen that is needed to complete a task. You should explain only one concept on one screen or one area of the screen. If a user sees irrelevant information, they will become confused.

It's important to keep your sentences as short as possible. When giving instructions, you should also keep the language as simple as possible. This will make instructions easier to read and understand.

Make appropriate use of white space

White space is unused space on a screen and can be any colour. The amount of information that is given should be linked to this. If a page has a lot of white space, then it will have more information on it. However, if there is not a lot of white space, then the amount of information given will need to be reduced.

It is important to balance the amount of information with the amount of white space so that the screen does not look cluttered.

For example, have a look at this Google™ webpage.

The screenshot shows the 'Create your Google Account' page. Annotations include:

- Popup help messages appear when needed to reduce the number of items on the screen at any one time.** (Points to a password strength help popup)
- There is a suitable amount of white space so the screen does not look cluttered.** (Points to the overall layout)
- The instructions are short, clear and specific.** (Points to the 'Name' field instructions)
- The instructions are given at different stages when the user is ready for them. The user does not have to read all the instructions at once.** (Points to the 'Choose your username' and 'Create a password' sections)

Google and the Google logo are registered trademarks of Google Inc., used with permission

Figure 1.9: Why might short instructions be more effective than long instructions?

ACTIVITY

You are supporting a novice user with little experience of using computers.

- 1 Write down the instructions that will help the user send an email. You should write these instructions as an ordered list. Remember, don't assume that the user knows anything.
- 2 In pairs, discuss how easy you found writing instructions for novice users. In a program of your choice, open the help menu. Read a tutorial for a tool that you have never used before. Then try to follow the tutorial.
- 3 Discuss with your partner how you found the task. How effective was the amount and language of the text in the tutorial? How well did you manage to follow the tutorial? How did the use of language and amount of information help you?

CHECK MY LEARNING

Write a list of dos and don'ts for using text in a user interface.

Design principles: layout

GETTING STARTED

Think of a program, app or website that you use regularly. Without looking at it, sketch the layout of one of the screens. Compare your sketch with the actual screen. How accurate was your sketch?

The term 'layout' refers to where different items on the screen are placed. The placement of items has a massive impact on how easily people can use them.

KEY TERM

Prominent means to stand out easily and be particularly noticeable.

Consistency

A user interface will often be made up of many different screens. It is important that the way in which the items are placed is the same across all screens. This is because when a user has become familiar with one screen they should be able to use all the other screens within the same user interface.

Matching user expectations

Users will interact with many different user interfaces for many different programs and apps. They will have developed expectations about how the user interface should look. Therefore, the design of the interface should match the user expectations.

Placement of items

You need to consider which items on the page are important and which items are less important. The important items should be placed in a **prominent** position as this will demand the attention of the user. Items that are less important can be placed in menus. It is important that any feedback for the user can be clearly seen. For example, in Figure 1.10, error message 1 is placed in the bottom right hand corner where the user may not see it. Error message 2 is placed in the centre of the screen so that it demands the user's attention.



Figure 1.10: Think of other ways to demand the attention of the user on the screen

LINK IT UP

To find out more about grouping related tasks together, go to the lesson 'Reducing the user selection time' in Learning outcome A of this component.



Figure 1.11: We automatically associate a magnifying glass with a search

Grouping related tasks together

It is important to group items that are related to each other together. This reduces the amount of navigating the user has to do and enables them to complete tasks more quickly. For example, when designing a user interface, you could group all user accessibility tools together. Therefore, the user can review all the accessibility features together rather than having to jump to different places.

Navigational components

The ability to find your way around is one of the most important aspects of a user interface. The user will often start at the homepage of a user interface and then navigate to other pages. It must be easy for the user to move from one screen to another.

Search fields

Search fields are areas of the user interface that allow the user to type in keywords to find something. The user interface will then suggest areas that the user can navigate to based on what they typed in.

It is good practice to have a search field on every screen within a user interface. However, this may not always be possible on devices that have a small screen.

Icons

Icons are buttons that, when clicked, will take the user somewhere within the user interface. Icons will usually have pictures or text to show what the button does.

Breadcrumbs

Sometimes the user will complete a task that involves moving through different stages on different screens. For example, a customer may purchase a product from an online store or complete a job application form. **Breadcrumbs** allow the user to see how many steps need to be completed in total and what step they are currently on.

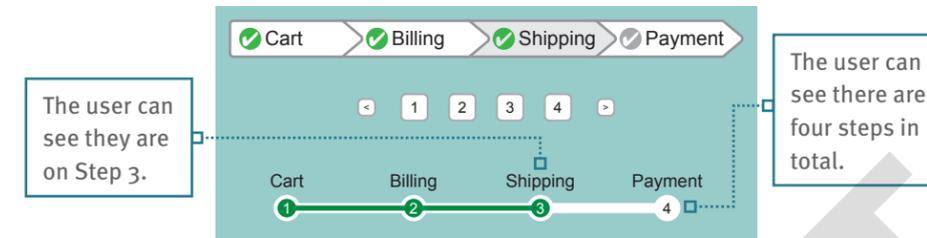


Figure 1.12: What other tasks might you complete that could use breadcrumbs?

Input controls

Input controls allow the user to enter data and select options. They are often used on form-based interfaces. Using input controls makes it faster for the user to interact with the user interface. They also reduce the chances of the user making mistakes because there is less typing for the user to do.

Table 1.8: Example input controls

Input control	Description
	Drop-down menu – a list of items for the user to select from. The list is already predetermined and the user can only select one item.
	Tick box list – a list of predetermined items for the user to select from. The user can select multiple items.
	Toggle – a kind of button that can be used for areas that only have two different conditions. This is usually Yes/No or On/Off. The user can only select one item.

ACTIVITY

Choose a program or website and take three screenshots of different screens. Annotate each screenshot to show how the program or website has made effective use of layout. You should include the following.

- Which items and features are the same across all screens.
- Where you feel the screens could have made more effective use of layout.
- How well items are placed in prominent positions.
- What navigational components are used to allow the user to move easily around different screens.
- Where input controls have been used and how effective they are.

KEY TERMS

Icons are small computer graphics. This is usually an image representing an application or file. When selected, it will complete a task.

Breadcrumbs is the term used to describe a user interface component that makes navigation easy and instinctive.

Predetermined defines something that is set in advance such as a drop-down list of values.

LINK IT UP

To find out more about predetermined items and default values, go to lesson 'Design principles: keeping the user engaged' in Learning outcome A of this component.

CHECK MY LEARNING

In pairs, discuss why the layout of items on a user interface is important. What factors influence the layout of items on the screen?

Design principles: user perceptions

GETTING STARTED

Imagine you give a tablet computer to a toddler. How might they react? What are they likely to do?

Users will often get frustrated when they come across something that doesn't work in the way they expect it to. That's because we all have expectations about the way devices and their user interfaces should work.

As a baby, you have relatively little understanding of the world that we live in; you simply react to things as they happen. As we grow, we make certain associations with the world around us, and we perceive certain things in certain ways. For example, if we see a smiley face, we perceive that to mean we have completed something correctly. Therefore, when developing a user interface, it is important to ensure that the screen matches user expectations.



■ From what age do you think children start to expect devices to work in a certain way?

Colour

Humans generally have a perception of different colours and when we see a colour on the screen we are instantly able to determine what it means. For example, people generally see blue as a cold colour and red as a warm colour.

We can use what people think about colours when designing user interfaces.

For example:

Green is used when your interaction with the user interface has been **successful** and you can **continue**.

Amber is used to indicate a **warning** and an error may occur if you continue.

Red is used when your interaction with the user interface has been **unsuccessful** or when you have made an **error** and you need to **stop** and try again.

Sound

Humans also have perceptions of sound. Often, as soon as we hear a sound, we can distinguish what it means and then react to it. For example, when a fire alarm goes off, you know immediately that you need to exit the building.

If we hear a sound while interacting with the user interface, we are instantly able to determine what it means.

- If a positive high-pitched sound is played, we instantly know that our last interaction with a device was successful.

- If a negative sharp low-pitched sound is played, we instantly know that our last interaction with a device was unsuccessful.

Symbols

From a very young age we recognise different shapes and symbols and can give them meaning. For example, your teachers in school may mark your work using ticks and crosses. As soon as you see these you instantly understand what they mean.

- ✓ Ticks are usually used to indicate that your interaction with a device has been successful.
- ✗ Crosses are usually used to indicate when your interaction with a device has been unsuccessful. The user interface will usually give the user feedback on how to correct this.

New Member Form

First Name:	<input type="text" value="Lisa"/>	✓
Surname:	<input type="text" value="Green"/>	✓
Date of birth:	<input type="text" value="09/10/2098"/>	✗
Type:	<input type="radio"/> Peak <input type="radio"/> Off-peak	✗

■ Figure 1.13: How well do you think the ticks and crosses support the user?

Visuals

We have learned in this lesson that people instantly form an idea in their head as soon as they see a certain colour or hear a certain sound. However, we can also use visuals, such as images and graphics, to represent what something does. For example, if we see a picture of a printer, we tend to associate this as being the print button; if we see an image of binoculars, then we associate this with the find button.

ACTIVITY

When you delete a file, a sharp negative low-pitched sound may play to warn you that you are about to delete a file.

- 1 Think of three other situations when a positive high-pitched sound and sharp negative low-pitched sound may be played while using devices. Explain your reasons.

You want to change your password. A green tick may appear on the screen to confirm that your password is long enough and meets the password complexity rules.

- 2 With a partner, think of three other situations when green and red may be used to indicate that something has been successful or unsuccessful on the screen. Explain your reasons.

LINK IT UP

To find out more about how to use visuals when designing a user interface, go to lesson 'Design principles: intuitive design' in Learning outcome A of this component.

CHECK MY LEARNING

Share your answers for Questions 1 and 2 with the class. Did anyone else have the same expectations as you? Why do you think this was the case?

Design principles: retaining user attention

GETTING STARTED

Think of a lesson or part of a lesson where you lost your attention. What factors do you think contributed to you losing your attention?

KEY TERM

Engaged is a term used to describe how involved someone is in a task and how much attention they are paying to it.

When a user begins to interact with a user interface, it is important to keep them **engaged**. If it is not obvious what they need to do, they may lose interest.

Grab attention

Sometimes, you need to grab the user's attention. For example, the user needs to be warned if they have made an error when typing into a form.

The following methods can be used to grab attention.

- Pop-up messages – these are messages that appear on the screen to inform the user of something. They are often used to warn the user when an error has occurred.
- Flashing graphics – these are pictures or graphics that flash on the screen. They can be used to help the user. For example, if the user interface has been updated, then flashing graphics can be used to highlight what has changed.
- Sound – these are sounds that are played when you are interacting with the user interface. This could be the shutter sound on a camera, or a round of applause in a gaming app.
- Animations – these are moving images that could be for decorative purposes to improve the look of the screen, to indicate movement from one area of the site to another, or to show the user how to complete a task.

LINK IT UP

To find out more about appropriate amounts of information, go to lesson 'Design principles: text elements' in Learning outcome A of this component.

LINK IT UP

To find out more about possible risks of autofill, go to lesson 'Data level protection: firewalls and anti-virus software' in Component 3, Section B.

Uncluttered screens

The amount of information and tools on the screen needs to be carefully considered. If there is too much information, the user will have to read more, which may slow them down. However, if there is not enough information, the user may not know what to do, which can also slow them down. Some users are put off as soon as they see lots of text. Having too many items on the screen can make it harder for the user to focus.

Autofill

Autofill is when some parts of the user interface are automatically completed with an individual's details that have been previously used and stored on a browser. This tool is usually used on form-based interfaces to reduce the amount of text a user has to enter. Using autofill also increases the accuracy of the text because as the user is typing less text, they are less likely to make mistakes.

Figure 1.14: What other details could autofill complete on a form?

Labels

Do not automatically assume that the user will know what every part of a user interface is or how to use it. Labels should be placed next to different items to tell

the user what they are. They should be short and limited to one or two words. Long labels can clutter the screen and increase the amount of reading the user must do. Figure 1.15 gives an example of how labels can be used on a forms interface.

Default values

A default value, also known as a predetermined value, is something that is already on the user interface before the user opens it. If an option is popular, then it can be automatically completed to save the user from having to enter it. For example, Figure 1.15 shows a gym membership form for a gym in Liverpool. Most people who use the gym are from Liverpool and therefore the town, county and country have already been completed.

Figure 1.15: What form have you completed that made use of default values?

Tip text

Tip text gives the user a 'tip' or guidance on what something is. It is often used on buttons to tell the user what the button is called or to tell them what action the button will do. Tip text can be used to give less experienced users guidance without cluttering the screen. Even more experienced users may make use of tip text occasionally if they are using a tool they have not used before.

Figure 1.16: Where have you seen tip text being used?

KEY TERMS

Tip text is text that appears on the screen when the user hovers over an item.

ACTIVITY

- 1 In pairs, you should each familiarise yourself with a different program or website. Focus on one tool or feature from your website that your partner has not used before. After you have learned how to use the tool or feature yourself, ask your partner to use it without any help from you.
- 2 Observe your partner completing the task. They should say what they are noticing and thinking at each stage of the task. Make notes about how they found the task. You can include comments on the following.
 - Did they complete the task? If so, ask your partner what features helped to keep their attention on the task.
 - Did they lose their attention? If so, at what point? Ask your partner why they lost their attention.

CHECK MY LEARNING

List three methods that can be used to sustain the attention of a user while they are using a user interface.

Design principles: intuitive design

GETTING STARTED

Make a list of five computer skills you have learned that you can now use without even thinking about them.

The word intuitive refers to something that can be used by someone easily without having to think about what they have to do.

Graphics to illustrate what buttons do

When we see an icon image on the screen, we form an idea about what the icon will do when we click on it. It is important that the icon image should match the action that users have envisaged.

Table 1.9: Examples of icon graphics used in Microsoft® Word

Icon	Reason
 Cut	When you see a pair of scissors, you know that they are used to cut paper. When you see this icon on the screen, you can predict that you are going to cut an item such as text.
 Find	When you see a pair of binoculars, you know that they are used to find something or see something more clearly. When you see this icon on the screen, you can predict that you will be able to find something in a document.
 Blank page	When you see a piece of blank paper, you know that it has not been used. When you see this icon on the screen, you can predict that you are about to insert a blank page into your document.

Helpful pop-up messages

When you need to inform the user that an error has occurred, it is good practice to use pop-up messages. These are messages that appear in a small window with information telling the user what has gone wrong.

When pop-up messages are used, they should be helpful and the information should tell the user exactly what they need to do to correct the problem.



Figure 1.17: Which error message is the most helpful and why?

LINK IT UP

To find out more about reversal of actions, go to lesson 'Improving the speed of user interfaces' in Learning outcome A of this component.

Easy reversal of actions

We all know how frustrating it can be when we make a mistake and are unable to correct it. User interfaces should be designed in a way that will allow users to return to earlier tasks that they have already completed to make changes or fix errors.

Easy-to-use help features

User interfaces should contain enough help to allow the user to successfully complete tasks. However, novice and occasional users may require more support. Therefore, user interfaces should contain a help feature. This can usually be accessed by pressing a button or selecting it from a menu option.

The help feature should be split into different topic areas for the user to select from. More advanced help features allow the user to type in exactly what they need help with.

For example, on this website, there is a support option on the navigation bar to provide additional support to users who need it.

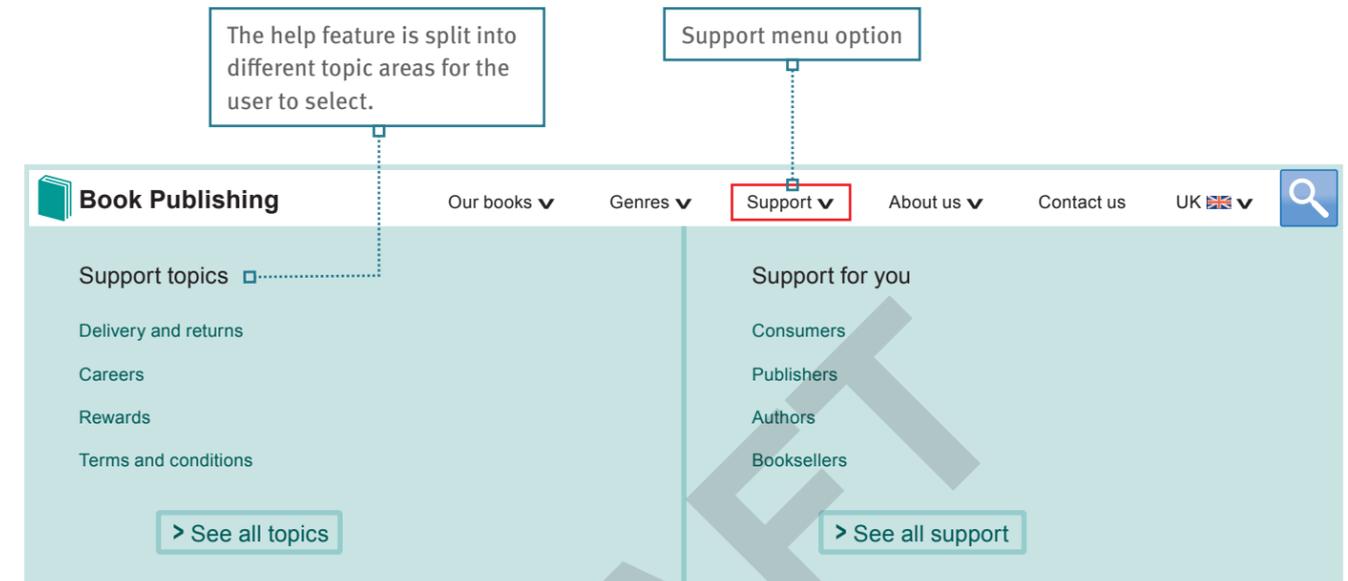


Figure 1.18: Have you ever accessed the help menu on a user interface? How useful was it?

Ensure consistency

Another method of making sure your user interface is intuitive is ensuring that each screen has a consistent design.

ACTIVITY

- 1 With your partner, choose some **productivity software** available to you and look at the user interface within the different programs. What features are the same across all programs? What features are different?
- 2 With your partner, investigate a program within the suite that you have not used before. Would you be able to work out how to use the program based on your knowledge of the other programs you have used? Why?
- 3 Open some word-processing software. Find out what images have been used for the following tools: copy, paste, print, spelling and grammar. Why do you think these graphics have been used? Are they effective?

CHECK MY LEARNING

We have learned about what the word intuitive means. How can we achieve an intuitive design? Why is intuitive design important in a user interface?

LINK IT UP

To find out more about a consistent design, go to lesson 'Design principles: layout' in Learning outcome A of this component.

KEY TERMS

Productivity software is software that is made up of a suite of different programs such as Microsoft® Office or the Google Drive™ Apps.

Designing an efficient user interface

GETTING STARTED

Think of an app, website or program that you have used that has run slowly. How did it make you feel?

When designing a user interface, it's important to ensure it's efficient. The efficiency of a user interface is determined by its speed and its accessibility. In this lesson you will learn how to increase the speed of a user interface, which will help your understanding of how to make a user interface more accessible, which you will cover in the next lesson.

Keyboard shortcuts

When we complete tasks using a user interface, it can involve various mouse clicks or finger taps on a touchscreen. However, sometimes it can take a long time to complete a simple task and a lot of time can be wasted, particularly if we are repeating the same actions.

A keyboard shortcut is a way of speeding up tasks. It is when we can press a combination of keys on the keyboard to automatically take you to something or complete a task for you.

Table 1.10: Examples of keyboard shortcuts used across Microsoft Windows and macOS High Sierra

Microsoft Windows	macOS High Sierra	Description
CTRL + C	COMMAND (⌘) + C	Copy the selected item(s) to the clipboard.
CTRL + V	COMMAND (⌘) + V	Paste the contents from the clipboard into the current document.
CTRL + P	COMMAND (⌘) + P	Print the current document.

LINK IT UP

To find out more about informative feedback, go to lesson 'Design principles: intuitive design' in Learning outcome A of this component.

Informative feedback

It is helpful to allow a user interface to give feedback so the user can see if their interactions are successful. It will give novice and occasional users more confidence to know they are completing tasks correctly. For example, a screen pop-up saying: 'Thank you for your order' would confirm the user's intention to purchase or order was completed. You will also need to consider when to give the feedback and how much. Too much feedback would slow a process down. When you give the user feedback, you should ensure it is informative. It needs to be short, clear and specific.

Reversal of actions

While users are completing tasks on a user interface, it is not uncommon for them to make mistakes and want to reverse or change something they have done earlier. User interfaces should be designed in a way that will allow users to return to actions they have already completed to make changes.

For example, when ordering a product online, before confirming your order, you may wish to return to the 'dispatch address' page to change your delivery address or you may want to return to the 'items' page to delete an item in your electronic shopping basket.

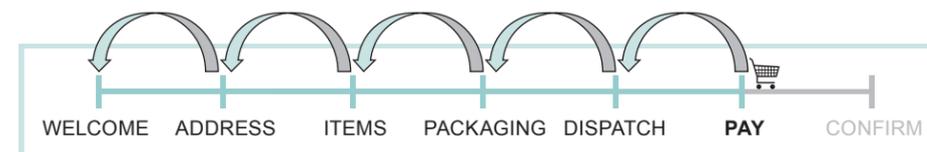


Figure 1.19: What other reasons might a user want to return to earlier screens?

Distinguishable objects

The user needs to be able to distinguish the difference between each part of the user interface. It can speed up their interaction if they know which areas require them to read something and which areas require them to carry out an action. For example, if the user sees <https://www.pearson.com/uk/> then they distinguish that this is a hyperlink that, if selected, will take them to a different location.

For example, here is the design for a table booking screen for a restaurant.

Figure 1.20: Think of a user interface you have used. What design features were used to make it easy for you to identify the different objects in the interface?

ACTIVITY

1 With a partner, research five different keyboard shortcuts for either a Windows PC or Apple Mac computer. For each shortcut, say what the shortcut is and what it does.

Visit a website where you can purchase products and place some items in your shopping basket. Then try to change the options of the items you have selected such as the colour or quantity of each item. Then try deleting the items from your shopping basket. DO NOT ENTER ANY PAYMENT DETAILS.

2 How easy did you find it to make these changes to your shopping basket? Explain your reasons.

3 Take a screenshot of the website and paste it into word-processing software such as Word. Annotate the screenshot to show which areas provide information, which areas allow the user to carry out an action, and which areas allow data to be entered.

CHECK MY LEARNING

What design features could you use to help users interact with an interface more efficiently?

Influencing and reducing user selection time

GETTING STARTED

Throw a dice onto an A4 sheet of paper placed on the floor. Then reduce the size of the paper by half and throw the dice again until it lands on the paper. Keep repeating this process. What happens as the size of the paper gets smaller?

The amount of time it takes to interact with a device is made up of thinking time, movement time, selection time and response time. In this lesson you will look at methods to reduce movement and selection times.

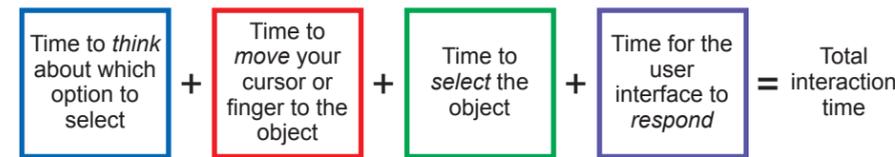


Figure 1.21: The factors influencing user interaction time

Appropriate object sizes

The size of the objects such as icons or buttons, will largely depend on the size of the user interface. Objects that are bigger can be seen more easily and selected more quickly; the size of the object can also influence user selection.

It is important that the whole object is selectable. This means the user should be able to click or tap on any part of the object to select it rather than being forced to focus on an area of it. For example, the button in Figure 1.22 is 2 cm high and 4 cm wide. However, the area that the user has to focus their finger or mouse cursor on is a lot smaller.

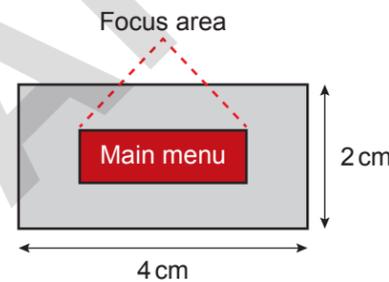


Figure 1.22: Why might users with physical or motor needs find it difficult to use small focus areas?

The button in Figure 1.23 is the same size, but the focus area has been increased so that the whole area of the button is selectable. Now the user can focus the cursor or their finger on any part of the button to select it.

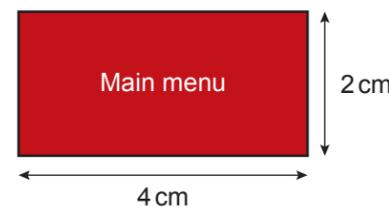


Figure 1.23: What keyboard shortcut could you create for this button?

Making the objects and focus areas bigger reduces the selection time. This is because if the user is using a touchscreen, they can tap on the items once. However, if the items are smaller, it may take the user several attempts to get their finger exactly on the item or focus area, increasing the selection time.

Object emphasis

Another way to influence and reduce object selection time is to make objects stand out. This can be achieved using colour, emphasis and font styles such as bold, italic, underline and shadow. You can also make the essential objects bigger. This will allow them to be seen more quickly and selected faster. You can make the options, such as the button to access the help menu, smaller as these may not be needed by all users.

For example, in Figure 1.24 Button 2 stands out more than Button 1 because:

- the size of the button is bigger
- it has a thick border
- the font size is bigger
- the font colour stands out
- bold emphasis is used.



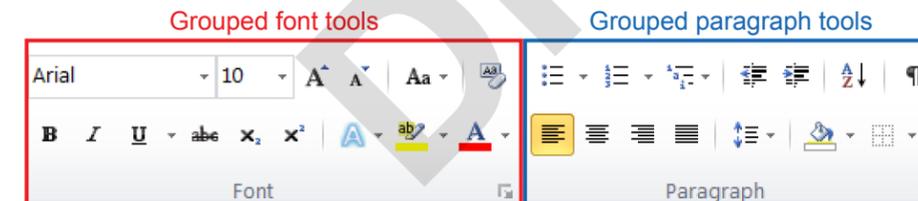
Figure 1.24: Examples of emphasising buttons

Objects can also be over emphasised and therefore influence or distract users. For example, using a large 'add to basket' button may encourage users to add items to their shopping basket. However, the 'delete items' button may be smaller and more difficult to find, therefore making it more difficult for users to delete items from their shopping basket.

Group related objects

It is important to group items that relate to each other together. By grouping related items in one area, it reduces selection times because it allows the user to try to guess where a certain tool is.

For example, Microsoft Word groups each of their tools into separate areas. All tools that are related to changing the font settings are grouped together and all tools that are related to changing the paragraph settings are grouped together. Therefore, if you need to use a tool, such as the highlight tool, you would be able to guess that this is related to the font settings and be able to go to that area and find the tool faster.



How would these groups help someone who has never used this program before?

ACTIVITY

- 1 Go to a website you use often. Set the zoom setting to 150%. Navigate around the website by clicking on the different buttons. Then set the zoom setting to 100%, 50% and 25%. As the objects get smaller, how does your experience of using the website change?
- 2 Word-processing software has the following tools: Word count, Find, Copy, Blank page, Grammar check, Chart, Shapes, Paste, Clip art, Page borders, Header, Page orientation, Spell check, Footer, Margins, Word art, Replace and Page size. With your partner, decide how you would group these into related areas. What would each area be called? What tools would you place in each area?
- 3 With your partner, think of other tools that you could put in each area.

LINK IT UP

To find out more about the importance of object emphasis, go to lesson 'Designing an efficient user interface' in Learning outcome A of this component.

CHECK MY LEARNING

List the factors which influence the amount of time it takes for each interaction between the user and a device. Write down three methods that can be used to reduce selection times.

Project planning techniques

GETTING STARTED

In pairs, research one IT project that has failed. Share your findings with the class.

DID YOU KNOW?

Around 70% of IT projects that involve creating new hardware or software fail. This could be because the hardware or software does not meet the project requirements or is not completed on time/within the agreed budget. Poor planning, poor communication and not using the correct project methodology are the main reasons why projects experience problems.

KEY TERMS

Project methodology is a term used to define the phases and processes that should be completed within a project and the order that they are completed in.

Waterfall methodology requires one whole task or section to be completed before another task begins. All the project requirements are analysed, then designed, implemented, tested and evaluated at the same time within each stage.

In this learning outcome, you will understand different project planning techniques to plan and design a user interface for an organisation. You will learn the importance of using an agreed set of procedures when implementing a project.

A **project methodology** is how the time within a project is structured and in what order the tasks will be completed. It is important to use a project methodology to make sure that the system you are creating meets the project requirements, and is completed on time and within budget. In this lesson you will learn the different project methodologies that you can use.

Waterfall methodology

A **waterfall methodology** is where the tasks flow in one direction from start to finish. This methodology relies on a lot of planning very early in the project. Once the project has started, the client will have very little involvement. The whole project is delivered to the client at the very end of the project.

The waterfall methodology usually has the following stages.

- Analysis – project requirements are established, including the user requirements, such as what they want the system to be able to do. It will also include how much money is available for the project and the date for completion.
- Design – the look of the new system is created based on the project requirements. It will often include sketches to show the designs of the different screens within the user interface.
- Implementation – the new system is created. In this stage, the programming code for the new system is created along with the user interface.
- Testing – the new system is checked. It will be tested to ensure that it is working correctly and contains no faults. This is where the client will see the new system so that they can try it and give feedback.
- Evaluation – check that the new system meets the project requirements as stated in the analysis section.

The waterfall methodology is used when the project requirements are extremely clear at the start of the project. It is also used when the requirements will not change throughout the whole project.

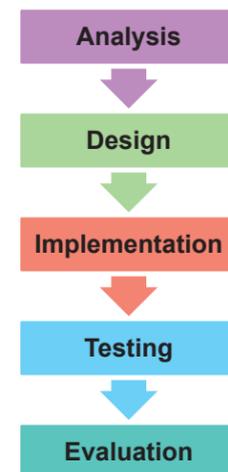


Figure 1.25: Why do you think this methodology is called the waterfall model?

Agile approach

One drawback of the waterfall methodology is that the project is usually delivered all at the end. It can also take a while before the system actually starts to be created. This means that the end-user may have to wait a while before they start to see a prototype of the new system.

An agile approach aims to complete the project in smaller phases with the first phase usually being completed after a couple of weeks. Each phase is planned, developed, tested and reviewed before the next phase starts. By doing this, the project is delivered in stages rather than all at the end. The end-user also gets to see prototypes of the new system much earlier and provide feedback that can feed into the next stage. There are many different styles of an agile approach, for example scrum.

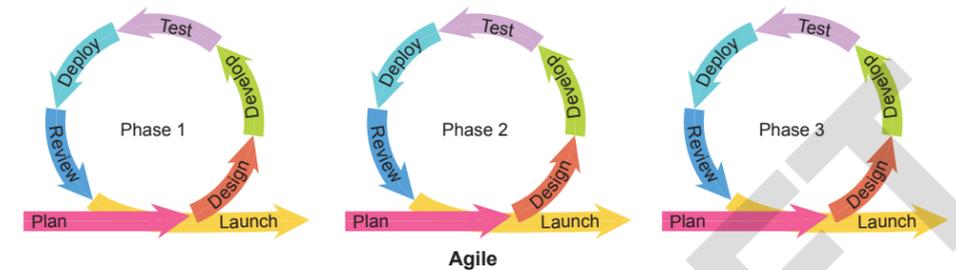


Figure 1.26: How is this different to the waterfall model?

Scrum approach

Scrum is an example of an agile approach. A project wish list is created in priority order known as a backlog. The scrum team will then take one item from the top of the wish list called a sprint backlog and then plan to implement it. The team will then complete the task in a sprint of 14 weeks. A scrum master keeps the team focused and the progress of the project is assessed in a meeting called a daily scrum. When the sprint has finished, the team will review and close the sprint down and then start the next sprint.

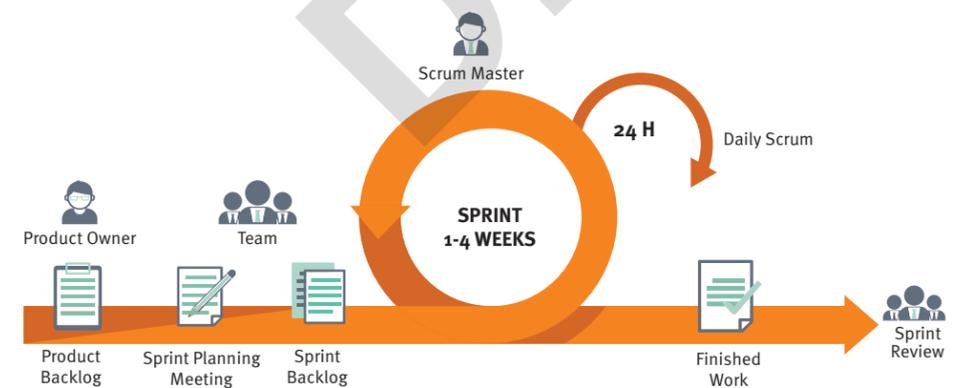


Figure 1.27: The scrum approach

ACTIVITY

- 1 In pairs, discuss four reasons why the waterfall and agile methodology would be used.
- 2 In pairs, research the benefits and drawbacks of using each methodology. Share your findings with the class.

PhonesUI is a company that specialises in developing mobile phone apps for their customers.

- 3 Explain why PhonesUI would make use of an agile methodology when creating user interfaces for their apps, rather than a waterfall methodology.

CHECK MY LEARNING

Explain the common reasons why projects fail.

Give reasons why an agile methodology would be used and reasons why a waterfall model would be used.

Basic project planning tools

GETTING STARTED

Read the requirements given in the project brief for GameExchange123. Where would you start in creating a user interface? How would you approach the project?

Projects usually start with a project brief. This is a document provided by the client. The project brief will set out what the project is about and what should be achieved.

Project – GameExchange123



Project brief

GameExchange123 is an online company that operates in the UK. They buy used computer games and then sell them to make a profit. Users log in to the website, enter details of the games that they want to sell and are then offered a buying price. If they are happy with the price, they will post their games and the money will be transferred to their bank account.

The company has grown in recent years and now has approximately 500,000 users. 75% of their customers are aged 18–25. The company's annual revenue is £6.2 million. They want to set up a smartphone app to keep up with their competitors. The app should provide the same functionality as their website. They have asked you to design and develop the user interface of their new app. They want to view the design of the user interface at different stages and to have opportunities to provide feedback.

Requirements

Screen 1 – Homepage

The homepage should welcome the user to the app and display a list of games that are currently high in demand. There should be a search facility to allow the user to enter the name of a game they want to search for and the results will be displayed on the screen.

If users do not already have an account, then there should be a link to a form allowing the user to sign up and create an account. The user should be able to enter their:

- | | | |
|--------------|--------------------|---|
| 1 first name | 4 postcode | 6 email address |
| 2 surname | 5 telephone number | 7 what type of games console they have. |
| 3 address | | |

Suitable outputs and prompts should be given to support the user when they are entering these details. The app should confirm when their account has been successfully set up.

Screen 2 – Log-in/sign-up page

Screen 2 – Log-in/sign-up page

This page should allow users to enter their username and password. Once they have successfully done this, they will be shown their account information. They should be able to view and update their personal details.

This screen should allow users to enter details of the game they want to sell. They should be able to enter:

- | | |
|---|--|
| 1 the barcode number | 3 if the user manual is still available (i.e. yes, no) |
| 2 the condition of the box/packaging (i.e. poor, satisfactory, good, excellent) | 4 the condition of the disk (i.e. poor, satisfactory, good, excellent) |

Suitable outputs and prompts should be given to support the user when they are entering these details. When all these details have been entered, the app should then display a buying price. The user can then accept or decline. If the user accepts the buying price, then a code should be generated and displayed on the screen for them to send with their game in the post.

Additional requirements

The user interface should:

- | | | |
|--|---|--|
| 1 be suitable for the hardware and software that is found on smartphones | 3 have a range of suitable accessibility features | 5 use the most appropriate type of user interface to meet the requirements in this brief |
| 2 be suitable for the age, skill level and past experiences of the user | 4 make effective use of design principles to allow users to navigate the user interface effectively and efficiently | 6 promote the company house style by using the colours blue and black. |

The project should be completed in six weeks.

After you have received a project brief, it is a good idea to break it down into different parts. You should also consider any information that is unclear and that you need more information about.

Task lists

A task list is a numbered list of tasks or actions that need to be completed. It can be used to list the different tasks within a project you need to complete or to list things you need to find out before the project starts.

LINK IT UP

To find out more about task lists, go to lesson 'Co-ordinating project tasks' in Learning outcome B of this component.

Graphical descriptions

Graphical descriptions allow you to break down the different sections of a project visually. One way of doing this is to use a mind map with a central idea in the middle and branches representing different ideas for different sections of a project. The information on a mind map is usually brief and gives an overview of the whole project in a single diagram.

Written descriptions

A written description does the same thing as a mind map. However, it contains information about the different sections of a project using text rather than a visual diagram. It allows you to go into more depth about the different sections or parts of a project.

Project – GameExchange123

Example graphical description

The mind map in Figure 1.28 has been fully completed to show the requirements of the buying page and log-in/sign-up page.

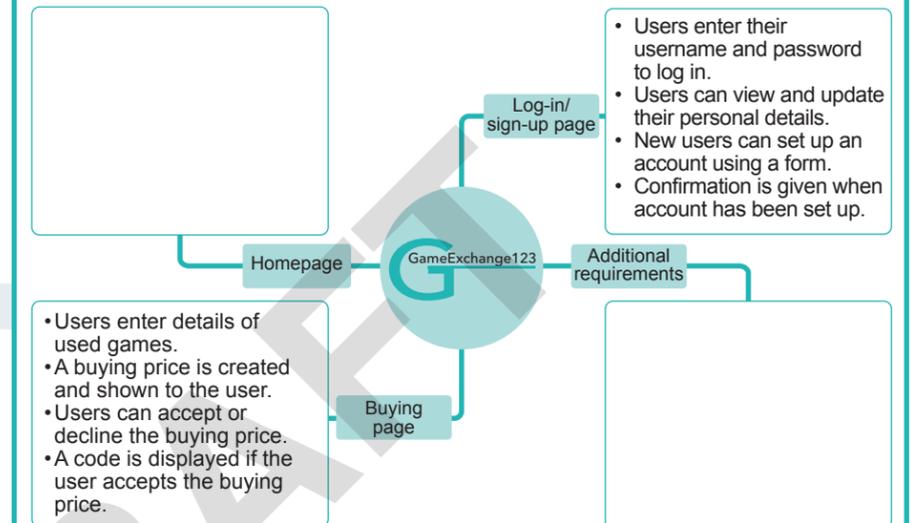


Figure 1.28: What are the benefits of using mind maps as opposed to task lists?

ACTIVITY

- In pairs, produce a written description of the buying page requirements given in the GameExchange123 project brief.
- Discuss in pairs the benefits and drawbacks of using graphical and written descriptions for this project.

ACTIVITY

In pairs, copy and complete Figure 1.28 to give an overview of the homepage requirements and additional requirements given in the project brief. Remember, the information on a mind map should be brief and specific.

Mood boards

A mood board is another type of graphical description. It is usually a one-page document and can either be physical or digital depending on the type of project. Mood boards contain images, materials and pieces of text that are combined to show visually the overall 'mood,' 'look' and 'feel' of a product. Colour is also an important part of a mood board and can be used to add texture. You should be able to see the overall colour scheme that will run throughout a product, such as a user interface.

ACTIVITY

In pairs, research different examples of mood boards on the internet. What feeling do you think each mood board creates?

CHECK MY LEARNING

What tools are available to allow people to plan their projects? Give benefits and drawbacks of each method.

Defining the project requirements

GETTING STARTED

Imagine you are using a website to book cinema tickets. In pairs, discuss the difference between the input and output requirements of this website. You should give examples of specific inputs you will need to enter and examples of outputs that will be displayed onscreen.

When you are defining the project requirements, it is a good idea to separate them into different groups. This makes it easier to see what hardware and software you are going to need to achieve them.

Audience

The target audience is the people who will be using the system. It is important to consider the audience at the very start of a project to ensure that the system is suitable and will be accepted and used by the target audience.

If the target audience is not carefully considered at the start of a project, then the system may need to be changed, which takes more time and is likely to cost more money.

Purpose

The purpose is the reason why something is created. Considering the purpose at the very start of a project ensures that the system does what the client wants and what they are paying money for.

User requirements

User requirements are what the client wants the system to do or contain. For example:

- the styles they want to be used, including the colour choice, text styles or the text sizes
- the items they want on the screen and where they want them to be placed
- what tasks the user should be able to complete.

Project – GameExchange123

Example user requirements

- 1 The user interface should use the company house style colours blue and black.
- 2 The user interface should use methods of interaction found on smartphones.
- 3 The user interface for the homepage should list games that are currently high in demand.

KEY TERM

Haptic relates to a sense of touch. Haptic outputs recreate the sense of touch by applying forces to the user.

Output requirements

Output requirements are what the system should give out for the user to see, hear or feel. What is outputted from a device will often determine what and how the user will respond.

Table 1.11: Different methods of output

Method of output	Description
Visual	These are displayed on the screen for the user to see. For example, error messages that pop up on the screen to give a warning, or text that appears that shows something such as the result of a calculation.
Audio	These are sounded through speakers for the user to hear. For example, beeping noises to tell the user they are about to close a screen without saving, or a clicking noise to inform the user that they have successfully selected something on the screen.
Haptic	These allow the user to feel something. For example, a vibration to inform the user that there is new activity such as a new message, or it could be to grab their attention when the user interface has loaded.

Input requirements

Input requirements are what the system should allow the user to put into the system using their device.

Table 1.12: Different methods of user input

Method of input	Description
Mouse	This will be used to control the cursor and select items. For example, to click on the help menu option or to select an item from a menu.
Keyboard	This will be used to enter text into the computer. For example, to type in a username and password.
Voice	This will be used to say verbal commands to the computer. For example, you may want to search for something using your voice.
Touch	This is when you touch a device, such as a touchscreen or touch pad, to put commands into a computer. For example, you can swipe the screen up to move to another screen within the user interface.

User accessibility requirements

It is important to consider if any users have accessibility needs and the possibility of other users having accessibility needs in the future. It is not always possible to take every single accessibility need into account, so you should build generic options into the user interface.

Project – GameExchange123

Example user accessibility requirements

- 1 Include a zoom facility to allow the user to make parts of the screen bigger.
- 2 Allow the user as much time as they need to enter details of a used computer game.
- 3 Make the focus area of the buttons big so they can be easily selected.

ACTIVITY

In pairs, complete the following tasks in the context of the GameExchange123 project brief.

- 1 Complete the list of user requirements to cover all requirements from the brief.
- 2 Complete the output and input requirements to cover all interactions between the user and the device from the brief.
- 3 Discuss with a partner three more accessibility features you think could be built into the user interface.

LINK IT UP

To find out more about user accessibility requirements, go to lesson 'Audience accessibility needs' in Learning outcome A of this component.

CHECK MY LEARNING

Identify which requirements from a project brief are user requirements, input requirements, output requirements and accessibility requirements. Explain the difference between them.

Project constraints

GETTING STARTED

Think about the way you travel to school in the morning. Make a list of the possible things that could happen to influence the amount of time it takes you to travel there.

After you have established the project requirements, you need to look at all potential barriers that could prevent you from achieving them. This is important because you will be able to see if there are any project requirements that cannot be met, so that these can be discussed with the client before the project begins. This would then enable you to develop solutions to help overcome these barriers.

KEY TERM

Constraint is a limitation or restriction that you face while completing a project.

Constraints

You should plan what **constraints** you face before you start a project. After you have assessed all the possible constraints, you may then recommend that the project:

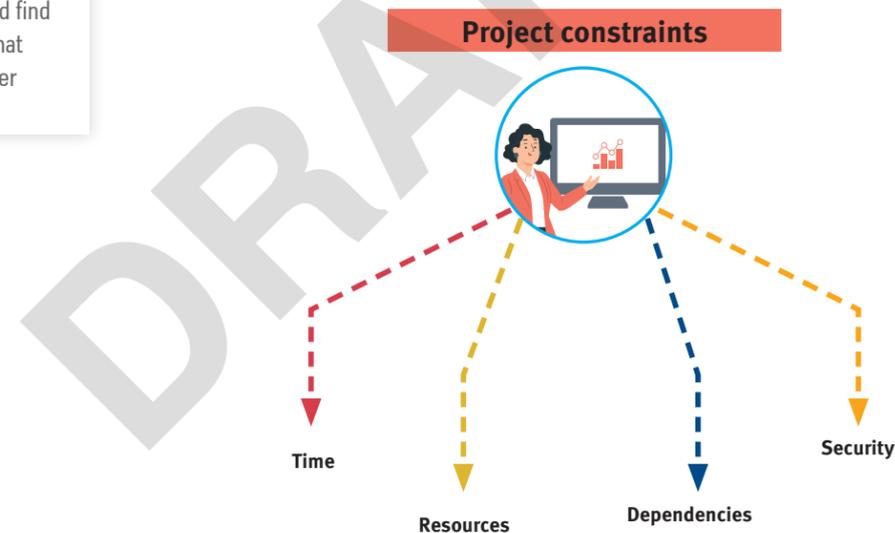
- 1 can continue and *all* requirements can be met
- 2 can continue but *not all* requirements can be met
- 3 can continue but *some* requirements need to be adapted
- 4 *cannot* continue because not enough requirements can be met.

BEST PRACTICE

As a project manager it is really important that you think about project constraints. This will allow you to plan ahead and find solutions to problems so that the project does not go over the time deadline.

If any project requirements cannot be met or need to be adapted, the client should be informed and agree to these changes before the project continues.

There can be many different constraints within a project. The most common constraints are time, resources, dependencies and security.



LINK IT UP

To find out more about agile project methodology, go to lesson 'Project planning techniques' in Learning outcome B of this component.

Time

The amount of time that you have available to complete a project is a big factor to consider. If you have a lot of time, you may be able to cover all the project requirements. If you are using an agile project methodology, you may have lots of time to revisit parts of the system already completed to improve them further.

If you don't have a lot of time available, it could mean that you end up with a system that is good enough, rather than perfect. You need to prioritise each task that needs to be completed. For example, each task can be given a priority rating between 1 (not important) and 5 (extremely important). As you are working through a project, the tasks that are not as important can be dropped from the project if you are short of time.

Resources

You need to consider if you have all the resources you need at the start of a project, when you will need them, and how you will get them.

Technological resources

These are the hardware and software resources. For example, you will need software to be able to create a user interface. You then need to ensure that the software has the tools available to be able to meet the project requirements.

Human resources

These are the different people that will be involved in the project. For example, there may be a designer who will design the user interface and a programmer to create it. You therefore need to ensure you have the right people with the correct level of skills.

Premises resources

These are the buildings that you have available to complete the project in. You will need to ensure you have a suitable room to be able to work on the project. You may also need other rooms, such as a meeting room, to be able to meet with the client.

Equipment resources

These are other items that you may need. For example, you may need some sticky notes to jot down a task list or paper and pencils to sketch out some initial ideas.

Figure 1.29: Think of some example resources that belong to each category

Task dependencies

The project methodology used will depend on how the tasks within a project depend on each other. For example, if you are using the waterfall methodology, then the tasks will follow on from each other. Each task or phase must be completed before another starts. This could delay the programmer, reducing the amount of time they have available to create the programming code.

KEY TERM

Task dependencies are the previous tasks that should be completed before a new task can start. For example, Task B depends on Task A and therefore Task B cannot start until Task A is fully complete.

Security

Projects may be constrained by codes of practice or by law. There are many computer-related laws that must be followed when developing user interfaces.

- The overall look and feel of the user interface cannot copy another user interface that is already used by another organisation to comply with the Copyright, Designs and Patents Act 1988.
- If the user interface allows users to input personal information, then the developer must ensure these are stored safely to comply with the Data Protection Act 2018.
- Developers need to ensure that the user interface cannot be used by users to gain unauthorised access to areas of a computer they are not authorised to see. This is to comply with the Computer Misuse Act 1990.

ACTIVITY

You will soon start to design a user interface that meets the requirements given in the GameExchange123 project brief. Remember, you have six weeks to design, create and refine your user interface and you only have the resources available in your school to use to complete this project.

In groups, discuss what project constraints there are in your school. You should include: time, resources, task dependencies and security.

CHECK MY LEARNING

What is a constraint? List different constraints in a project. List four different constraints.

Planning project timescales

GETTING STARTED

What else do you think needs to be considered when you are planning the timescales in a project? How could you decide whether six weeks is enough time to complete your project for GameExchange123?

Some projects need more time than others. Thinking about the timescales involved can help you decide on the right length for a project and help decide whether an existing project plan is achievable.

Overall timescales

The overall timescale is the amount of time available to complete a project from the initial start date to the completion date. It is important to consider that a lot of projects start when the project brief is handed over from the client. This could mean you have less time than you may think to complete the project. Therefore, it is important to agree when the project will officially start before the project brief is handed out.

BEST PRACTICE

As a project manager it is really important to manage your time well when working on projects. Projects running over their time deadline is one of the biggest reasons why projects fail in the real world.

When tasks will be completed

When you know the overall timescale available, it is helpful to break down the whole project into different tasks and to decide when each task will be completed. It is also a good idea to break each task down further into smaller subtasks that can be completed separately.

Table 1.14: Example tasks and subtasks

Main task	Subtask
Analyse the problem	<ul style="list-style-type: none"> Meet client and discuss project brief Define the project aims and objectives Define the project audience and purpose Define the user requirements Define the input and output requirements Assess the project constraints Create a contingency plan
Design a solution to meet the problem	<ul style="list-style-type: none"> Create a set of storyboards Define the hardware and software requirements

Key milestones

Milestones occur throughout the whole of a project and may include:

- dates by which each of the main tasks within a project will be completed
- dates when the client will be able to review the system and give feedback so that the system design can be updated. You may need to plan several client reviews into the project so that the client can review the system after each update
- dates of when the progress of the project is going to be reviewed. This may involve a date that includes a decision as to whether the project continues, or which tasks will be dropped from the project
- a date of when the whole project is going to be completed.

Gantt Charts

You are about to plan when each task in a project will be completed. These tasks are shown in Table 1.15. In this project there are eight tasks in total, known as Tasks A–H, and each has an allocated length. The table also shows the task dependencies.

ACTIVITY

In pairs, look at Table 1.15.

- 1 Discuss how easy you think the details shown in the table are to understand.
- 2 Discuss how easy it is to determine which tasks can be done at the same time.
- 3 Discuss how easy it is to determine which task or tasks are holding up a project.
- 4 Research and confirm your understanding of what is meant by the term 'slack time'.
- 5 Discuss how easy it is to determine where the slack time is in this project. Explain your reasons.

Table 1.15: The task names, lengths and dependencies

Task	Length (days)	Dependencies
A	2	-
B	2	A
C	3	B and F
D	2	C
E	2	D
F	3	A
G	2	E and H
H	2	D

You can use visual diagrams to make it easier to understand when tasks within a project will be completed and to monitor the progress being made. These could include Gantt charts.

A Gantt chart uses different blocks to represent the amount of time each task will take. The tasks are usually shown along the vertical axis of the diagram and the amount of time is usually shown along the horizontal axis of the diagram.

Project – GameExchange123

GameExchange123 have stated that they want to review the user interface at different points to provide feedback, therefore the agile approach would be the most suitable.

Figure 1.30 shows a Gantt chart that has been put together for the homepage user interface. This is broken down into several subtasks and each subtask has been allocated a start date and end date.

Task	Start Date	End Date	Week 1					Week 2				
			1	2	3	4	5	6	7	8	9	10
Task: Iteration 1 – Homepage												
Subtasks	Analyse and design homepage	5 November	7 November	■	■	■						
	Develop prototype of homepage	8 November	9 November			■	■					
	Customer reviews prototype	9 November	9 November				■					
	Update prototype based on customer feedback (review 1)	12 November	12 November					■				
	Customer review 2	12 November	12 November					■				
	Update prototype based on customer feedback (review 2)	13 November	13 November						■			
	Final customer review 3	13 November	13 November						■			
	Contingency time	14 November	14 November							■		
	Key milestone: homepage will be completed	15 November	15 November								■	
Project review	16 November	16 November									■	

Figure 1.30: If the tasks planned for Week 1 are delayed, what problems will this cause to the rest of the plan?

ACTIVITY

Complete the following task in the context of the GameExchange123 project brief.

In pairs, produce a Gantt chart that shows how you would spend your time in this project. Remember, the project must be completed in six weeks. Make sure your diagram includes:

- the overall timescale of when you would start and end the project
- when tasks and subtasks will be completed
- key milestones, including when reviews with the client will be carried out

CHECK MY LEARNING

What should be considered when planning the timescales in a project? Explain why it is important to plan key milestones and reviews into projects.

What is a design specification?

GETTING STARTED

Think of any occasions when you have had to explain to someone else what you were planning to do, for example, when building a model.

LINK IT UP

To find out more about how to meet these requirements, go to lesson 'Defining the project requirements' in Learning outcome B of this component.

As part of your project design you will need to produce a design specification. This will help you to explain to others what your new system will consist of and how it is going to work.

What requirements does a design specification need to meet?

When you are creating a design specification, you need to ensure that you meet the:

- user requirements
- input requirements
- output requirements
- accessibility requirements.

What should the design specification allow for?

Increased user confidence and familiarity

If there is no existing user interface, then you will need to ensure that the new interface is suitable for the users' skill level and demographics. For example, you will need to find out the age and past experiences of the target market and then ensure that the design meets their needs.

If you are designing a user interface that is going to replace an existing one, then you will need to consider what the previous user interface looked like. Where possible, you need to try and keep items in the same place as they were before. This is because if users can see that the layout is like something that they have used previously, then it will increase their confidence and they will be able to use the new user interface more intuitively. However, it is not always possible to keep the layout the same. Therefore, if you are changing where items are placed, it's important that these are communicated to the user.



- Why is it important for mobile phone operating systems to leave the user interface unchanged?

LINK IT UP

To find out more about how to meet these requirements, go to lesson 'Audience skills and demographics' in Learning outcome A of this component.

Reduced learning time and time to complete tasks

It is important to design a user interface that will allow users to quickly learn its features to complete tasks.

You can reduce the amount of learning time and the time it takes users to complete tasks by:

- ensuring items are placed where users expect to see them so they can find them quickly, such as placing all navigation items in a menu bar
- having a help facility in case users are unsure what the new features do
- designing error messages to allow users to correct their mistakes easily
- providing help text for additional help to users if they need it.

Increased user attention

When people use something new, they will often use a 'trial and error' approach to work out how to use it. People can often feel disheartened if they are not able to make progress quickly and therefore lose their attention if they are not able to use something.

You can increase user attention by:

- using pop-up messages, flashing graphics, sound and animation to guide users when completing tasks
- ensuring the screen is uncluttered and only contains items or information that is needed to complete tasks
- making sure that all items and features are clearly labelled with their purpose
- making use of predetermined values and autofill to reduce the amount of work the user must do.

Reduced need for specialist knowledge

Specialist knowledge is often specific information that the user would need to know to complete a task. For example, users generally have an idea of how to close software such as where to click or what gestures to carry out. Therefore, if this does not follow the idea of the user, then this would be classed as an example of specialist knowledge as it is something specific for that one user interface.

A user interface that requires users to have specialist knowledge will be more difficult to use and learn. It will also increase the amount of time taken to complete tasks.

You can reduce the need for specialist knowledge by ensuring that the user interface requires general knowledge and skills that users already know or have. You should consider the likely devices that users will have experienced using and the skills they will have developed to use them, and ensure you make use of these in your user interface.

ACTIVITY

In the next lesson you will create a design specification for GameExchange123. Complete the following in pairs.

- 1 Discuss how the requirements of the project are going to impact your design specification.
- 2 Discuss how you will create a design that will reduce the need for users to have specialist knowledge.

GameExchange123 currently does not have a mobile phone app.

- 3 In your pairs, discuss how this is going to impact your design.

LINK IT UP

To find out more about how to increase user attention, go to lesson 'Design principles: retaining user attention' in Learning outcome A of this component.

CHECK MY LEARNING

What is a design specification? What should you consider when creating the various elements of the specification? Why should these be considered at the design stage?

Creating sketches and storyboards

GETTING STARTED

What do you think are the benefits of sketching out your ideas first? It may help you to think back to a product that you have designed in school, for example in an Art or Technology lesson.

Before we create products, we often sketch out our initial ideas and plans on paper first. Creating an outline sketch has benefits and drawbacks and these will be explored in the lesson.

A visual user interface is something that the user will see. This part of the user interface can take a long time to develop as you need to ensure that the user understands how to use the device and can use it with ease.

Designing the look of the user interface first may save you time later in the project. The client can see what the user interface is going to look like so that they can provide feedback before it is developed.

Sketches

A sketch is a rough, often unfinished drawing that will help you generate ideas. You could skip this process and go straight to creating the product. However, our first idea is not always our best idea. We can sketch out our initial ideas in seconds to see if they are going to work or not.

A sketch allows you to see where items should be placed on the screen and what sizes they should be. You can quickly see if the screen design is going to meet the project requirements and design principles. You can then add more detail to your sketch or create a storyboard showing the design in more detail.

A sketch may be revisited and changed at many different points within an agile methodology when feedback from the client is received.

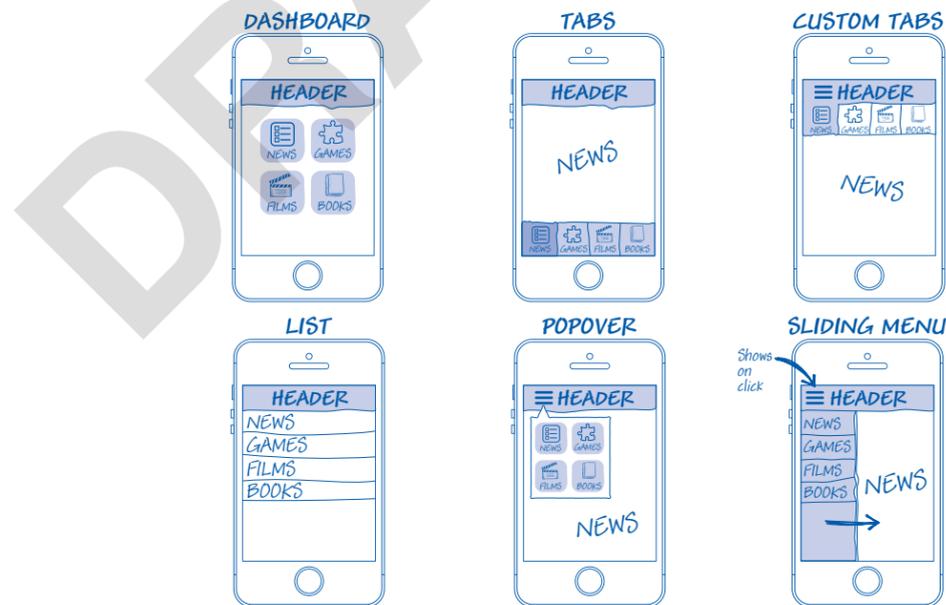


Figure 1.31: What are the benefits of sketching out your initial ideas on paper first?

Storyboards

A storyboard is another tool that can be used to design the visual aspect of a user interface. Although a storyboard does include sketches, it will also give more information about the system that is being developed.

A storyboard illustrates the main events or sequence that will happen while a user views or interacts with a multimedia object such as a video or website. For example, it can show what the user interface will look like when it is first loaded on the screen and what it will look like after the user has input a command. Although a storyboard may take time to create, it will help you to share your vision for the user interface with others, including the client.

A storyboard should:

- show where items are going to be placed on the screen
- give an idea of how big the items are going to be in proportion to the size of the screen
- show what colours will be used
- demonstrate the methods that users will use to interact with the system
- present what the user interface will look like when the accessibility features are applied
- describe non-visual events such as sounds.

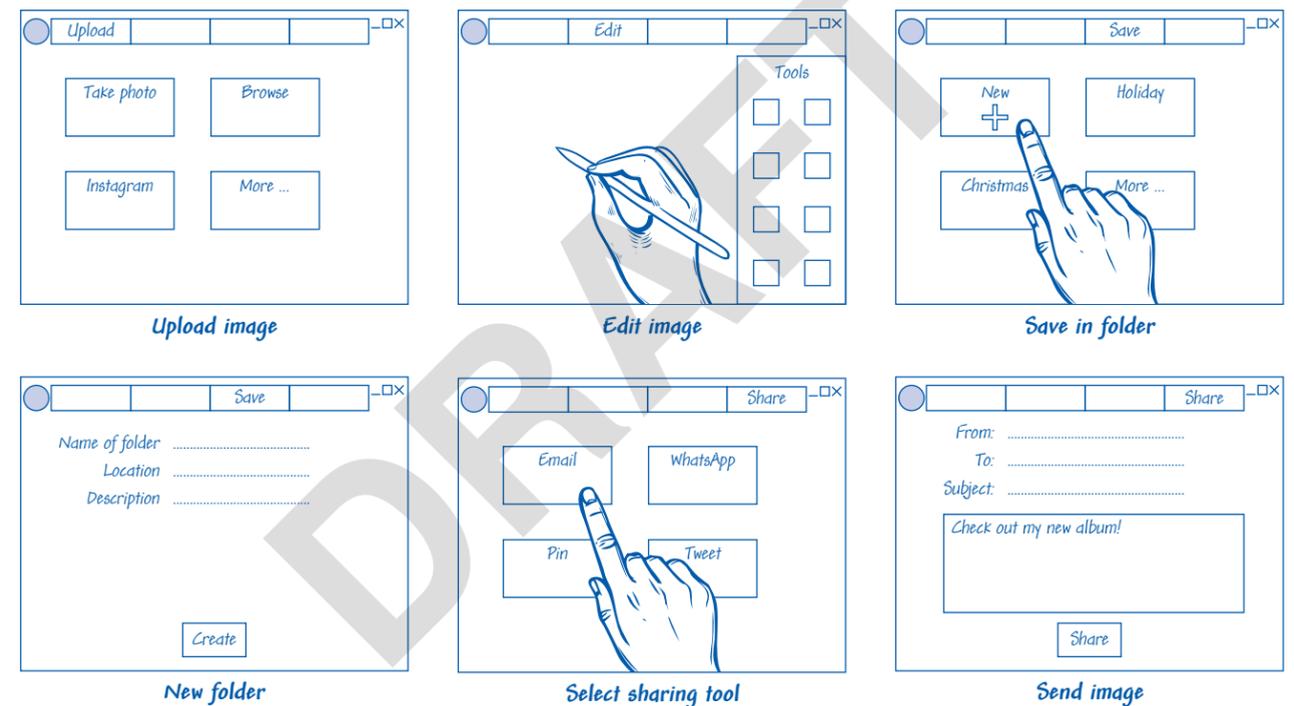


Figure 1.32: How can storyboards allow you to explore your ideas in more depth?

ACTIVITY

In pairs, create a storyboard for the homepage. This should show what the screen will look like at different stages, including:

- what will be initially displayed to the user
- what the screen will look like while the user is entering their game search criteria
- what the screen will look like after the user has entered their search criteria.

NOTE: Make sure you include the features covered in the previous lesson.

CHECK MY LEARNING

What is the purpose of a storyboard and what features will it show? What are the benefits of using sketches and storyboards?

Defining the hardware and software requirements

GETTING STARTED

Which software products are you familiar with? Which of them could be used to develop a user interface design? Are any other software products available in your school that would be better to use?

When you have defined the project requirements, the next step is to select the hardware and software that you will use to create your user interface.

Software requirements

The software requirements are a list of tools the software should contain to meet the project requirements and the user interface design.

The first key decision is to check that the software will be able to produce a user interface that will work on the device or devices that the user is going to use.

If it does, you then need to consider what tools you are going to need and then assess which piece of software has the best tools to be able to meet the project requirements most effectively.

Project – GameExchange123

Software requirements

Here are some software requirements to create the sign-up user interface.

- 1 Software should have tools to create a sign-up form containing text boxes, form fields, radio buttons and so on.
- 2 Software should have facilities to create pop-up messages to confirm the user account has been set up.
- 3 Software should have facilities to create a beeping sound and embed this within the final product so that it plays a beeping noise.

Ultimately, the user will use the software and therefore you must ensure that you use the correct tools. If you don't, you could create a system that the user does not actually want.

Hardware requirements

The hardware requirements will depend on what software you have chosen to use. Each piece of software will have a different set of hardware requirements. These can be split into the following.

- **System hardware** – hardware requirements to run the software on your computer. This might include the amount of RAM needed to run the software, or storage space that needs to be available to store the program.
- **Peripheral hardware** – devices that you will use to access the software. This can be hardware such as a mouse and keyboard. Some projects may require more specialised hardware, such as a graphics tablet, to draw objects. For example, as the user interface for GameExchange123 needs to make a beeping sound, speakers are therefore going to be needed. A microphone may also be needed to record the text that will be displayed on the screen so that it can be played to users with visual needs.

KEY TERM

A **peripheral** is a device that is not part of the essential computer (i.e. the memory and microprocessor). Peripherals are intended to be connected to the computer and used.

It may help to break the hardware devices that you need into input and output devices. An input device allows the user to enter data and commands into a device such as a keyboard or mouse. An output device allows data to be given to the user such as a monitor or speakers.

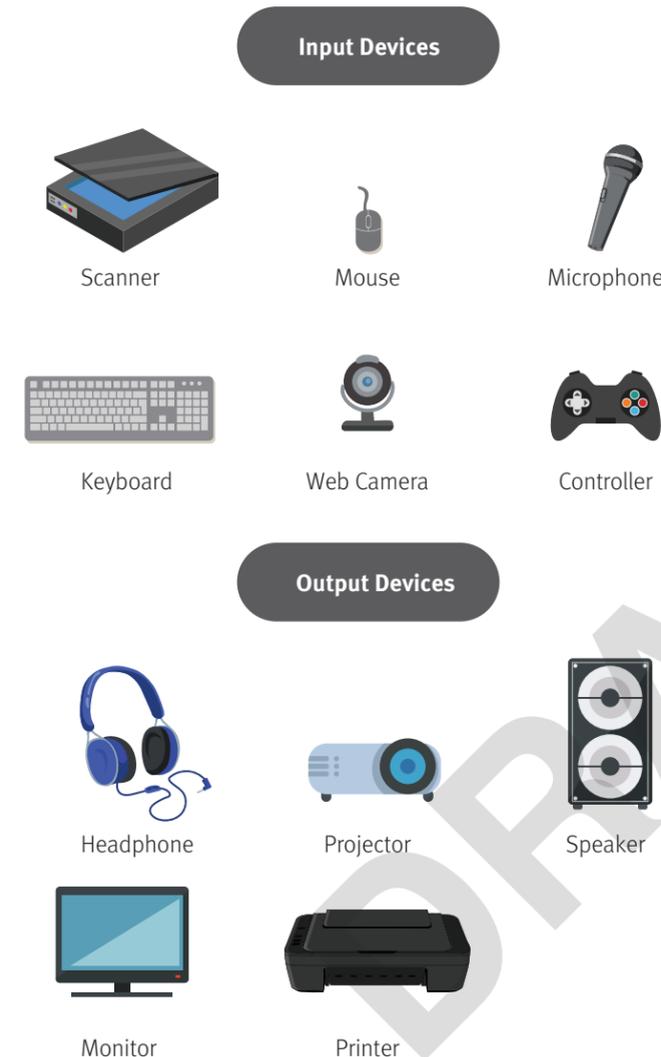


Figure 1.33: Can you think of any more input or output devices?

ACTIVITY

- 1 In pairs, select some software that can be used to create smartphone apps. Research the system hardware requirements and what peripheral devices can be used to operate it. Give examples of how you can use each device within the software.
- Complete the following task in the context of the GameExchange123 project brief.
- 2 In pairs, discuss the software requirements for the homepage.

CHECK MY LEARNING

Explain how you would identify the software and hardware requirements for a project.

Learning outcome A and B: assessment practice

How will you be assessed?

Now that you have studied all of the topics in Learning outcomes A and B, you must now:

- complete a project proposal
- plan timescales
- design an initial user interface of four screens
- develop a working prototype of your user interface.

You need to show that you can select **appropriate** project planning tools that are suitable for the project brief that you will be given. This needs to include all major parts including timescales, constraints and contingencies.

You will need to create suitable user interface designs that meets the user requirements and use effective design principles.

You then need to show that you can manage your time effectively and follow your plan independently in order to create a working prototype of the user interface that shows all features.

CHECKPOINT

Strengthen

- **Identify** different project methodologies can be used to structure projects.
- **Identify** different tools can be used to create a project plan.
- **Identify** what elements should be included in a design specification.

Challenge

- **Explain** different situations when each project methodology would be used.
- **Analyse** the suitability of different project planning techniques that can be used.
- **Assess** the effectiveness of a design specification and how effectively it incorporates standard design principles.

Mini project brief

FunDayzOut is an entertainment complex that offers fun for the whole family. The complex is split into four different areas:

- zorbing
- skateboarding
- quad biking
- rock climbing.

They would like a mobile phone app that can be used to give users information about each different area of the complex. This includes:

- safety information
- prices
- opening times
- customer reviews.

The audience for the app is adults, families and young children. The language should be simple and clear for the audience. The app should be accessible so that as many different users as possible can use the app.

FunDayzOut would like the app in 11 weeks' time. You should split your time into different stages:

Stage 1 – Designing

This includes:

- researching existing user interfaces
- creating a project proposal
- producing initial designs.

Stage 2 – Developing

This includes:

- creating prototypes
- implementing your prototypes.

The client would like to be involved during the project and would like regular meetings so that they can be updated on the project.

Creating a project proposal

Create a project proposal for FunDayzOut. This should include:

- the purpose and audience of the project
- the project requirements
- the user requirements
- the project constraints.

TIPS

- Make sure that your project proposal is written in comprehensive detail. You should ensure that you have given careful consideration to the project requirements and user requirements.
- You can easily show this by continually referring back to the project brief. You can say things like 'this project requirement is needed because...' or 'this is suitable to the project because...'

Learning Outcome A and B: assessment practice

ASSESSMENT ACTIVITY 1B LEARNING OUTCOME A AND B

Create a project plan

Create a project plan for FunDayzOut. This should show:

- timescales including the different tasks and subtasks
- key milestones
- task dependencies.

TIPS

- You must ensure that you have broken your project down into different tasks and then broken these down into further subtasks.
- Make sure each subtask is one small part of the project that can be completed in isolation.
- Make sure that these are written in order and that you have given full consideration to the task dependencies.
- Make sure that you keep referring back to the project brief.

ASSESSMENT ACTIVITY 2 LEARNING OUTCOME A AND B

Create user interface designs

Create user interface designs for **four** different screens. Each screen should focus on one particular aspect of FunDayzOut:

- zorbing
- skateboarding
- quad biking
- rock climbing.

The user interface should:

- be easy to use
- use appropriate design principles
- include different accessibility features.

TIPS

- Make sure that your user interface designs actually meet all of the user requirements.
- You should reread the scenario and check that you have included all of the requirements in your designs.
- You should also ensure that you have fully considered the different groups of users that will be using the user interface and ensure that suitable accessibility features are included.
- Make sure that you keep referring back to the project brief. You can say things like 'This is suitable to the user requirements because...' or 'I have included this accessibility feature because...'

TIPS

- Make sure that you have given appropriate consideration to the design visualisation, including all of the input and output screens.
- Think carefully about what extra outputs you may need such as error messages and user feedback messages.
- Make sure that you keep referring back to the project brief.

ASSESSMENT ACTIVITY 3 LEARNING OUTCOME A AND B

Create a prototype of your user interface

Use your designs from the previous activity to actually produce your user interface. It should have a screen for each area of the FunDayzOut complex:

- zorbing
- skateboarding
- quad biking
- rock climbing.

TIPS

- Make sure you make appropriate use of different design principles. This includes appropriate use of colour, font styles, font sizes, language, white space and layout.
- Make sure you place items where users would expect to see them and keep the user engaged. Use design principles that the user will be able to relate to. For example, using green to tell the user they have been successful.
- Make sure screens are not cluttered and make use of tip text and clear labels.
- Make sure that your prototype actually works and that you have tested the navigation methods to ensure that the links between the different elements and screens work as you planned.

TAKE IT FURTHER

Can you identify which project methodology would be used to create this project? Can you then justify why this is the most suitable methodology to complete the project for FunDayzOut?

Make sure you give the advantages of your chosen methodology and the disadvantages of alternative methodologies.

Reviewing the user interface

GETTING STARTED

Why is it important to review the user interface? At what point should this be reviewed? Why might it not always be possible to make changes to the user interface following a review?

In this lesson you will learn how to review your user interface effectively. Next lesson you will learn how to review the project planning techniques used to manage its creation.

Reviewing the user interface checklists

How well have you met the project requirements?

During a review, you should check how well the project requirements have been met, as the client is paying for the user interface and therefore it should do what they want.

Item	Item to check	Achieved?
1	Have you met all the user requirements?	
2	Have you met all the input and output requirements?	
3	Have you met all the accessibility requirements?	

How suitable is the user interface for the audience and purpose?

You should check how suitable the user interface is for the users who will be using it. If it is not appropriate, then it could slow down the speed at which users can complete tasks.

Item	Item to check	Achieved?
1	Is the user interface suitable for users with accessibility needs, such as: <ul style="list-style-type: none"> • visual needs • hearing needs • speech needs • motor needs • cognitive needs? 	
2	Is the user interface suitable for the user skill level, such as: <ul style="list-style-type: none"> • expert skills • regular skills • occasional skills • novice skills? 	
3	Is the user interface suitable for the user demographics, such as: <ul style="list-style-type: none"> • age • past experiences • beliefs, values and culture? 	
4	Does the user interface allow the user to complete the tasks they need to?	

Is the user interface easy to use?

You should check that your user interface is easy to use by the target market. This is because if it is difficult to use, then it may deter people from using it.

Item	Item to check	Achieved?
1	Does the user interface match user perceptions, such as: <ul style="list-style-type: none"> • colour and sound • symbols and pictures? 	
2	Does the user interface sustain the user's attention, such as: <ul style="list-style-type: none"> • ensuring the screen is uncluttered • using labels • using predetermined/default values and autofill • using tip text? 	
3	Is the design of the user interface intuitive? <ul style="list-style-type: none"> • Do the button/icon graphics match what the button does? • Are the pop-up messages helpful and informative? • Is there a help feature for the user to access? • Does the user interface have a consistent design? • Can the user easily reverse an action? 	

How effectively have design principles been met?

You should ensure your user interface implements design principles to ensure it is more effective.

Item	Item to check	Achieved?
1	Have you used appropriate colour choices, such as: <ul style="list-style-type: none"> • made limited use of colours • used the correct organisational house style colours • used colours that contrast with each other? 	
2	Have you used appropriate font sizes/styles, such as: <ul style="list-style-type: none"> • used a font style/size that is readable • used a sans-serif font? 	
3	Have you used appropriate language that is: <ul style="list-style-type: none"> • age-appropriate • appropriate for the user skill level? 	
4	Have you provided the right amount of information, such as: <ul style="list-style-type: none"> • to allow users to complete a task • linked the amount of information to the amount of white space available? 	
5	Have you used appropriate use of layout, such as: <ul style="list-style-type: none"> • ensured that each screen is consistent with each other • kept layout as close as possible to what the user is expecting • placed important items in prominent/obvious positions • made use of navigation components? 	

What areas could be developed further?

When you have completed the checklists in this lesson, note that any ticks in the 'achieved' column are the key strengths of your user interface. You will easily see if there are areas that you have not ticked and will be able to set these as targets for improvements.

If there is enough time left in the project, then you may want to go back and make these changes. Sometimes, due to time constraints, it may not be possible to make these changes. However, your areas for development can still inform your design work on other user interfaces that you may create in the future.

ACTIVITY

You are going to practise reviewing a user interface. You should review the user interface that you created in the assessment practice section at the end of Learning outcome B. You should:

- 1 use the checklists in this section to determine if each item has been achieved, partly achieved or not achieved at all
- 2 use the information from Question 1 to make a list of areas that could be improved further
- 3 explain how these changes will make the user interface more effective.

CHECK MY LEARNING

Why is it important to review a user interface? What should you consider when you are reviewing a user interface?

Learning outcome C: assessment practice

How will you be assessed?

You should have completed the assessment practice exercises from Learning outcome A and B before completing this section. Now that you have completed Learning outcome C, you must now review your user interface that you created for FunDayzOut.

You then need to be able to suggest the strengths and weaknesses of your user interface and decide how it can be changed to better meet the audience needs.

CHECKPOINT

Strengthen

- **State** what a user interface should show and include.
- **Describe** the benefits of using the agile process involving potential users.
- **State** what you should include when determining the strengths and weaknesses of a user interface.
- **State** what you should include when determining the strengths and weaknesses of the project planning techniques.

Challenge

- **Assess** the usefulness of reviewing the user interface and how this can influence the design of other user interfaces in the future.
- **Assess** the usefulness of involving the client and the benefits and drawbacks this can have on the project.

Mini project brief

FunDayzOut are an entertainment complex that offers fun for the whole family. The complex is split into four different areas:

- zorbing
- skateboarding
- quad biking
- rock climbing.

They would like a mobile phone app that can be used to give users information about each different area of the complex. This includes:

- safety information
- prices
- opening times
- customer reviews.

The audience for the app is adults, families and young children. The language should be simple and clear for the audience. The app should be accessible so that as many different users as possible can use it.

ASSESSMENT ACTIVITY 1 LEARNING OUTCOME C

Review your user interface

At the end of Learning outcome A and B you designed and created a user interface for a mobile phone app for FunDayzOut. This included a screen for each area of the complex:

- zorbing
- skateboarding
- quad biking
- rock climbing.

Review the user interface that you have created to determine how:

- well it meets the user requirements
- easy it is to use
- effective your chosen design principles are
- effective your chosen accessibility features are.

ASSESSMENT ACTIVITY 2 LEARNING OUTCOME C

Suggest improvements that can be made to your user interface. You should ensure that your improvements better meet the audience needs.

TAKE IT FURTHER

Think of **possible** developments in both hardware and software in the future.

For each development, **discuss**:

- How this could impact the user interface that you have created.
- How the way we apply different design principles may change in the future.
- What new design principles it could create.

TIPS

You need to use clear and appropriate lines of reasoning of how the user interface meets the user requirements and ease of use. You can achieve this by using sentences like 'This meets the user requirements because...' or 'This feature will make it easy to use because...' or 'This design principle is suitable to the user needs because...' You should try and do this as much as you possibly can to justify your choices.

TIPS

Make sure you suggest a wide range of different improvements. For each improvement that you state, make sure you explain why it is needed. In particular, you should state how it will better meet the audience needs. You can do this by using sentences like: 'This will help to improve the audience needs because...'