# COMPONENT 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 AIMS**

In this component you will:

- A Investigate user interface design for individuals and organisations
- **B** Use project planning techniques to plan and design a user interface
- **C** Develop and review a user interface.



### EXPLORING USER INTERFACE DESIGN PRINCIPLES AND PROJECT PLANNING TECHNIQUES

### 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.

### **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.

Accessibility is about how devices are designed for people with disabilities to use with ease. 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?

Introduction to user interfaces

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.



What user interfaces are you familiar with?

### Human features

Humans are the individuals that use a device. A device can be used by a small group of users within an organisation or by millions of users across the world.

Users may have different:

- **accessibility** needs for example, some users may have visual needs and may need some parts of the user interface enlarged. Other users may have hearing needs and may need to read text rather than listen to text being read aloud
- skill levels for example, some users may be able to operate a user interface on their own. Other users may not have a lot of confidence using digital devices
- demographics for example, users may be different ages and therefore have different experiences of using digital devices.

### Software features

Software is the part of the user interface that allows the user to enter commands into a device. This is usually something that the user will see or hear such as:

• menus – for example, a user may select an option to change the brightness of the screen or to change the font styles in word-processing software

- forms for example, a user may enter details of a person into their contacts list or enter their payment details when buying products online
- voice for example, the device may read parts of the screen aloud for a user who has accessibility needs.

### Human to device interaction

Humans and devices obviously work in different ways, so careful planning needs to go into designing how the two will interact. When designing a user interface, you need to consider all user needs and the features of the device.

## 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 applications of user interfaces

Computers       These are general computers       Image: Computers         that are used within the home       Image: Computers       Image: Computers         or workplace.       Image: Computers       Image: Computers	De .ai
HandheldThese are small devices that are usually portable.• D C	Dig Sm
EntertainmentThese are devices that are often used in the home for leisure activities.• G • H	Ga Ho
Domestic These are devices that are • V appliances used to complete household • M tasks.	Va 1io
Controlling devicesThese are devices that are used to control other devices automatically.• E • C	Bu Ce
Embedded systemsThese are much smaller computer systems that sit inside a larger system.• C 	Ca Ae

### 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.

### LINK IT UP

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

ple devices with a user interface

esktop computers ptop computers

gital watches nartphones

ame consoles

ome cinema systems

ashing machines crowave ovens

ırqlar alarms entral heating systems

r automatic braking systems roplane autopilots

## **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.

## **KEY TERMS**

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.

### 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.
- The user interface will respond instantly with an output.
- Text interfaces do not require powerful hardware as they don't 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 means.
- 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.

### Menu interfaces

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

### Features of menu interfaces

- The user interface displays a list of options for the user to select.
- 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.

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- Cancel New Contact Done First add photo Last Company add phone add email **Ringtone** Default Vibration Default
- Figure 1.2: When was the last time you used a form interface? What was it for?

**2** The user selects the option they want by pressing a button.

1 A list of options

will appear on

user to select.

the screen for the

### 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.

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 TERMS**

**KEY TERMS** 

or patterns.

Sensors detect and respond

them. They can be responsive

to heat, light, sound, movement

to the environment around

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

**Pixels** are the smallest dots that make up the screen on our devices. An image is made up of millions of pixels.

## **Complex user interfaces**

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 interfaces**

A graphical user interface allows users to interact with devices through icons and other visual features.

### 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 icons for users to select with the mouse or touchscreen.
- Contains menus to display options for the users to select.
- Requires powerful hardware as it has to process graphics containing millions of **pixels**.



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.

• 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 benfits 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.

### 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 files.
- 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 to the factors for 123Laptops?

### GETTING STARTED

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

### **User requirements**

efficiently and make more profit.

or designing a user interface.

Performance

Choosing a user interface

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.

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 areas that you should consider before choosing

The performance of a user interface is important as you need to consider how guickly

lunchtime and therefore the user interface will need to enable the restaurant staff to enter customer orders guickly. This means that they will be able to serve customers

it allows you to complete tasks. For example, a restaurant will get busy around

### **KEY TERMS**

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

### 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 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.



### CHECK MY LEARNING

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

# How hardware and software affect user 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?

### KEY TERMS

**Operating systems** control the whole operation of a computer system such as mobile phones or tablet computers.

**Platform** is the name given to the computer (hardware) and operating system (software) on which applications can be run.

Keyboard shortcuts are combinations of keystrokes or a sequence of keystrokes which commands the software.



What are the challenges when designing a user interface for different devices? 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<sup>™</sup>, Nintendo DSi<sup>™</sup> or Linux<sup>®</sup>. 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 small watch 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.

### Method 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

Method of user input	How it works
Keyboard	The user will use either a physical or online keyboard to enter commands such as <b>keyboard shortcuts</b> .
Mouse	The user will move the mouse to control the cursor on the screen to select options.
Voice	The user will use their own voice to say what they want to do.
Gesture	The user will carry out a gesture using their hand for the interface to react to. Gestures include tapping, pinching and swiping movements.

### Available resources

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.

### ACTIVITY

1 In pairs, recreate and complete the table below usin

	Desktop computer	Sma
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 be devices.
- **3** Discuss how the hardware and software available 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 The processor is a 2.5 GHz Quad Core. How will these components impact the user interface?

### **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.

ng word-processing software.			
phone	Smartwatch		
etween the three different			
on each device will impact on			
ount of RAM	l available is 2 GB.		

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.

## LINK IT UP

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

## User accessibility needs

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 be able to read.	Don't rely on colours alone to get across the importance of something.

### 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 dema precisely o
Allow the user to use shortcuts to speed up tasks.	Don't requi
Allow the user to use their voice to input commands where possible.	Don't ask u on a lot of

### **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

)os	Don'ts
Provide a spell check so users can check heir spelling.	Don't use reading.
lave an option so the text on the screen can be read aloud.	Don't use (
insure the layout of each screen is consistent.	Don't requ

### 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 students to sign up to new courses. Describe how the user interface can be adapted for users with visual, hearing and speech accessibility needs.

- and users focus the cursor on a small object.
- ire tasks to be completed quickly.
- users to enter lots of text or click objects.

- lots of text that requires a lot of
- complicated language.
- ire 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?

## User skills and demographics

User skills

### 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?

Different users	will have different skills. These are summarised in Figure 1.3.
Expert user	<ul> <li>An expert user will have a lot of experience in using a range of different technologies and will be able to use a user interface to complete all tasks.</li> <li>An expert user will be able to use technologies confidently and navigate their way around a new user interface on their own.</li> <li>An expert user will know instinctively what to do without thinking about it.</li> <li>An expert user will be able to predict what a tool/option will do before they select it.</li> </ul>
	A regular user will have experience of using common, everyday devices and be able to use a user interface to complete almost
Regular user	<ul> <li>all tasks.</li> <li>A regular user may need help occasionally but will be able to complete tasks on their own after being shown how to.</li> <li>A regular user will often be able to navigate their way around a user interface, although they may sometimes need to think about what to do.</li> <li>A regular user will often be able to use a 'trial and error' approach in order to complete tasks.</li> </ul>
	An occasional user will have some experience of using different
Occasional user	<ul> <li>devices and will be able to use a user interface to complete most tasks.</li> <li>An occasional user may need to complete a task several times before they are able to do it confidently.</li> <li>An occasional user may be able to navigate their way around a user interface but may need to think about what they are doing.</li> <li>An occasional user may need to attempt a particular task several times before they are successful.</li> </ul>
Novice user	<ul> <li>A novice user may have no or very little experience of using digital devices. They may be able to use a user interface or complete some tasks.</li> <li>A novice user may need to be supervised by another user with more advanced skills.</li> <li>A novice user may need one-to-one support when completing a task.</li> <li>A novice user may not know how to attempt to complete a task.</li> </ul>

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

### 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.

### 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.

### 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.

### 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.

- 1 Discuss with your partner what experiences you think children and teenagers will have of using different devices.
- 2 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.

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 vou notice any similarities between these items?

### **KEY TERMS**

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

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### 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.



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

## **Design principles: visual elements**

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 important to use the organisation's house style colours.

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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, using 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 vou want to set and then use colours that match that mood.

## 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 *Uladimir Script*, Gigi, 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.

### ACTIVITY

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





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

### 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.

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.

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.

## **Design principles: text elements**

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.

### 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 website.

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<sup>™</sup> webpage.

Create your Google Account



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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?

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The instructions are short. clear and specific.

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.

### CHECK MY LEARNING

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

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?

### **KEY TERMS**

Prominent means to stand out easily and be particularly noticeable.





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 aim A of this component.



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

Q

## **Design principles: layout**

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.

### 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.

### 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.

### 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.

### 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 from 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's 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.

### lcons

**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



### 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 easily move around different screens.
- Where input controls have been used and how effective they are.

The user can see there are four steps in

Drop-down menu – a list of items for the user to select from. The list is already predetermined and

Tick box list – a list of predetermined items for the user to select from. The user can select

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.

### **KEY TERMS**

Icons are small computer graphics. This is usually an image representing an application or file.

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.

### LINK IT UP

To find out more about predetermined items and default values, go to lesson 'Design principles: keeping the user engaged' in Learning aim 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 expectations**

### 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 older, our brain develops, and we gain an understanding of how things work, including the digital technologies that we use. This allows us to predict what will happen before we do something. Therefore, when developing a user interface, it's important to ensure that the screen matches users' 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.

### **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.



**V** Ticks are usually used to indicate that your interaction with a device has been successful.

X Crosses are usually used to indicate when your interaction with a device has been unsuccessful



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

### 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.

### 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 aim 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: keeping the user engaged

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, then they may lose interest.

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 TERMS**

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

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.

### Uncluttered screens

Grab attention

### LINK IT UP

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

**KEY TERMS** 

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

P

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.

## 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 1.14: Where have you seen tip text being used?

### 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.



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?

### 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 1.16: What other details could autofill complete on a form?

### 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.

The address of the property has automatically been completed by the user interface.

### 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.

### CHECK MY LEARNING

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

### EXPLORING USER INTERFACE DESIGN PRINCIPLES AND PROJECT PLANNING TECHNIQUES

## Design principles: intuitive design

### GETTING STARTED

Make a list of five computer skills you have learned that vou 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<sup>®</sup> Word



### 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 aim 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.

### 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 aim 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<sup>™</sup> Apps.

## Improving the speed of user interfaces

### 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.

### **Kevboard 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 (光) + C	Copy the selected item(s) to the clipboard.
CTRL + V	COMMAND (光) + V	Paste the contents from the clipboard into the current document.
CTRL + P	COMMAND (光) + P	Print the current document.

### **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?

### LINK IT UP

To find out more about informative feedback, go to lesson 'Design principles: intuitive design' in Learning aim 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.

### **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?

## Reducing the 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 guickly; 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 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 guickly 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.

Button 1

Clear

Objects can also be over emphasised and therefore distract users. For example, using a large 'add to basket' button may allow users to quickly 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. Grouped font tools Grouped paragraph tools



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?

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.

- 2 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.



### Figure 1.24: Examples of emphasising buttons

### LINK IT UP

To find out more about the importance of object emphasis, go to lesson 'Improving the speed of user interfaces' in Learning aim 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.

## Learning aim A: assessment practice

### How you will be assessed

Now that you have studied all topics in Learning aim A, you will need to show that you understand how different types of user interfaces meet a range of different design principles and be able to give relevant examples. You also need to show that you understand how different types of user interface meet a range of different user needs and be able to give relevant examples.

You will be expected to produce a written report using screenshots of different user interfaces. You should be able to describe how two different types of interface meet a range of specific user needs and design principles.

Try the following tasks to help you build the skills and knowledge you will need to complete your assignment.

### CHECKPOINT

### Strengthen

- Identify four different types of user interface.
- Describe how the user interacts with each type of user interface.
- Explain why the following user needs must be considered when designing a user interface: accessibility, skills and demographics.
- Explain why different design principles are used when designing effective user interfaces.

### Challenge

- Explain how a user interface can apply design principles to meet specific user needs
- Assess the suitability of different types of user interface and how effectively they meet user needs.
- Assess the extent to which your chosen user interface meets its purpose.
- Assess the extent to which other user interface designs would achieve the same purpose.

### ASSESSMENT ACTIVITY 1 LEARNING AIM

### Assessment of design principles

Choose two different types of user interface from the following list:

- textual based menu based
- forms based
- graphical user interface
- speech based
- sensor based.

For each of your chosen user interfaces:

identify where different design principles have been used

- assess how the different design principles improve the effectiveness of the user interface for its users
- assess the positive and negative effects that each design principle has
- assess how each design principle supports the user to use the interface efficiently.

You should include examples of where each different design principle has been used. These should be relevant to your specific user interfaces and be justified.

Your evidence can be in the form of screenshots of your chosen user interfaces, with annotations to show where different design principles have been used. You may also want to provide text that goes into more depth about how effective the different design principles are.

### ASSESSMENT ACTIVITY 2 LEARNING AIM

### Assessment of user needs

Complete the following for each of your chosen user interfaces in Assessment activity 1.

- Describe how intuitive the user interface is and how it could be developed further to better meet the needs of users.
- Assess to what extent they support users with different accessibility needs. skill levels and demographics.
- Assess to what extent they match user perceptions and the methods that are used to keep the user's attention.
- Assess their suitability and describe an alternative user interface that could have been used.
- Give clear reasons why the alternative type of user interface would better meet the user needs.

Your evidence can be in the form of screenshots of your chosen user interfaces, with annotations to show the different features that meet specific user needs. You may want to provide text that goes into more depth to justify your reasons.

### TAKE IT FURTHER

Consider the possible ethical issues that each of your chosen user interfaces may create for groups of people with different demographics.

For each issue explain why it is an ethical issue and suggest ways that the user interface can be adapted to resolve these issues.

The command word *identify* means that you are required to look at something and pick out key areas that answer the question. This means that you need to look at different user interfaces and highlight where you think different design principles have been used.

### TIPS

The command word assess means that you are required to cover the different factors that answer the question and then choose which are the most important or relevant. You are also required to give a conclusion by providing reasons why these are the most important or relevant.

Try to include as many examples of where specific user needs have been met as you can. These should be relevant and well justified.

### TIPS

TIPS

The command word *describe* means that you are required to give an account of something. You are required to look at different user interfaces and then give a written description as to how it meets different user needs.