CHAPTER 5

APPROACHES TO PROBLEM SOLVING

Key knowledge

After completing this chapter, you will be able to demonstrate knowledge of:
Approaches to problem solving

- key principles of information architecture
- characteristics of effective user interfaces for mobile devices, for example useability, accessibility, tolerance, visibility, legibility, consistency, affordance
- design principles that influence the appearance of websites
- design tools and techniques for representing websites
- formats and conventions suitable for websites
- software functions and techniques for manipulating and validating data, and testing websites
- tools and techniques for coordinating the tasks, people, digital systems resources and time required to create solutions.

For the student

Designing and developing a website collaboratively requires extensive preparation and organisation. The purpose of this chapter is to assist you with designing a website for Unit 1, Outcome 3, paying special attention to the principles of information architecture. The design and development stages of the problem-solving methodology are described in detail. You will explore techniques for representing designs, manipulating data into information, and formats and conventions for websites.

For the teacher

This chapter introduces students to solving information problems through the use of information systems. A problem-solving methodology is discussed, with the emphasis on design and development. The content of this chapter leads students to an awareness of creating digital solutions using various techniques and procedures. At the completion of Chapters 4 and 5, students should be able to demonstrate Outcome 3, which requires students to contribute collaboratively to the design and development of a website that presents an analysis of a contemporary issue and substantiates the team's point of view.

Creating team solutions

Working in a team is a common practice in most workplaces. The benefits of **collaboration**, even with team members in other countries or states, are great. The right team can share work and pool experience to produce more useful solutions far more quickly than any one individual could achieve. With work teams comes the need for organisation. Resources need to be allocated, timeframes determined and personnel briefed on an ongoing basis to ensure that the project or task is completed on time and within budget. In this section of the chapter we will look at some common techniques and tools used to coordinate team-based tasks – that is, to manage a project.

Managing projects

The work of an organisation might consist of routine, day-to-day operations, or it might involve organising unique projects. Managing a retail outlet or a manufacturing business, where sales and production occur continuously, will be different from managing a construction project that is unique and has definite start and completion dates. **Project management** techniques have been developed to help organise a range of unique projects. Examples of projects could include larger-scale projects such as introducing a new brand of toothpaste to self-serve checkouts in supermarkets, and smaller-scale projects such as developing a website.

What is a project?

An idea usually launches a project. An individual or a group of people decide that there is a need for a new solution, a study is commissioned and then project planning begins. A project has the following characteristics.

- A clearly defined purpose
- A starting time
- A finite lifetime
- A number of interdependent tasks

Examples of large projects include the rollout of the National Broadband Network (NBN) across Australia and the Fisherman's Bend Urban Renewal Project in Victoria. Both have a clearly defined purpose and a definite lifetime. Both required a complex set of interdependent tasks. However, in small organisations, projects would not be as complex as these. Organising a school dance, creating a website for a local sports club or creating solutions using databases and spreadsheets are also projects in which project management techniques could be used effectively.

We manage small personal projects every day, and they can range from preparing dinner to buying a car. With larger projects, the number of tasks involved and the complexity of their relationships make it more difficult to manage time and cost. Project management techniques help managers to allocate resources (people and digital systems, for example), schedule tasks, monitor the project timeline and manage costs.

Project management techniques

Project management involves identifying key tasks, allocating resources, scheduling and monitoring those tasks, identifying milestones and determining **contingency plans**. It is therefore important to be aware of the factors you need to consider, as well as the meaning of commonly used terminology.

Tasks

The project should be broken into a series of tasks. Each task should be substantial, but not so large and complex that running over time will seriously affect the completion time of the whole project. The criteria for assessing when the task will be complete must be clearly defined so that a completion time can be recorded. One common method of checking that a task is complete is a checklist. A **milestone** is reached when a particular stage of the project has been completed. A milestone is not a task, so it has no time duration.

Resources

Resources are assigned to each task, and include technical (money and equipment) and human resources. People involved in a task must have input into setting completion times for the task so that timelines are realistic.

Schedule

Tasks are interdependent. A schedule allows you to map the project tasks and display interdependencies. A Gantt chart is one common way of displaying a schedule. A Gantt chart provides a timeline of how the project will be implemented. It visually represents the tasks that have to be completed, when they are to be completed and the time that each task should take. A Gantt chart may also show which tasks are dependent on one another, thus allowing for the identification of the **critical path** of the project.

Because tasks are interdependent, they must be completed in a particular order. Starting some tasks depends directly on the task that is completed before them. For example, when baking a cake, you must first gather the ingredients and materials, then mix the ingredients together, then place the mixture in a tin, and then put it into the oven. To bake the cake before the ingredients have been gathered or mixed together is not possible.

Costing

A charge, or cost, is assigned for the use of resources. Human resources can be charged at hourly rates; other resources may have a fixed charge or a daily rate.

Quality control

Each project has a defined goal, and the project must meet all the specified requirements by completion. **Quality control** involves checking results against identified quality standards. It is just as important to apply quality-control techniques to processes as it is to apply them to products or other end results. Quality control on processes can cut costs and improve timelines.

Tools such as flowcharts, control charts, cause-and-effect diagrams and scatter diagrams can be used to monitor quality control. Of these, the **flowchart** is the most useful, especially for procedures.

The time for some tasks can be extended without affecting the completion time of the project. Other tasks might delay the whole project, even if they are a short time overdue. Such tasks lie on the **critical path** of the project, and extra resources may need to be provided to ensure that they do not run over the time allocated.

Contingency plans

You can create a 'perfect' project management plan; however, if there are some hold-ups with the completion of tasks, your plan can be thrown into chaos. Project managers look carefully to identify possible risks and work out how these potential problems could be overcome with minimal disruption to the overall project timeline; for example, equipment not being available at a critical time, proofreading taking longer than expected or a task proving to be more difficult than expected.

Contingency plans are a set of predetermined actions that a project team will take if some kind of disaster occurs. For example, if the new software is not developed in time for its scheduled implementation, staff may keep using a manual system until the new one is ready. Meanwhile, the software installation task could be delayed while another task, such as hardware delivery, is brought forward.

Tools for managing projects

You can draw on a number of tools to assist you when planning projects. Most are designed to show different aspects of a project's status, such as the time taken as opposed to which tasks depend on one another. Therefore, the project management tools discussed below should be used to complement one another; not in isolation. Project management software does not create tasks and assign resources. You must make informed decisions, and the software will aid the management, documentation, presentation and communication of project information. You can update the documentation easily when changes are made during the course of the project.

Project table

The project manager will brainstorm, on a separate sheet of paper or word processing document, all the possible tasks involved in analysing a problem, and designing, developing and evaluating a solution (Table 5.1). Once **brainstorming** is complete, the project manager can use the task analysis outline shown in Figure 5.1 to order each individual task.

TABLE 5.1 The main headings of a project table for publishing a report

Task number	Task name	Duration (days)	Resources required	Task milestone (Y/N)	Dependent tasks (predecessors)
1	Departmental reports	5		No	N/A
2	CEO's report	3		No	N/A
3	Proofread	2		Yes	1, 2
4	Obtain artwork	5		No	N/A
5	Cover design	3		No	4

Gantt chart

A Gantt chart provides a standard format for displaying project schedule information by listing project tasks and their corresponding start and finish dates in a calendar format (Figure 5.1). Gantt charts not only show a timeline for completion of the project, but they can also highlight

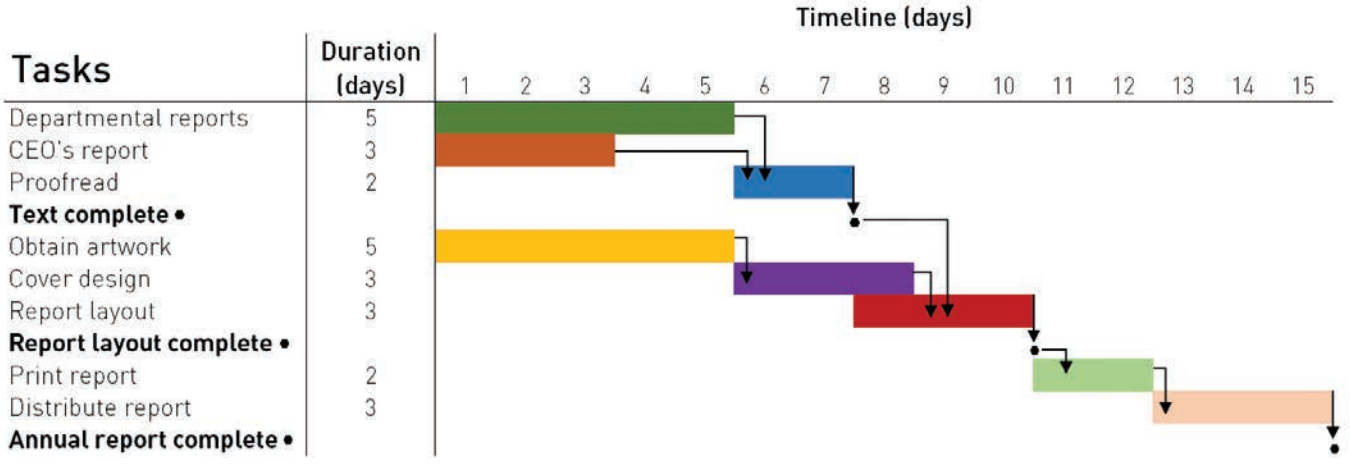


FIGURE 5.1 An example of a Gantt chart created in Microsoft Excel. Simple dependencies have been shown with arrows. Different colours can be used to make it easier to identify individual tasks.

tasks that are critical to the timely completion of a project. Using a Gantt chart makes it easy for the project team members to see when tasks need to start and how long they should take. Many Gantt charts also show milestones and basic task dependencies. Although you can use dedicated project-management software to generate Gantt charts, simple ones can be constructed in spreadsheet programs.

Groupware

When people work together to develop a solution to an information problem, they often do so in sequence. One person may conduct research, the findings of the research are considered for input and manipulation, and may be then passed on to the person performing the data input, and so on to the next person in the work cycle. An example of this might be a team working on a website, such as your group for your Outcome. The team must wait on modifications to the design from each team member before a final design can be agreed on and developing begin. **Groupware** is software that is designed to allow workers to collaborate on tasks, whether they are in the same building or spread across the globe.

A key part of collaboration is file **version control**. Consider the importance of file names that incorporate version information. With many people working on files, it is easy for someone to be working with out-of-date information, unaware that revisions have been made. In addition, workers may accidentally overwrite a newer version of a file with their own, older version.

Groupware applications, such as Microsoft SharePoint, allow project managers to keep control of document versions. Moreover, using a sequential file-naming strategy and storing working files in a central location that all team members can access will help to reduce the problem of working with outdated information.

File-naming conventions are discussed further on in this chapter on page 201.

Overview of Microsoft SharePoint for Office 365

Designing websites

When designing a website, it is best to follow a few key principles for effective design.

- Place most text and images within the dimensions of the screen size to minimise scrolling.
- Make the pages no longer than two average screen lengths. If the content requires more than two screens, divide it into several pages.
- Emphasise important words, not every word, so use bold and italics sparingly.
- Avoid underlining text because it can be confused with **hyperlinks**.
- Navigation buttons should be consistent and every page should link back to the homepage (index page).
- Use thumbnails and small images where possible and appropriate to reduce page loading times to keep visitors happy. If you want large image options, give users the options of clicking on thumbnails and loading images in full size.
- View your site in different browsers and different OS. Different browsers and systems always interpret code a little differently.
- Remember that generally, the colour of hyperlinks changes if a user has clicked it before. Indications of past navigation helps users to understand their current location and consider where to go next.

Lucidchart is a free online tool that allows users to create diagrams

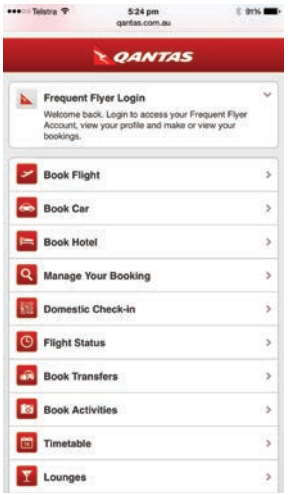


FIGURE 5.2 Qantas website on a smartphone

Designing for mobile devices

Characteristics of effective user-interface design

User-centred design is a methodology that focuses on the needs and characteristics of users, and is applied at the beginning of the design process to ensure that the website is useful and easy to use. The user interface (UI) is the screen that users see when they interact with a device. User interface designs can relate to websites, blogs, computers, mobile devices, ATMs, information kiosks, airport check-ins and any other device that a human interacts with. Mobile devices have become increasingly popular and are a rapidly growing technology. They are transforming our daily lives and providing the means to access the internet without having to use a computer as our primary means for accessing the internet. Given that websites are increasingly accessed through mobile devices, website designers need to carefully consider their interface designs and how they will be viewed on a mobile device (Figures 5.2 and 5.3).

As interactive touchscreen devices such as tablets and smartphones have become prevalent due to their mobility and the low dependence of data entry, these devices present some

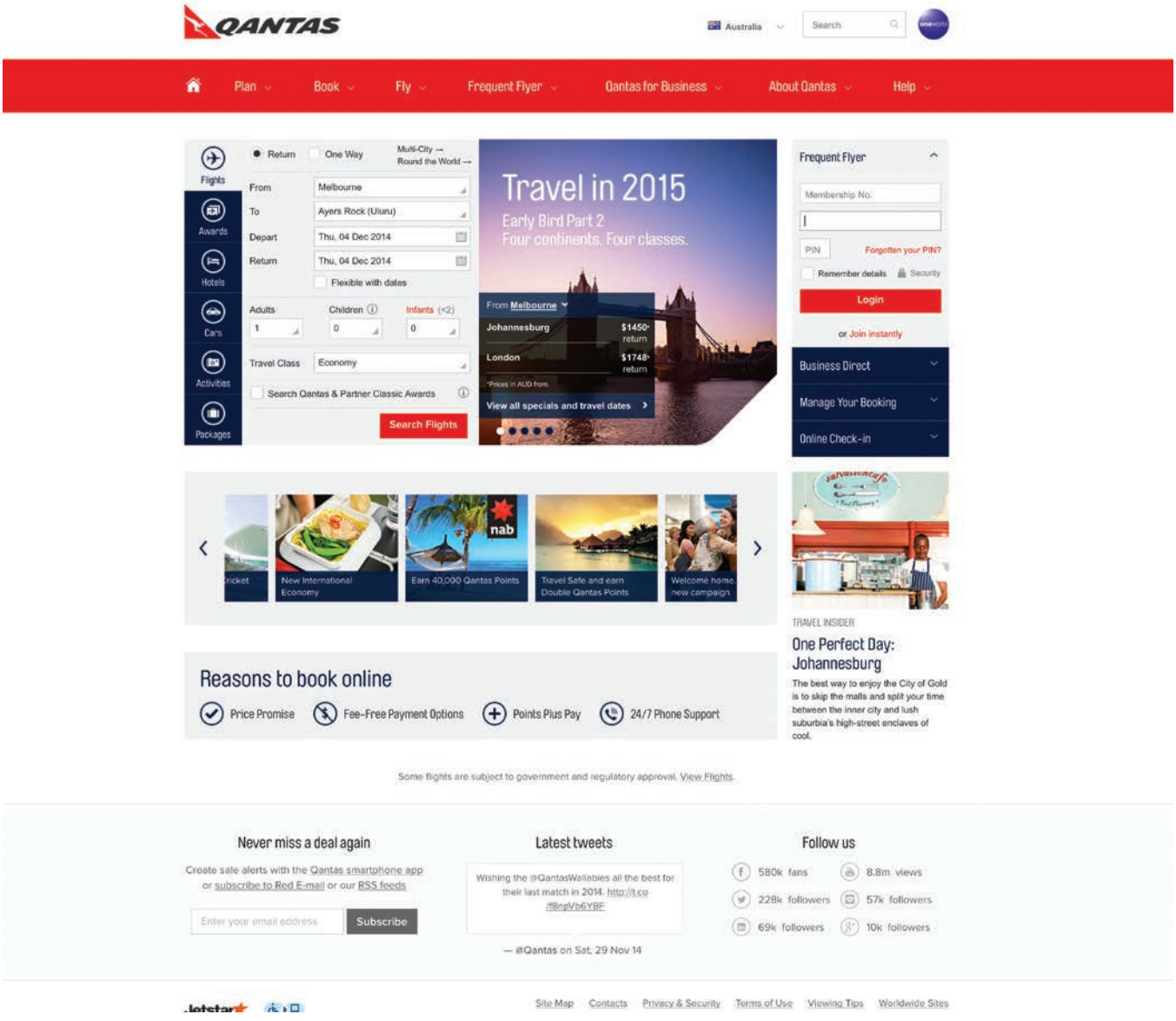


FIGURE 5.3 The Qantas website on a desktop looks very different to the mobile version.

useability challenges. The issues associated with mobile devices include, small, low-resolution screens, limited options for input, unpredictable connectivity issues and lower hardware specifications. Many websites have been designed for full-scale laptops or computers and have not been considered for mobile users.

Useability

Developers of websites need to understand their users, in particular their goals, skills, preferences and propensities, before designing the website.

Useability of a website is a quality or characteristic that represents how easy the website is to learn and to use. It is based on a set of characteristics aimed at designing usable and accessible websites constructed on user-centred design.

When designing the interface, developers need to ensure that it is kept simple. That is, the language is clear on the labels and there are no superfluous elements to distract the users.

Designers need to consider the consistency of common elements throughout the website. Users need to feel comfortable by being able to pick up patterns in language, layout and design throughout the site. For example, if the front page is called 'home' then all references to this page need to be called 'home'. Sometimes, instead of words, a graphic may be used to direct users to a particular page; for example, a picture of a house may be used to indicate the homepage.

Touch zone

When designing mobile interfaces, the touch zones on the website need to be big so that users can easily and accurately tap the targets. Small touch zones or ones grouped closely together make it harder to manoeuvre, as they require more accuracy. Sometimes users have to change the finger used, a thumb, for example, is much larger than the target, and an index finger is slimmer, which can assist with accuracy. The size of a touch zone should not cause users to make errors; therefore, increasing the size will help users avoid mistakes.

Increasingly, users of mobile devices walk while using their device, and therefore context and walking is another constraint. If you need to use your mobile device while walking, then the touch zone has to be bigger to accommodate the possibility of errors. The text of the page needs to be even bigger to allow for the jumping and moving around.

An MIT Touch Lab study found that the average width of the index finger is 1.6 to 2 cm (16–20 mm) for most adults. This equates to approximately 45–57 pixels, which is wider than what most mobile guidelines suggest. There are inconsistencies between Apple and other vendors' guidelines; however, Apple's guidelines are for the touch zone to be approximately 1.55 cm to allow for an average human finger size when interacting with the device.

Read-tap asymmetry

A read-tap asymmetry is where the font is large enough to read, but is too small to touch. While we can read very small fonts, they need to be much larger for us to touch them precisely; therefore balancing this causes everything to increase in size on mobile devices. Using large touch zones on websites will help users of mobile devices to have a positive experience.

Accessibility

People with a wide range of abilities need to be able to use interfaces designed for mobile devices. Interfaces need to be operable, understandable and perceivable for people with all levels of abilities including all disabilities, or limitations such as visual, auditory, physical, speech or cognitive impairments. For example, people who have visual impairments or cognitive disabilities can zoom or magnify the entire screen so that text appears larger.

Accessibility is also a design principle. See page 184 for more information.

The World Wide Web Consortium, sometimes known as WC3, is a widely accepted internal group that works with the public to develop standards and guidelines for the Web. One set of guidelines developed by WC3 refers to web accessibility for disabled users.

Some commercial companies sell software that can check websites against these guidelines. For instance, Bobby software is an application that acts as a spider. It will 'crawl' through a website to check that it meets all accessibility requirements. It then produces a report, which the website owner can act on to improve their site's accessibility.

WC3 standard and guidelines for the web

Accessibility can also refer to technological barriers such as a lack of resources or choice of technologies. For example, internet access can vary even when using broadband, and if users need to download large files, this may not be accessible to those who have a slow connection. Sometimes the location of the house and its distance from the telephone exchange mean that broadband is not available. As a result, the household must rely on mobile wireless data, which is costly.

THINK ABOUT COMPUTING 5.1

1 Visit the World Wide Web Consortium website and look at the five guidelines for Web accessibility. Choose three and write a brief explanation of each.

2 Do you think that these five WC3 guidelines should become law? Discuss.

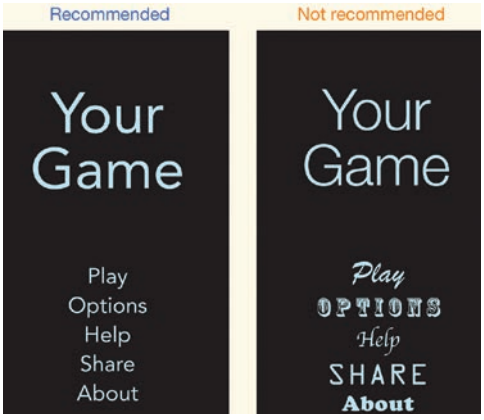
Tolerance

Websites that are well designed should prevent users from making mistakes. Although mistakes will always occur, a tolerant user interface should let users recover from their mistakes. For example, if you forgot your password, how many times will you be allowed to retry it before the system penalises you? Another example of tolerance is when the software auto-corrects spelling mistakes in user messages – the software can anticipate and correct most typing errors. A final example is when conducting a search on Google, the user types in what they are looking for and, even with spelling mistakes, Google refines the search and produces variations.

Legibility

The use of typography, that is choice of fonts, sizes and arrangement of text can assist to create hierarchy and clarity. It can also increase the readability of the site. Developers of user interfaces should take into consideration the following.

- There needs to be sufficient contrast between the use of colours so users can differentiate between contexts. One way to test this is to use the device in varying light conditions such as indoors and then outdoors on a bright sunny day.
- Do not use a combination of red and green buttons to distinguish between two options, as colour-blind people struggle to tell the difference.
- Research the use of colours, as some cultures and countries perceive colours in different ways. For example, in Chinese culture the colour red signifies good luck; whereas white signifies death and mourning.
- Text should be legible. Ideally, body text should never be smaller than 11 points, even when the user chooses the extra-small text size.
- In general, use a single font. Mixing several different fonts can make your website seem fragmented and sloppy. Instead, use one font and just a few styles and sizes.



https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/ColorImagesText.html

FIGURE 5.4 Stick to one font throughout the development rather than many different ones

Visibility

By giving thought to the placement of items on the page based on importance, a designer can draw attention to the main pieces of information and can also assist with readability. The use of colour, light, contrast and texture can either attract users or redirect their attention from items. Effective visibility provides prompts and cues, which can assist users through an interaction, guide them through a series of steps, indicate the possible options available to them and communicate the context of the situation (See Figure 5.5).

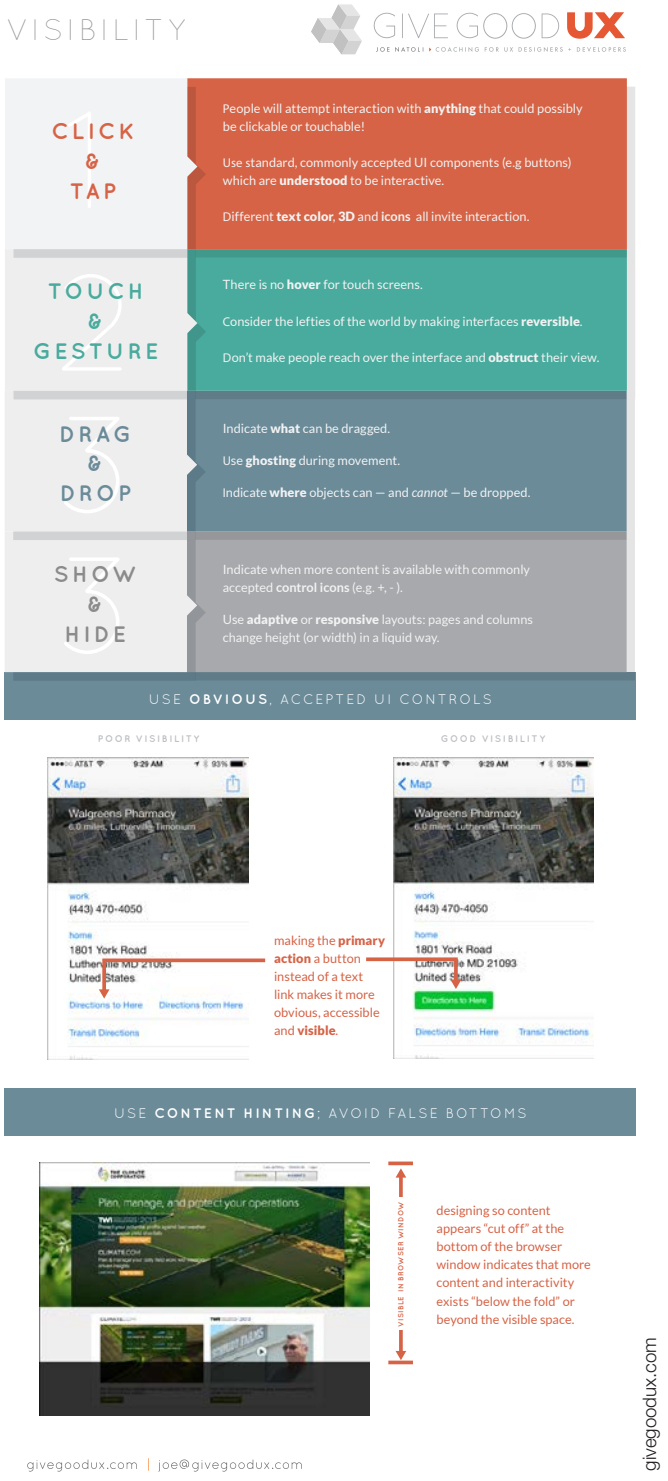


FIGURE 5.5 An infographic on visibility

Useability – US government website guidelines

Consistency

Just as we mentioned that consistency is important in navigation design on page 173, it is also important to use common elements in a user interface to ensure that the site is consistent. By using common elements, users are able to navigate the website confidently and comfortably. Consistency of user interface involves creating patterns in language, layout and design as can be seen in the Useability weblink.

THINK ABOUT COMPUTING 5.2

How many possible actions can you name from the Tumblr home page (Figure 5.6)? For example:

1 Input an email address

2 Input a password

3 Click the privacy link

Affordance

An affordance is a desirable property of a user interface. It logically and naturally leads people to take the appropriate steps to accomplish their goals. Affordances indicate what is achievable and can take many different forms such as shape, texture or size. For example, a toaster slot affords the insertion of bread in the slot; a door knob affords the turning of it. Affordances provide subtle clues on how to interact with objects. Web and mobile interfaces must gain all of their affordance through design. For most designers, this is intuitive and instinctive, based on the thousands of design patterns seen every day. In terms of a website, the solution should provide strong clues to the operation of things. The user should know how to operate a control just by looking at it rather than looking for words or instructions.

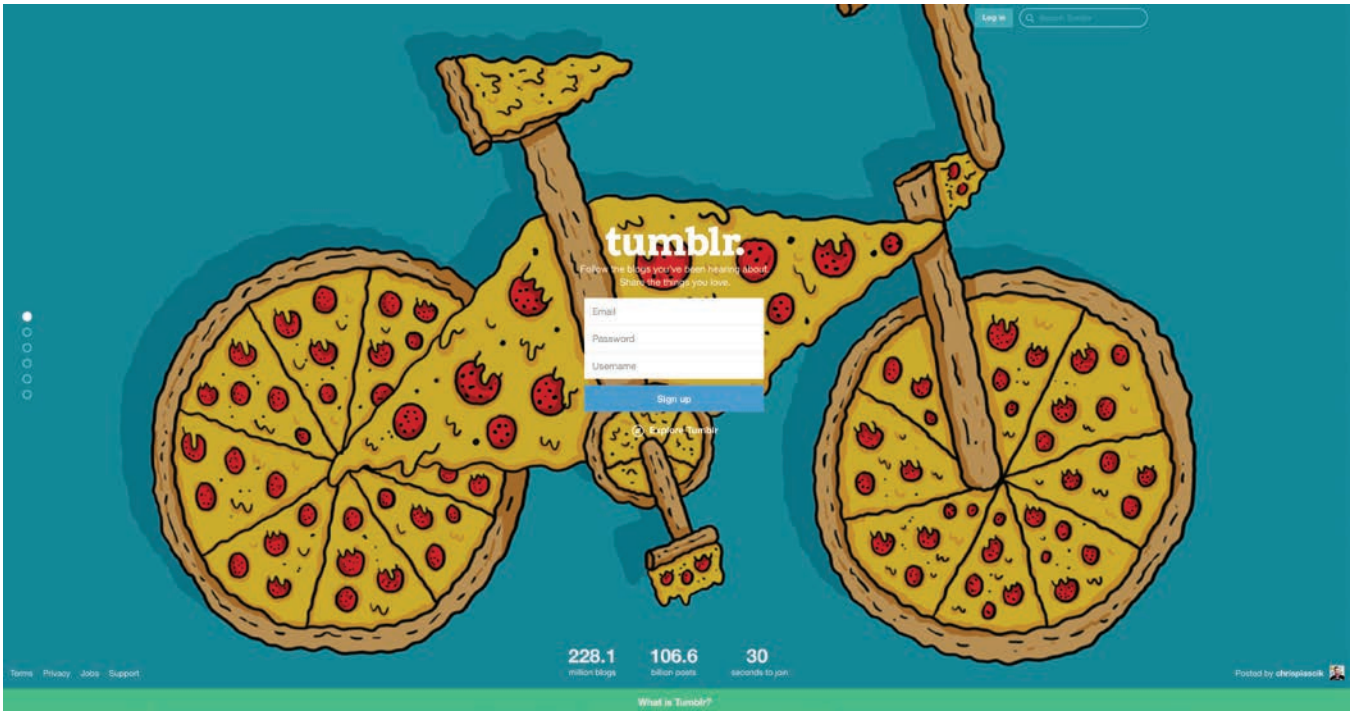


FIGURE 5.6 The homepage of Tumblr has many actions that are affordances.

On the Tumblr home page (Figure 5.6) there are many actions that are affordances, which interact with the way that an interface 'affords' its capabilities to the user. By identifying and recognising patterns, users are able to work their way through the website with little guidance or direction, because of the capabilities of the user interface.

Skeuomorphism is a design principle in which design cues are taken from the physical, real world; for example, the use of folders and files graphics for computer filing systems make them feel recognisable to users. Affordance cues are still evolving; however, we are moving away from skeuomorphic towards digital cues.

Information architecture

When designing your website for Unit 1, Outcome 3, you should consider the site's information architecture. Information architecture refers to the ways that content, which is made up of information and objects, is grouped, labelled and located in online solutions. In other words: how a website is structured and its navigation pathways. If users cannot navigate easily through a website, they will become frustrated and soon leave. Effective website navigation is crucial. If you consider and use the key principles governing information architecture when designing your website for Outcome 3, you will design a website more likely to enable users to intuitively and confidently locate the information they require. The key principles of information architecture include disclosure, classifications, navigation, growth and choices.

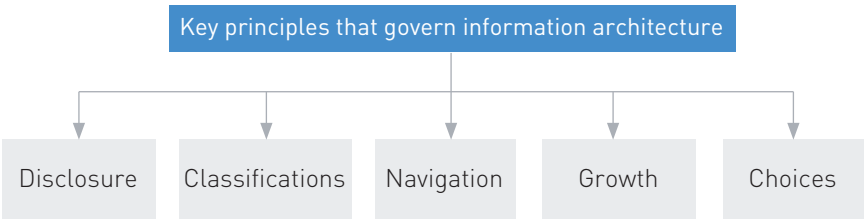


FIGURE 5.7 The key principles that govern information architecture

The user interface is everything designed into an information system with which a user may interact. This can include both hardware and software components. Examples of hardware UI components include the display screen, keyboard, mouse, tablet, stylus and touchscreen. Examples of software UI include the operating system (such as Windows, Linux or Mac), and application software.

See Figure 5.31 on page 199 for an example of a layout diagram.

An interface designer will utilise design tools such as layout diagrams to plan the appearance of onscreen output. Layout diagrams show the placement of important elements on each screen, including headings, graphics, text, hyperlinks and search fields.

Business and government websites would have differing information architecture (Figures 5.8 and Figure 5.9), so it is important that information is structured correctly. You should plan the information architecture of your website carefully using appropriate design tools, such as site maps and multimedia storyboards. These tools are used to plan the way the information is structured, linked and navigated. It is equally important that your website be designed for viewing on mobile devices.

Text-based information, in particular, requires information architecture because navigating through files relies on user interaction. Make sure the structure is logical for the user. You can make video-based information more self-contained and self-guided, but the information architecture must still be well planned and structured. As with the architecture of a house or building, careful forethought and design for information architecture will lead to a solid structure for the solution.

The following section discusses each of the principles of information architecture in turn: disclosure, classifications, navigation, growth and choices.

Disclosure

In information architecture, the principle of disclosure is about presenting only as much information as is necessary to complete a given task. The users of your website will only be able to process so much information at a time.

You have to limit the information, emphasise the important points and present only what your users need. If you go too far and try to give them all the information you have at the same time on the same page, you will create information overload and the importance and emphasis will be lost in the 'noise'.

The key is to show less information, but make sure it is the right information, and offer your users options to access more content if they want to.

Dropdown menus, +/– icons that open and close a hierarchy, alt text and thumbnail images that enlarge to full-size images when moused over are all simple ways of using disclosure to your advantage.

Classifications

Users do not always use the same terms for searching or browsing. Information architecture recognises that human beings are prone to classifying things in different ways and that no single classification scheme will be right for everyone. It is wise to use multiple classification schemes on your website so you can offer users more than one way to find content.

Classification schemes for online content include the following.

- Alphabetical
- Audience
- Formatting
- Geographical
- Organisational
- Subject/topic
- Task
- Combination

UX Booth: Classification schemes – and when to use them

CLASSIFICATION SCHEMES

1 Research classification schemes online. Read the information at the UX Booth weblink as a starting point.
2 Choose two of the classification schemes, other than alphabetical, and find three websites, not from the weblink, which use that classification scheme. Take screenshot examples.
3 Summarise and justify how each website uses the classification scheme indicated. Hint: Annotating the screenshots may help.

Navigation

When you have planned the organisation of your website thoroughly, you should plan your navigation paths accordingly. For example, imagine that you were a shoe retailer and had the following five webpages to add to your new website:

1 Job vacancies
2 Privacy policy
3 Grand opening sale
4 Items $20 and under
5 Mary Jane shoes sizes 8–10

You would never put links to all five of these webpages in the same menu, because they are not of the same category. This principle goes together with the principle of classifications. You need to focus the navigation on your website so that menus group similar items together to make the most sense to users.

As a shoe retailer, you could probably group 'Job vacancies' and 'Privacy policy' in the same menu, because these are often located in the headers or footers of websites and users expect these to be unobtrusive but easy to find if they scroll on the homepage.

'Items $20 and under' and 'Mary Jane shoes sizes 8–10' could be grouped in the same menu – but only at a stretch. One indicates a price ($20 and under) and the other a category (Mary Janes in sizes 8–10) – but they both also indicate a product: shoes.

The only solo item would be the 'Grand opening sale', which would occupy prime real estate on the front page.

By the time you are at the stage of developing the navigation for your website, you will know a great deal about how you have organised its content. Have you organised it alphabetically, by category, time, location or by using some kind of hierarchy? This organisation is relevant to how you develop the navigation pathways.

If you wanted to be able to view both 'Items $20 and under' and 'Mary Jane shoes sizes 8–10' in the same menu (shoes), you could instead use the **principle of disclosure** by adding all products to one page, and apply filters (by size or shoe style) and sorting (by price) to show only the desired items.

Growth

When building a website, you should assume that the content you have today is only a fraction of the content that will eventually be there. Websites keep growing and changing. Most are perpetually under construction. You need to organise content on your website in a way that allows for growth. Consider a simple blog – even this is constantly growing and changing as entries are written, published and commented upon. Blogging software needs to be written to allow for such growth. On the opposite end of the spectrum, websites with massive volumes of sales change rapidly as new products are added, out-of-stock products are removed, promotions are created and new stores-within-stores (such as Amazon's Kindle storefront) go live.

If you do not build a website with the principle of growth in mind, you will be faced with needing to retrofit your design to accommodate it – or you will have a website that will not be easy to update and will slowly stagnate and die.

You should try to make sure you can:

1. Easily add the same type of content to an existing category (for example, add new blog entries to a blog)
2. Add a different type of content to an existing category (for example, add video or audio to a category that only had blog entries)
3. Create a new category of content.

Choices

Sometimes when you are given too many choices for something, it can be harder to make a decision. The longer the dropdown menu is, the less it is will be used. The principle of choices in information architecture is about minimising the number of choices that users need to make at each level, especially the top levels. You do not want to make your users sort through all of the options in the menus to find what they really need, which is what will happen if your menus are too long and are unfocused.

Make shorter, meaningful lists at the top level. Use tabbed, expanding lists, sub-lists and hierarchical levels to show deeper levels of information where needed. Minimise the range of choices that your users have to make at each level.

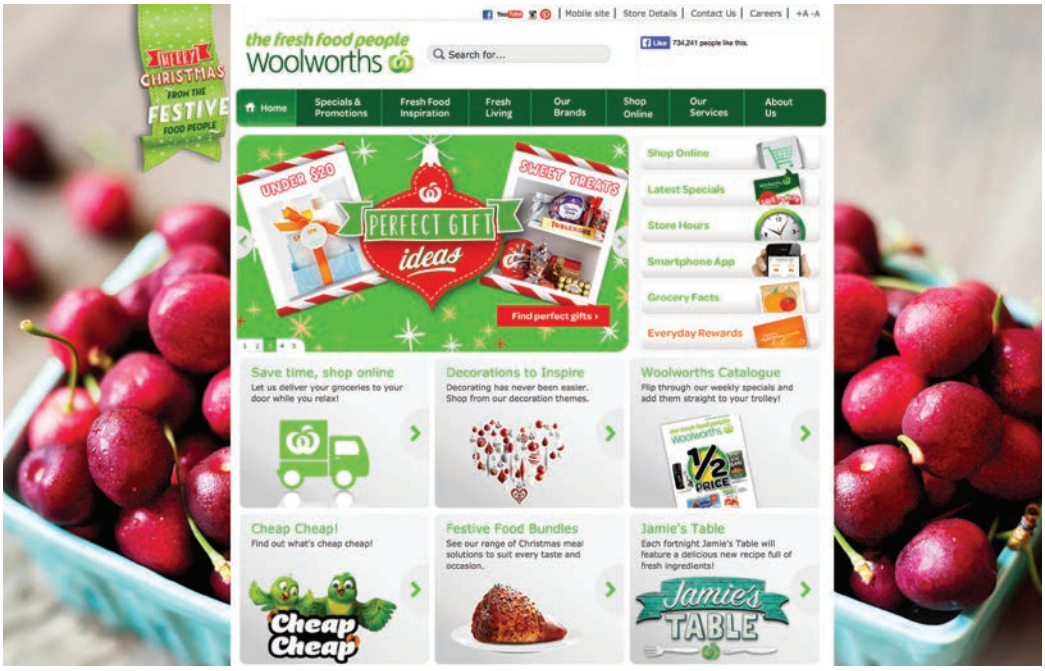


FIGURE 5.8 An example of commercial website architecture

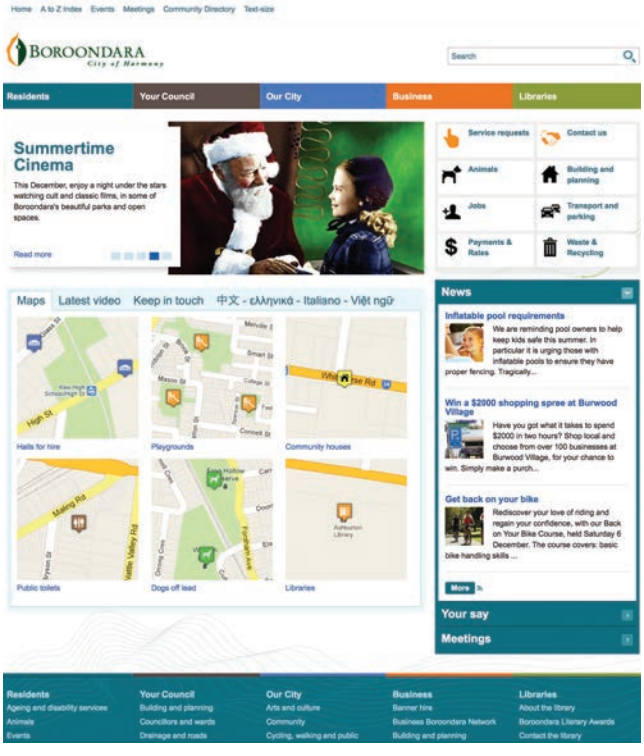


FIGURE 5.9 An example of government website architecture

THINK ABOUT COMPUTING 5.3

Find another example of a government website and see if there are any comparisons between the features in Figure 5.9 and your example. What makes a government website different from a commercial one?

Design principles

Your website for Unit 1, Outcome 3, should be carefully designed. To communicate your issue effectively, it should be easy to access and navigate with minimal time and effort, as well as visually clear and functional.

If your website is not functional, it will frustrate users (Figure 5.10).

FIGURE 5.10 The Liberty Van website is a good example of a website with poor navigation and random links

Design principles are factors that enhance the appearance and functionality of graphic solutions, such as websites. You need to ensure that your issue is obvious and your message is unmistakable. Your website must be carefully designed, taking into account the importance of design principles.

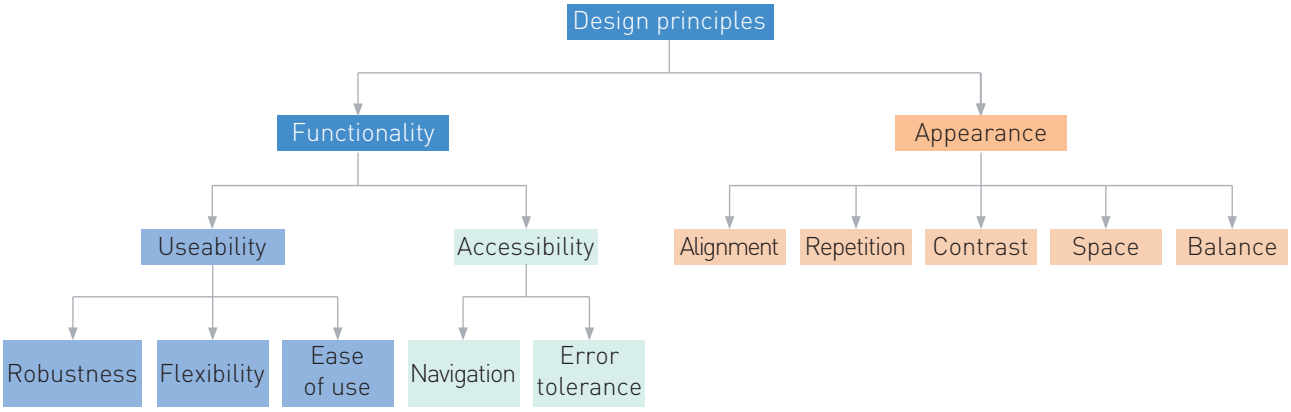


FIGURE 5.11 Design principles are accepted characteristics that contribute to the functionality and appearance of solutions. For VCE Computing, the principles that relate to functionality are useability and accessibility. For appearance, they are alignment, repetition, contrast, space and balance.

Website users want a well constructed website that provides the necessary information and does not make them waste time sifting through pointless material. They also want a website that loads quickly.

The principles shown in Figure 5.11 are discussed in the following section, in terms of how they may apply to the website in Unit 1, Outcome 3.

Functionality

Useability

Useability refers to a website's capability of being used and its availability to a user. It is important that any website incorporates maximum compatibility with a wide range of devices, including future technologies, so that users are not tied to a particular platform or device. This is one reason why websites and apps are designed to work on desktop PCs as well as tablets and smartphones.

If you ensure that users cannot view or access any data structures or important libraries during browsing, you are also abiding by the information architecture **principle of disclosure**.

Robustness is a website's ability to cope with errors during use. In your website, this may mean giving a user the option to correct data or undo an action, step backwards or forwards, and provide accurate and unambiguous error messages. You should also make sure that users cannot access any data structures during browsing because this may introduce bugs into your code and cause further website errors.

Flexibility relates to information architecture's **principles of classifications, navigation** and **choices**.

Flexibility is a website's ability to support multiple ways of performing tasks. For example, many websites were once designed with fixed-width dimensions, such as 800px. These websites only supported a single way of viewing the website – using a browser that supported the fixed-width page size. With so many different browsers, operating systems and devices in use today, it is better to build websites that are flexible, without fixed dimensions, and instead let the user determine the page size.

Scalable type, which is text that can be scaled up or down in size, is also desirable. This is especially important for Outcome 3, because you are creating a website designed for viewing on mobile devices. Device independence and liquid layouts are also desirable. View the Peach Pit weblink for more information on designing for liquid layouts, device independence and scalable type.

Peach Pit: Useability tips you can use: Designing flexible layouts

Ease of use refers to how user-friendly your website is. Some of the user-friendliness aspects overlap slightly with the appearance design principles. However, you should also ask questions when creating, planning and testing the website.

- Is it easy for users to intuit the design of your website and perform basic tasks?
- Can basic tasks be performed quickly?
- Will users remember how your website works when coming back after they have not visited for a long time?

If it is hard to learn the design of your website – *perhaps* because it differs greatly from other websites – it can be very confusing to users and they will be tempted not to return. If accomplishing basic tasks is too hard users will be reluctant to come back: have you ever felt frustrated simply because a website has required far too many clicks on one page just to transition to the next page?

Ask yourself and your group the tough questions about your website. You should make things as easy as possible for users. Too much scrolling, too much clicking, pages that pop-up unexpectedly and websites that are designed in unexpected or unpleasant ways can all reduce ease of use.

Simply being *different* from other websites does not necessarily mean your website will be confusing. If your design is logical or makes sense to users in other obvious ways, it may still work. You never know: your new website design may be a stroke of genius.

FLEXIBILITY

1 Using the Peach Pit weblink as a starting point only, research scalable type, device independence and liquid layouts. Visit at least five other websites.
2 In your Outcome groups, write a summary of:
   a device independence
   b liquid layouts.
3 In your groups, find one website on an issue similar to yours. View it on a mobile device and on a PC. In the table below are the principles of information architecture and design we have so far discussed. In the right-hand column, score each website between 0 for not at all and 5 for very well, in terms of how well you think it is applying each of the principles. You do not have to agree with the rest of your group, but you should discuss your opinions.

	Score (0–5)
Principle of disclosure	
Principle of classifications	
Principle of navigation	
Principle of growth	
Principle of choices	
Useability – robustness	
Useability – flexibility	
Useability – ease of use	

Accessibility

Accessibility as a website design principle really means making your website easier to use for everyone. With so many different versions of browsers and plug-ins available, avoid using special effects created in software such as Flash, Java and JavaScript as the only navigation method. (Particularly because devices such as iPads are unable to play Flash.) Your website needs to be accessible to all visitors, and this is especially true of navigation techniques. Interface designers should design onscreen user documentation that can be read in common software applications, such as Adobe Acrobat Reader. Design your website to be compatible with any browser, and do not require a specific screen resolution or plug-in for correct viewing.

Error tolerance as an aspect of accessibility means helping your users to avoid and correct their mistakes using clear instructions. It also means making it difficult for them to make errors by not allowing them to perform actions that could lead to errors in the first place. Grey out non-selectable options. Ask for confirmation of major actions. This is connected to **robustness**.

Navigation as an aspect of accessibility refers to ensuring that the navigation system is clear, simple and intuitive. For your website, it will also mean making sure that your website can be navigated comfortably by a touchscreen (so the buttons should not be too small and close together, making this difficult). Navigation has a number of other aspects that should be considered.

High-quality UIs are transparent, meaning that your users would not really notice the actual interface because it is so easy to use that they interact with it intuitively. The required information would be found quickly enough that users focus on it rather than the way they found it. The interface is a connection point or navigation tool rather than an end in itself, so it should be unobtrusive but clear.

You should also consider meaning, comprehension, consistency, and appropriateness and relevance in navigation.

Meaning

The labels of icons used for navigation should be meaningful, and the links need to be clear. For example, a school's internal newsletter is known by a particular name; however, visitors to the site who are not familiar with the school may find it hard to find the newsletter if they do not know its name. Someone who has never been to a website before should know immediately where a link will take them.

Comprehension

If images are going to be used for navigation instead of words, these images need to be commonly used and universally understood. For example, when we think of traffic lights, red means stop; amber, caution; and green, go. An image of traffic lights is universally recognised without having to write the words next to each light. Generally, images used as navigation on websites are not universally recognised and can cause problems as visitors to websites do not know how to navigate through the site. It is a good idea to associate text with images so that the links are understandable.

Consistency

To ensure that the website remains consistent and has a similar feel about it on all its associated pages, navigation should appear on every page of the website (Figure 5.12). The basic structure of the navigation in the same location should remain consistent throughout the website, with only minor changes used to indicate location within the hierarchy. It is often desirable to have a link back to the home page. A template or style sheet is often used to provide this consistency in a website. This also relates to **repetition**.

a

FIGURE 5.12 Each page of a website should have a similar feel about it. The personal tab of the ANZ website (a) has a similar feel to the corporate tab (b).

b

FIGURE 5.12 (continued)

Appropriateness and relevance

Your website must meet the needs of the intended audience with appropriate information that is relevant to its purpose.

The website must be able to present the right information for its users in a usable format and in a timely manner. Superfluous information, or distracting but unnecessary extras, should be avoided. A skilled interface designer will produce a streamlined and functional but attractive screen in preference to a screen full of fancy and artistic but useless or irrelevant items (Figure 5.13). Users need efficiency and effectiveness in their interface, not a screen that shows off a designer's bag of tricks.

FIGURE 5.13 The Google search engine is uncluttered with no irrelevant features.

Appearance

The screen layout of your website, or appearance, should not be unnecessarily elaborate and decorative, or contain superfluous animations. Too many buttons, bullets, icons, rulers and flashing graphics will confuse the eye and distract the user. Users should also have the option of turning off any onscreen hints or help features that they do not require.

Long or wide screens that require users to scroll should be avoided when possible, particularly if scrolling is required both across and down the screen (Figure 5.14). This makes the information harder to view. Short screens of information, with links to other screens, are more easily viewed and therefore more effective.

http://www.angelfire.com/super/badwebs/

FIGURE 5.14 An example of a long-screen website

Alignment

Alignment is also discussed in Chapter 2, on page 53.

The alignment of text can be left, right, centre or fully aligned (justified), as shown in Figures 5.15 to 5.18. Choose one alignment for each page and stick to it for the entire page. For paragraphs, left-aligned text is easier to read than centred text because the text begins on the left-hand side every time. The text is in a straight line and readers can follow the text with their eyes starting from the left edge. Centred text makes the eye work harder to locate the start of each line. Unlike left alignment where there is a consistent straight edge for the eye to follow, there is no consistent focus point for eyes to return to once each line is read (Figure 5.16).

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FIGURE 5.15 Left-aligned text has a straight left edge and each line begins at the same point on the left edge.

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FIGURE 5.16 Centred text has a jagged edge and each line begins in a different point on the left edge.

Centred text is often used for headlines and short lines of text. Users can read them with ease because the lines are short and the eyes do not have to scan through many lines of text.

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FIGURE 5.17 Right-aligned text has a straight edge on the right side.

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FIGURE 5.18 Fully aligned text has a straight left and right edge and each line commences in the same point on the left.

Avoid using all uppercase letters, except in some headings. Long sections of text typed in uppercase are very difficult to read because all the words have a rectangular shape; it is also considered to be bad 'netiquette' as mentioned in Chapter 3.

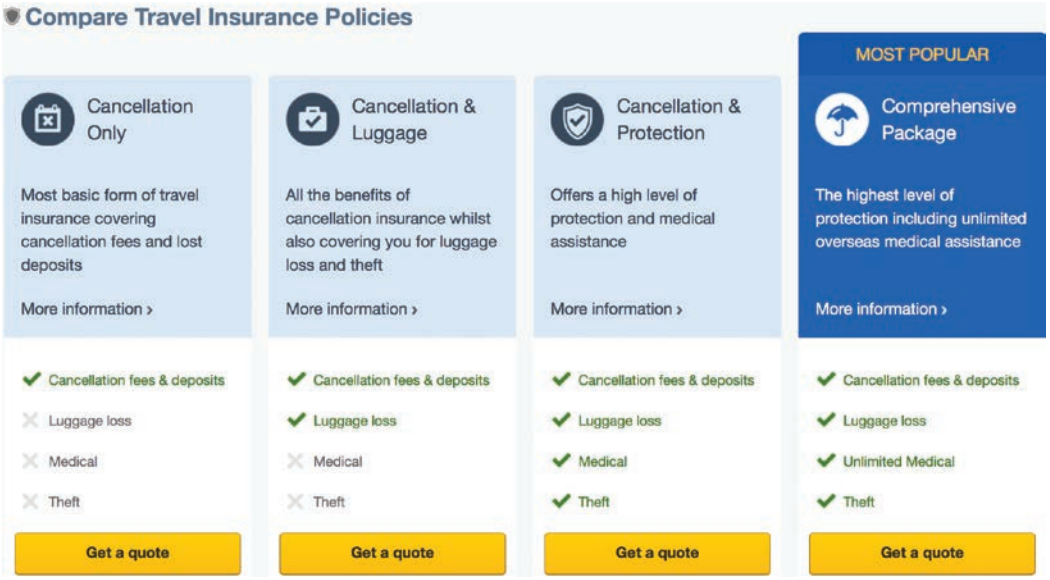

FIGURE 5.19 A website that uses left alignment

Repetition

Repetition is used to unify elements of a layout. This is achieved by repeating patterns, fonts, colours, images and page elements. On a website, use repetition so that users can understand how different pages or menus relate to one another, and to create a strong sense of identity and feeling of consistency.

Repetition is also discussed in Chapter 2, page 53.

The repetitive elements will help to create a sense of organisation to help the user interpret the meaning of what they are seeing. For example, looking at the Qantas image in Figure 5.3, three verbs – Plan, Book and Fly – are repeated in the red navigation bar at the top. Appearing in the navigation bar at the top is one form of repetition. Being in the same font is another. Being in the same form of wording – a short finite verb – is a third. This simple repetition tells the user that these three links lead to similar task-based pages.

Font selection

Most websites maintain the same font selection throughout the entire site. Sometimes different fonts are used in banners or headings, but consistent use of fonts and sizes (usually between 9 and 12 points, with body text at 11 points) is recommended.

Text styles are also discussed in Chapter 2, page 57.

Serif fonts are usually easier to read in printed works than sans-serif fonts. Serif fonts, which have small tails at the end of some letters, are used to make it easier to read, because they can guide the eye and reduce eyestrain when reading large blocks of text. Serif fonts include Times New Roman, Courier, New Century Schoolbook, and Palatino.

The differences between serif and sans serif typefaces

Sans-serif fonts, have no tails (are without serifs) and are better suited to the onscreen reading. Popular sans-serif fonts include Helvetica, Avant Garde, Arial, and Geneva.

Contrast

Contrast refers to the visual difference in colour or tone between objects (both text and images). Greater contrast will make objects stand out more from one another. If there is not enough contrast between two objects, they may blend into each other, making it difficult for the user to see each of them clearly. Contrast between the background of your website and text should make the information clearly visible and legible.

Contrast is also discussed in Chapter 2, page 53.

Colour

Most people do not use a scientific approach to colour schemes: they experiment and choose colours that they think will go together. Trial and error and a fair bit of reflective evaluation are usually required to ensure the colour scheme works. Remember that the colours selected for your website should:

- make it clear, legible and attractive
- enhance important features
- ensure easy navigation.

Use your chosen colour scheme on all pages to be consistent.

Colours can convey a strong message about your website. Table 5.2 shows a summary of the effects that different colours have on the emotions and impressions of users. For websites, what is of concern are how the colours contrast with one another (Figure 5.20). In terms of contrast, it is generally best to use a lighter, paler colour as a page background, with a darker colour for the text. This makes it easier to read the onscreen text, which encourages users to continue to browse the site. It is also important that the actual colours complement one another to achieve a visual harmony. A colour wheel can be used by web designers to find colour schemes that work well (Figures 5.21 and 5.22). Different but complementary colours may then be used for onscreen elements, such as headings and the main body text. Again, an overriding principle is that colour and contrast should be kept as simple as possible.

TABLE 5.2 The information you want to convey can be enhanced with the use of appropriate colours.

Colour	Connotation	Business application
Blue	Conveys the impression of calm, reliability and strength. Dark blue means 'strong and conservative'; light blue, 'youthful'.	In business, blue is associated with fiscal reliability.
Green	Reminder of nature, spring and the countryside. Less appealing traits: poison, decay, illness and jealousy.	Investment bulletins, order forms, training materials, flyers and labels.
Red	Powerful effect on the human eye. Symbolises blood, anger, fire, danger. Deep reds are aristocratic and stylish.	In business, associated with debt and deficit. Banks use red for withdrawal slips, inventory reports and other action documents.
Pink	Has feminine connotations. Pale pinks have calm, restful effects.	Business forms, such as financial statements and invoices.
Brown	Has a sense of practicality, comfort and realism. Sometimes can be seen as dull.	An elegant brown typeface on pale brown paper conveys tradition and quality.
Black	Traditionally in Western cultures, black symbolises the dark side: night, evil, death, despair and mourning.	It also has the modern image of distinction, sophistication and elegance.
Grey	Symbolic of status and authority. Subtle greys are assured, successful and elegant.	Used as background colour, grey is very effective as it provides a contrast to more vibrant colours.
Yellow	The most visible of all the colours, and is often a difficult colour to look at for a long period of time.	It makes shapes appear larger and whiter.
Purple	Sophisticated, mysterious, mystical, meditative, melancholy, dignified.	Traditionally symbolic of sovereignty and justice.

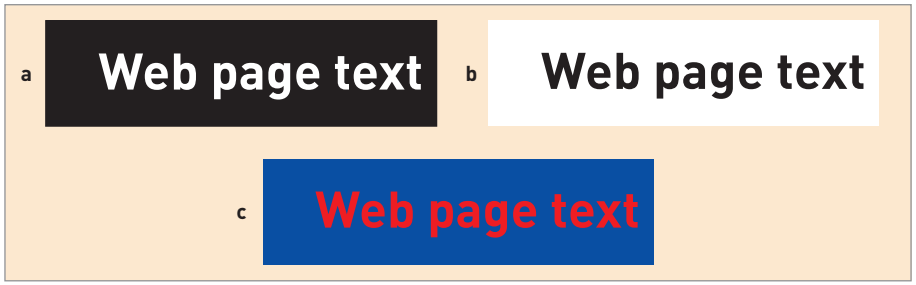

FIGURE 5.20 Illustration of contrast. Note how (b) is easier on the eye than (a) when the colours are reversed; (c) shows the problem of contrast with non-complementary colours – in this case, red text on a blue background.

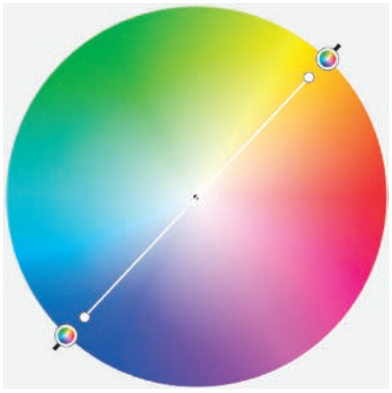

FIGURE 5.21 A colour wheel can show complementary colours. In colour theory, harmonious colour combinations use any two colours opposite each other on the colour wheel, any three colours equally spaced around the colour wheel forming a triangle, or any four colours forming a rectangle (two pairs of colours opposite each other). The harmonious colour combinations are called colour schemes.

FIGURE 5.22 The Adobe Color CC specialises in allowing you to make up attractive and interesting colour schemes for websites.

Conventions for onscreen colours can be helpful in determining colour schemes:

- The most easily readable colours for text are black writing on a white background.
- Avoid using red and green together because colourblind people have difficulty distinguishing between them. Blue and brown together can also be hard to read.
- Limit the variety of different colours on the screen.
- Light or pastel shades (or white) are the best choice for backgrounds. Avoid using bright, vivid colours, except for an area of the screen you wish to emphasise.
- Blue is a standard colour for an unvisited hyperlink, changing to purple when visited. If other colours are chosen for links, they should be consistent.

Traditional primary colours are red, yellow and blue; however, colours used by printers are magenta, yellow and cyan. Some colour printers are unable to reproduce the full range of colours visible to the human eye.

RGB

Combining red, blue and green (RGB) colours creates white, as can be seen in Figure 5.23. Consequently, RGB colours are often known as additive colours. These are mainly used for lighting, optics, video and monitors.

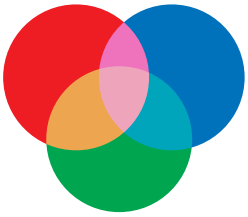

FIGURE 5.23 Red, green and blue (RGB) combine to create white.

To show colour on a screen, a **pixel** must have three coloured phosphor dots. These dots are the additive primary colours, red, green and blue. Each of the three-colour elements making up a single pixel may be set to one of 256 values (ranging from 0 to 255). A value of 0 means that the relevant colour is not visible at that pixel, and a value of 255 would cause the colour to be shown with maximum brightness. There are 256 possible values for each element, so the total number of colours that can be displayed on a (true-colour) screen is 16 777 216 (from 256 × 256 × 256).

Complementary colours are contrasting and stand out against one another. Often it is a good idea to use a complementary colour as the highlight colour. The complementary colour of a primary colour – red, blue or yellow – is the colour you get by mixing the other two: so the complementary colour of yellow is red + blue = purple; for red, it is blue + yellow = green; and for blue, red + yellow = orange. Even though colours are complementary, they aren't necessarily suitable because they might not be a good combination.

RGB (red, green, blue) and CMYK (cyan, magenta, yellow, black) are two major categories of colour representation systems.

Space

Space refers to the areas around and between objects – text and images. If your website is cluttered, it may be unpleasant to browse. Although you may want to include a lot of information on your website, you still need to put space between objects so they can be individually distinguished and navigated through correctly.

Space is also discussed in Chapter 2, page 54.

You need to space objects on your website so they are easy to perceive but not overlapped and obscured. The screen should not be so crowded with objects and features that the user finds it difficult to see the information they need.

White space can be used as a contrast around a chosen element of the page to draw the user's eye (see Figure 5.24). Within graphics, animations or videos, levels of colour and contrast should make the information clear and attractive. A common convention is also to avoid yellow or other light colours for text on a white background because this can be difficult to read on screen (Figure 5.25).

A large area of white space may be used to balance a section that contains an equally large area of text, because it will be of equal visual 'weight'. Working with space means also working with balance.

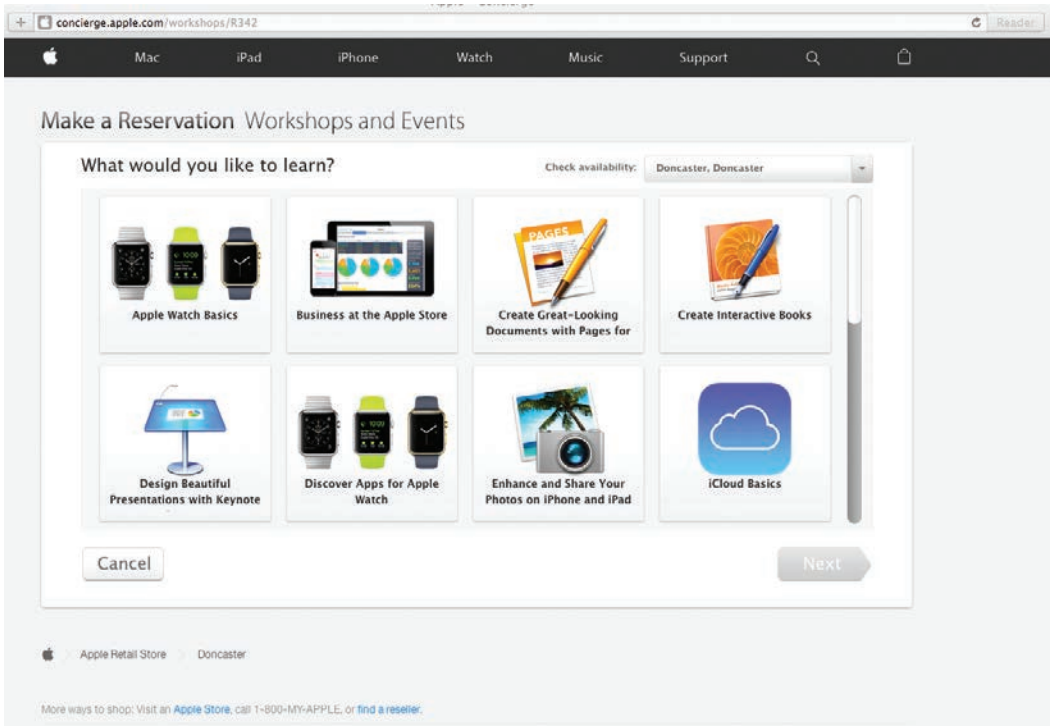

FIGURE 5.24 An example of a webpage that uses white space effectively. The website emphasises the eight pictures by using white space around them.

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FIGURE 5.25 Avoid using light-coloured text on a white background as there is not enough contrast to make it readable.

Balance

A website with a balanced design is visually appealing. Websites with unbalanced designs can lack the appropriate emphasis, can look untidy and they may end up discouraging users from visiting them.

Balance is also discussed in Chapter 2, page 56.

All elements of a layout, websites included, have a visual weight. If the elements on either side or the top and bottom of the screen are of an equal weight, then visual balance is achieved. There are two types of balance: symmetrical and asymmetrical.

With symmetrical balance, the visual elements on each side of an imaginary horizontal or vertical dividing line appear to be exactly the same in terms of visual weight, right down to the proportions and shading.

Asymmetrical balance occurs where visually matched weighting occurs through a combination of objects of differing sizes, shapes and colours.

Specific design considerations

In addition to the design principles and information architecture, there are some other specific design considerations you may find useful.

Proportion

Proportion refers to the visual hierarchy of a page on the screen (Figure 5.26). The designer must ensure that the most important pieces of information have visual prominence on the page, with less vital information taking a less prominent position in the visual hierarchy. Headings, logos or links may be very conspicuous on a company webpage, and therefore obvious to users. Other information that the company does not wish to emphasise as much, such as the cost of an item, may be in a smaller font in a less noticeable part of the screen.

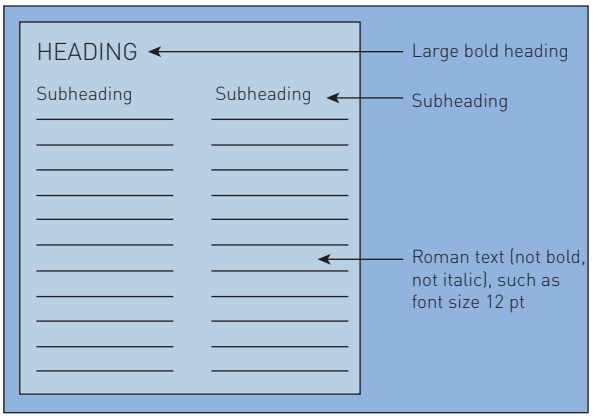


FIGURE 5.26 Visual hierarchy of a page. The main heading is large, bold and at the top of the page. Subheadings are bold. Normal text is roman. The user's attention is visually drawn to the heading and subheadings.

In the graphics industry, the top of a page is sometimes referred to as 'prime real estate' because it is the dominant location where important information will be most noticeable. This concept also applies to onscreen pages, especially for long pages where scrolling is needed. The bottom of a long page is low in the visual hierarchy, so the most vital information a user needs to see should not be placed there.

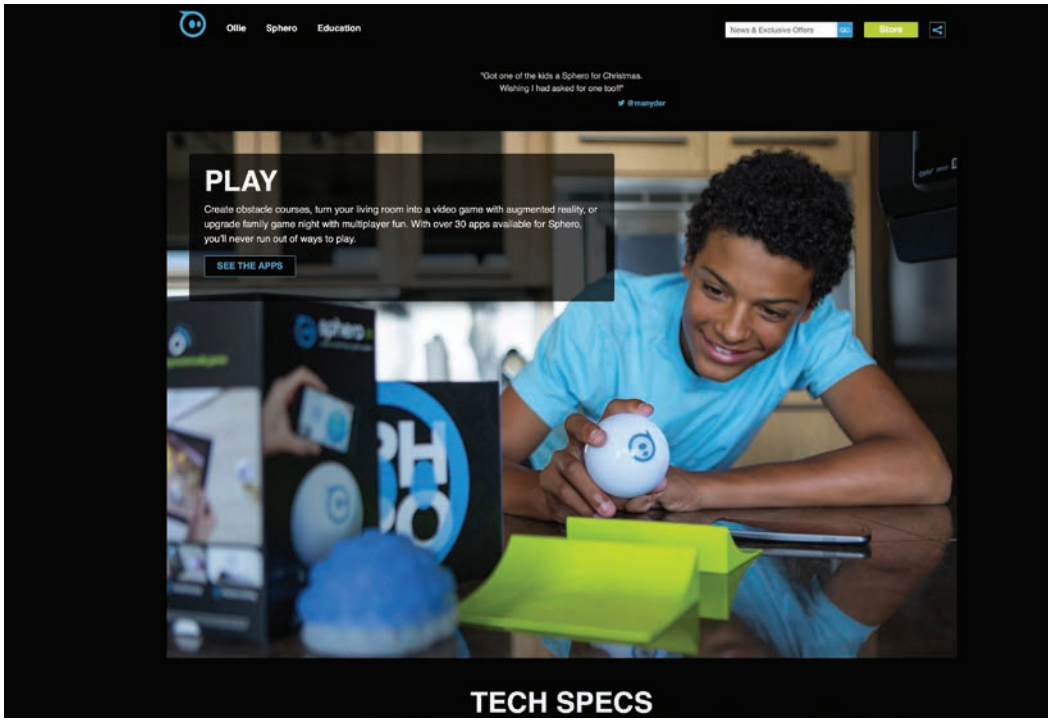
The proportions, or relative sizing, of fonts and graphics affect the visual hierarchy of a screen. The positioning of particular page elements – including white space around objects, the formatting of fonts and the use of animation – also affects the prominence of an element in the visual hierarchy of a page.

Orientation

In designing the layout, the interface designer will consider all elements that are to be included on the screen, taking into account the visual hierarchy or prominence of various items. They will orient objects on the screen and decide the direction that each screen element will face. An important consideration is the aspect of each screen element in relation to other objects on the screen, and to the screen overall. Some typical considerations for **orientation** of screen elements could be the direction that a logo is to face; whether or not a graphic should be flipped

over as a mirror image; whether a frame on a website should be at the top, bottom, left or right of the screen; and how text should be aligned (Figure 5.27).

The size of an onscreen page needs to be considered in the design for orientation of various screen elements. The orientation and **juxtaposition** of screen elements become extremely important.



Sphero

FIGURE 5.27 The designer of this website has used the picture to feature the product and its logo (flipped slightly to the logo on the top left). Text is aligned to the left and in a straight line from the edge of the Sphero logo.

Design tools

A good solution will undergo a rigorous design stage before any attempt is made to implement it. The solution must address the stated problem and provide all the required information. To design a solution to an information problem, you need to choose and justify the choice of your preferred solution, develop detailed design specifications, identify the appropriate procedures and techniques to be used, choose the test data, and correctly apply appropriate **formats** and conventions to the solution.

In the design stage, you focus on creating a plan of the solution. Designing a solution often occurs without using a computer at all. Much time can be wasted if a design has not been properly planned before work starts on developing the solution. As stated above, the two activities associated with this stage are first designing the solution and then designing the evaluation criteria.

In Unit 1, Outcome 3, you are creating a website. Generally, you would follow the steps below.

1 Identify the data you require.
2 Choose an appropriate web-authoring software.
3 Decide how to manipulate the data.
4 Determine the appropriate UIs and apply appropriate information architecture.
5 Develop the site map.
6 Construct storyboards.
7 Choose layout designs.

8 Choose test data.
9 Choose conventions and apply formats.
10 Consider the design principles that influence the appearance of onscreen solutions.

Many of the steps require you to make use of specific design tools. These tools can be considered as addressing either the functionality or appearance design principles. The following sections address each step and the design tools necessary to perform them.

Functionality

Identify the data you require

The PSM is also discussed in Chapter 2, on pages 31–42.

In the first step, you gather the data required, but new material may be need to be produced during the development stage of the problem-solving methodology (PSM).

Choose an appropriate web-authoring software

In the second step, you will be choosing an appropriate web-authoring software. The choice of software will be strongly influenced by the nature of the issue. If, in the analysis stage, it was decided that the creation of a webpage was the most suitable solution, the appropriate software application would be a web-authoring package, such as Dreamweaver. However, sometimes the choice could include custom-made software.

Decide how to manipulate the data

Input–process–output (IPO) charts

IPO charts are also discussed in Chapter 2 on page 66.

For the third step, you will need to decide how to manipulate the data. In problem-solving, certain strategies are adopted to see the 'bigger picture' of the design – or the macro design. These strategies include IPO charts. Also called a defining diagram, an IPO chart identifies a program's inputs, outputs and the processing steps required to transform the inputs into the outputs. Once the overall design has been determined, the finer details of the solution are considered, such as colour, fonts and styles.

Flowcharts

Flowcharts are also discussed in Chapter 2, page 45.

Flowcharts are also useful for the third step. A flowchart can be used to indicate the essential procedures that will be employed to create a solution, and to generate the required information. It uses symbols in a linear sequence to document each procedural step required; a simple set of symbols is shown in Figure 5.28. The flowchart should indicate some detail of the procedures to be followed to produce the solution and output.

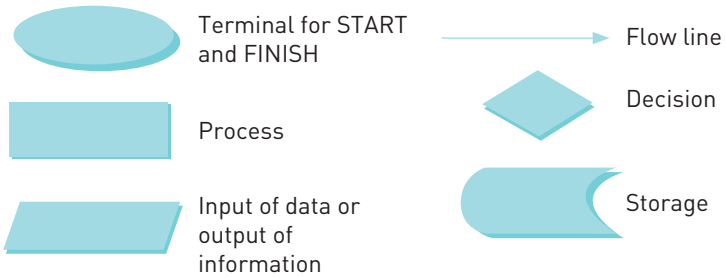


FIGURE 5.28 Simple flowchart symbols

You could create a flowchart to show the steps that would be involved in producing a webpage, based on your previous observations or experience. You would then trial the steps in the flowchart to see how well they work, as a form of quality control. If necessary, you would make changes to your flowchart to make the processes as efficient as possible. Next, you would compare it with another flowchart showing how the same process is actually being done by a web developer. Look for differences between the actual information flow and your 'best possible' flow. These differences may indicate inefficiencies in what the web developer is doing, which can then be rectified. Testing the solution following its development is also considered to be a form of quality control.

Quality control is discussed on page 169.

Develop the site map

A site map, or a linkage plan, is a graphic representation of how each page of a website links together. It is commonly hand-drawn as a series of boxes attached to one another. It gives the designer an overall picture of how large the site will be, and how each page is linked (Figure 5.29).

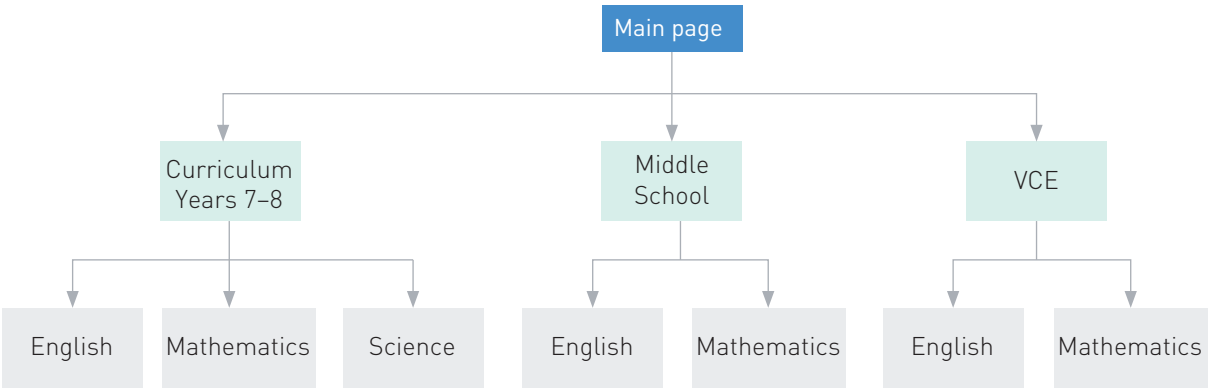


FIGURE 5.29 A site map represents how each page of a school subject selection website links together

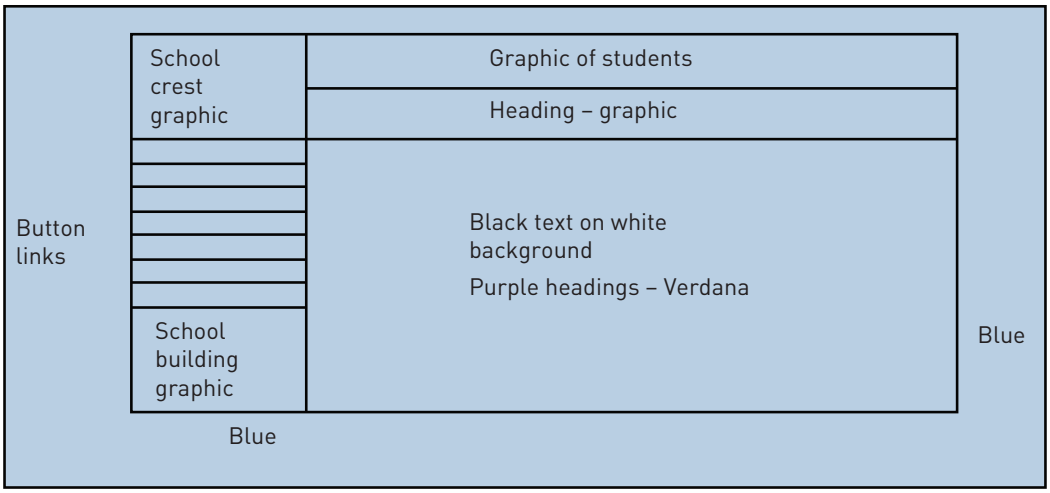
Construct storyboards

A webpage storyboard is a tool used to design the features of each individual page. A series of storyboards provide helpful tools for visual problem solving. Storyboards show general hand-drawn screen designs and the placement of graphics, and describe actions and links to other pages (Figure 5.30). The main part of a storyboard is the drawing of what the site should look like. Other features that should be included in a storyboard for a webpage are:

- title/heading
- page filename
- client's name
- designer's name
- page number
- background colour code/image file name
- the required screen dimensions
- the purpose/description
- a list of required image file names and their memory size
- a list of the required link file names.

To make it easier for a user to navigate through large documents or multiple webpages, the designer can use links, icons, buttons and page numbers. These techniques help the user to find information in which they are interested. It is inappropriate to produce a layout diagram by capturing a screen dump of the solution since the solution has not been created at this point. A storyboard is a common tool for a wide variety of presentations, not just webpages. For example, storyboards are used to help filmmakers design the sequence of scenes needed for their film.

Storyboard for Darby Vale	Page 1 of 43
Client William	Screen dimensions 1024 × 768



Purpose/description		Page title	Middle School
Introduction to Middle School page		File name	m_school
		Links	
		Link name	Link to
Graphics		Subjects	Table of subject
File name	Size (kb)	Year 7 & 8	Yr 7 & 8 page
DVC.jpg	23	VCE	VCE page
building.jpg	27	Policies	Policies page
heading.jpg	4	Contacts	Contacts page
		Site map	Site map page
Background(s)	Blue/white	Home	Home page

FIGURE 5.30 A storyboard is used to plan a website

Appearance

The following sections discuss tools that apply to the appearance of your solution: its layout, testing and formats and conventions, including examples.

Choose layout designs

The tools most commonly used to choose layout designs are layout diagrams and annotated diagrams, or mock-ups. The following sections discuss both of these and provide examples.

Layout diagram

Layout diagrams provide a visual representation of how the final designed product should look. The designs indicate features such as variation in font size, colour and positioning of text. The placement of text and graphics must be planned so that a balanced visual effect is achieved, as can be seen in Figure 5.31.

Annotated diagrams and mock ups

Annotated diagrams are also discussed in Chapter 2, page 67. This includes an example of a *hand-drawn* annotated diagram.

An annotated diagram or mock up provides a visual depiction of how an onscreen solution, such as a website, should look. An annotated diagram or mock up can be hand drawn or mocked up in software using a program such as Balsamiq. It is similar to a layout diagram but it is more explanatory.

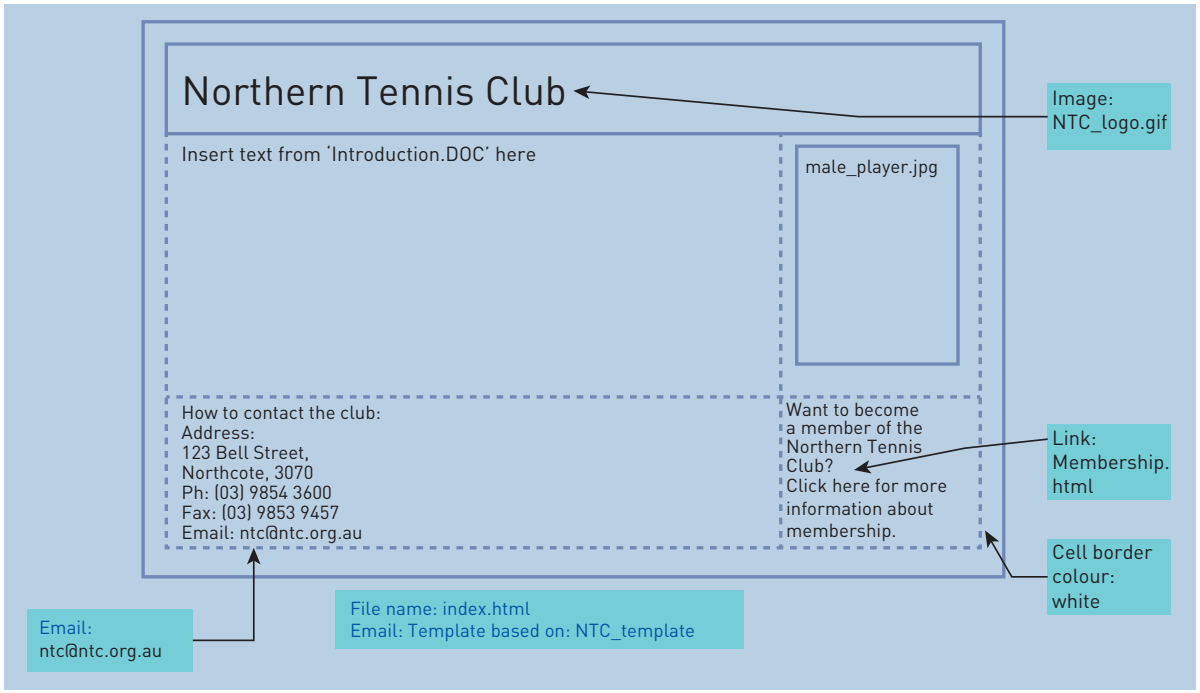


FIGURE 5.31 Sample layout diagram

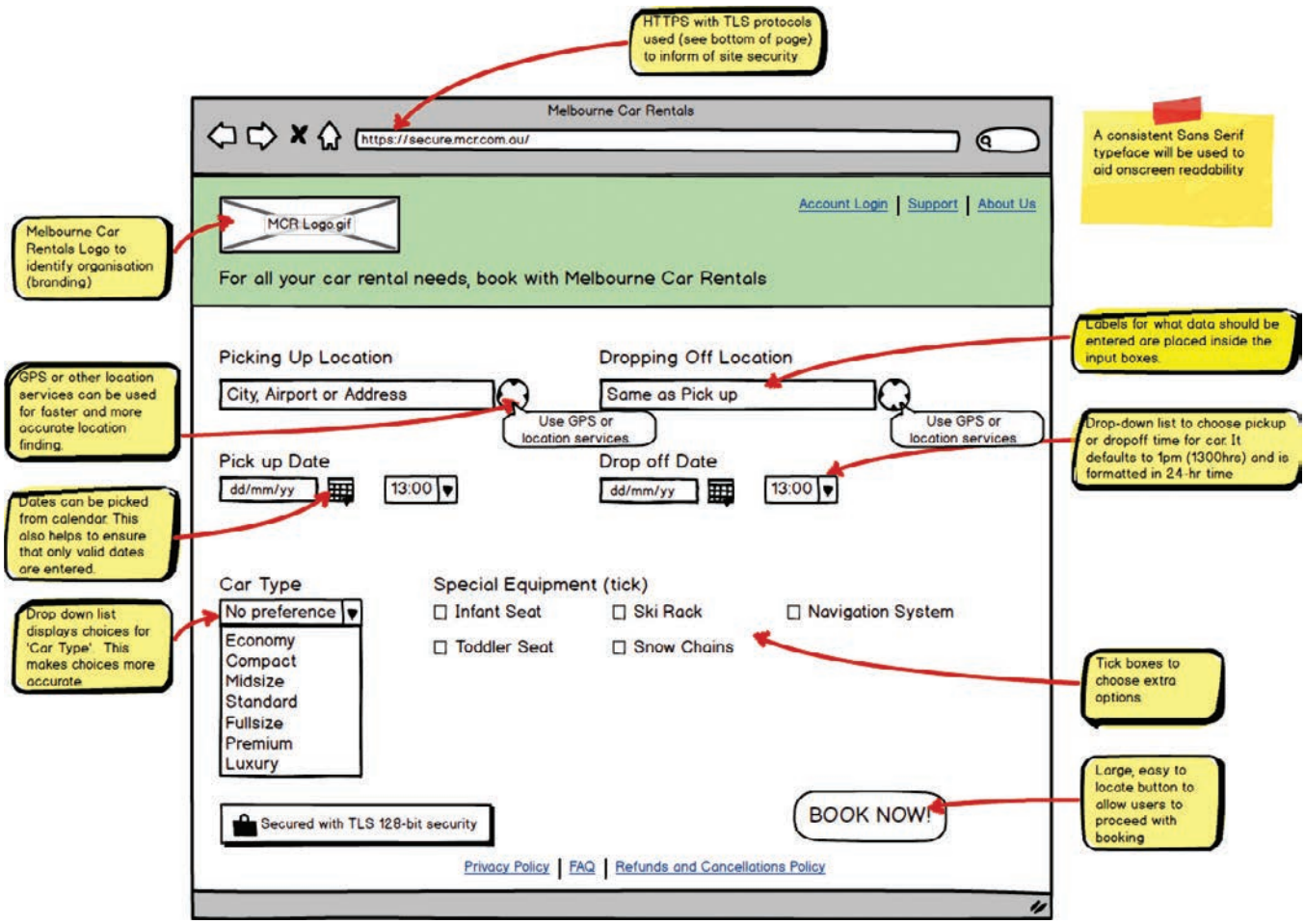


FIGURE 5.32 Sample mock up created with Balsamiq

Choose test data

Testing is a necessary step in problem-solving. Testing the product ensures that it is free of errors. It is not done in an ad hoc way; rather, through the development and use of test (or dummy) data (see Table 5.3). This is produced to test any error-handling or data-validation techniques that may be included in the product. Testing will determine whether the fonts, styles, type sizes and spacing are appropriate for the website. Testing to see that the message is conveyed accurately and clearly is also an important task when creating a website. This ensures that the correct information is communicated to the audience.

In the design stage of the problem-solving methodology, the test data is selected and the types of tests to be conducted are determined. A test table is used to document the tests to be performed. Actual testing takes place after the solution has been developed. Note that the button links need to be tested to ensure all navigation features are working properly. All key features of a webpage need to be tested, including video, audio or animation, if they are used.

TABLE 5.3 An example of test data in a test plan

What is to be tested	Test data	Expected/ required result	Why?	Actual result	Concluding statement
Internal link to 'Senior Singles Results' on 'Results' page	Starting page = results.html Link = Senior Singles Anchor name = `Results.html#SeniorSingle`	When the 'Senior Singles' link is selected, it should hyperlink to the 'Senior Singles Results' anchor.	Because the link is to '`results.html#SeniorSingle`' and there is an anchor called '`#SeniorSingle`' just above the heading '`Senior Single Results`'	See annotated printout.	See annotated printout.
'Mailto' email link to 'ntc@ntc.org.au' on 'Home' page	Starting page = index.html Link = mailto:ntc@ntc.org.au	When the 'ntc@ntc.org.au' link is selected, it should open a new email dialog box with the email address 'ntc@ntc.org.au' in the 'To' field.	Because the link's code is 'mailto:ntc@ntc.org.au'	See annotated printout.	See annotated printout.
Image 'tennis_ball.gif' loads to the left of the cell and in the vertical middle of the text on the 'results.html' page.	Code on 'results.html' is: img src = "Images/tennis_ball.gif" Width = 40 Height = 40 Align = 'absmiddle'	The image 'tennis_ball.gif" must load at the left of the cell and aligned with the vertical middle of the text. Its height and width should be 40.	Because the code links to the 'tennis_ball.gif" file in the images folder, its height and width are set to 40 and its alignment is set to 'absolute middle.' This coding is placed before the text in the table cell.	See annotated printout.	See annotated printout.
User acceptance of functionality	Procedures: Navigate to results page and locate current 'Senior Singles' results. Navigate to membership page, locate information for potential members and download membership form.	Users should be able to perform each of the procedures listed with minimal difficulty.	Interface has been designed to allow for easy navigation to these key areas (navigation panel on left and advertisement on home page).		

Choose conventions and apply formats

Conventions and formats are terms that are applied to the layout and presentation of the webpage. They enhance the appearance of information and make it more readable. Conventions are simply formal ways of displaying information (Figure 5.33). They are rules that people follow when creating webpages. An example is the placement of a navigation menu across the top or down the left-hand side of a webpage.

To format information means to create and/or change the appearance of a document by altering specific features, such as fonts, margins, spacing, columns, tables, graphics, borders, page numbers, headers and footers. Formatting looks at the presentation of the layout and its suitability.

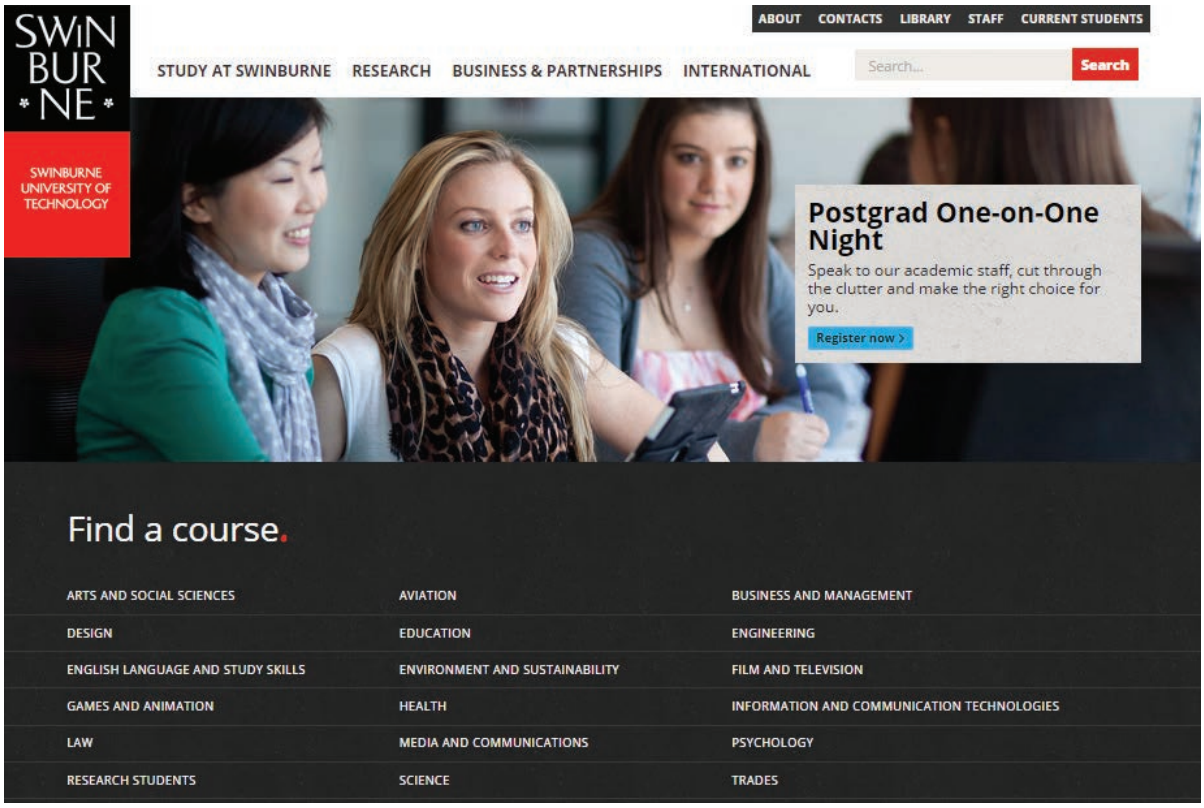


FIGURE 5.33 A website convention involves maintaining a balanced relationship between words and graphics

File naming

The index page, or homepage, is the first page that appears when you open a website. It is sometimes referred to as the default page. The file name of the index page is often `index.htm`, `index.html` or `default.html`, depending on the service that is hosting the website.

File names should be kept short and meaningful and they are easier to read in lower case than in upper case. Every webpage must be saved with a unique file name. File names usually contain letters, numbers or the underscore symbol. In a program such as Dreamweaver, the organisation of resources is assisted by defining a site and creating a resource library.

Most websites contain a large number of files and folders, but keeping them organised and logical is important. Create a set of electronic folders or directories to help locate files quickly. You should name these folders in meaningful ways, such as 'images', 'videos' and 'buttons', to make it easy to find files. File and folder names in websites should never contain spaces or any of the following characters: `/\?%*:|"<>`. It is best to restrict the range of characters in a file

name to alphanumeric characters, hyphens, and underscores; for example, `golden_gate.jpg` or `cable_car2.jpg`. Most file and folder names become part of the webpage's URL, so naming these files clearly is crucial. Keeping the file names short but meaningful makes it easy for users to type into the browser, especially on mobile devices. Long URLs are much harder for users to remember.

The index page

The index page of your website should include important information for users, such as:

- a contact email address or link to a contact form
- the date of the last modification to the website
- the author or company's name and contact details.

Images

A graphic, or graphic image, is a digital representation of information, such as a drawing, chart or photograph. Graphics were the first media used to enhance the text-based internet. The introduction of graphic web browsers allowed webpage developers to incorporate illustrations, logos and other images into webpages.

Webpages use colourful graphic designs and images to convey messages.

To enable graphics files to be used on mobile devices, they must be saved in an appropriate format. There are three universally supported image formats: GIF, PNG, and JPEG.

TABLE 5.4 Graphic formats used on the internet. Some users look at the file extensions to determine the type of file.

Acronym	Name	File extension	Characteristics	Use
GIF	Graphics Interchange Format	.gif	GIF limits the colour palette to, at most, 256 colours, which makes it a poor choice for most images. GIF is recognised as the best format when animation is required. The colour limitations often lead to colouring issues. They appear as white spots or blotches of colour.	• Can be viewed in all browsers • Creates animated images • Used for cartoons
JPEG	Joint Photographics Experts Group	.jpg .jpeg	JPEG uses a combination of lossy and lossless optimisation to reduce the file size of the image. It is best used for optimising photos and screenshots. Although JPEGs look fine from a distance, there is a loss of quality whenever users zoom in on an image.	• Can be viewed in all browsers • Easy to take and send photos via a mobile device as the file sizes are relatively small
PNG	Portable Network Graphic	.png Larger	PNG files are a lossless format so compression does not affect the quality of the image. It produces the highest quality image, but has a significantly higher file size than other formats. PNG files are larger than JPEG files, especially when they are high resolution.	• Can be viewed in all browsers • Not suitable for photographs

JPEG is the standard for photographic images and uses compression techniques to reduce the file size. These smaller sizes result in faster downloading of webpages. The more compressed the file, the smaller the file, but the lower the quality. The goal with JPEG files is to reach a balance between image quality and file size.

A graphic image saved as a GIF also uses compression techniques to reduce file sizes. The GIF format works best for images with only a few distinct colours, such as line drawings, single-colour borders and simple cartoons. GIF formats are limited to 256 colours and therefore not recommended for large blocks of solid colour in simple graphics. One of the disadvantages of using GIF is that it produces jagged edges when supporting transparency.

A PNG format was created in response to the limitations with the GIF format. Compression does not affect the quality of PNG files. Unlike JPEGs, which blur images at a certain point, a PNG file will always look as sharp as the original image. PNG files tend to be slightly larger than JPEG files, especially when they are high resolution.

JPEG, PNG, and GIF formats have benefits and limitations. Some formats are better suited for specific purposes; for example, when the image needs to be animated, you should use a GIF format. If file size is a consideration, and a smaller file size is required with some loss of image quality then JPEG would be the best choice. PNGs are best used when image size is not as important because they are better for capturing for **lossless** images.

To ensure that images are manageable when used with most applications, they must be compressed, which reduces the size of the photos.

THINK ABOUT COMPUTING 5.4
Take an image and convert it into different formats and evaluate the differences.

Video and audio files

As images, audio and video files take up a large amount of file space, it is worth investigating methods to make their file size smaller. You should limit the use of movie footage or sound on a webpage. Some users object to downloading large files, so clearly label the size of the file on the page so that users can estimate the time needed for download. Users with slow internet connections may have difficulty getting data fast enough and therefore the image quality will be poor. Sound files can be stored in the formats MP3 and movie files as MP4.

MP4 video formats are widely used for computers and mobile devices, and for downloading and streaming video. It is the default choice for smartphones and tablets and watching movies on computers and TVs. MP4s are compatible with Android and Apple mobile devices. MP4s support the H.264/AVC (Advanced Video Coding) codec, which processes the original large media file into a small package that can produce high-quality video at very low bit rates. The H.264 codec is optimal both for streaming internet video such as videos on YouTube and iTunes. H.264 is perhaps best known as being one of the video encoding standards for Blu-ray. Blu-ray discs handle high bit rates.

MPEG-4 is a file format that is commonly used to store media types defined by the Moving Picture Experts Group (MPEG), though it can store other media types as well. The files of this format usually have the extension .mp4. Apple's QuickTime file format was the foundation of the new MPEG-4 standard. MPEG-4 allows streaming over the internet, combining of multiple video and audio streams in one file (multiplexing), variable frame and bit rates, subtitles and still images.

MP3 (known as MPEG-1 or MPEG-2 Audio Layer III), is an audio coding format. It is commonly used to download digital music or audio streaming. Many digital audio players play MP3s. Even though it uses **lossy** compression, and the file is reduced in size, the sound reproduction is similar to the original uncompressed audio. Audiophiles would disagree and notice the quality loss; however, most people would not notice the difference.

MP3 was designed by the Moving Picture Experts Group as part of its MPEG-1 standard and later extended in the MPEG-2 standard.

Style guides

Style guides provide instructions to website developers about where to use different type sizes and fonts, and whether these should be in bold or italic. They can also contain information on colours and patterns to be used as backgrounds on webpages (Figure 5.34). Formats and conventions are also documented in the guides.

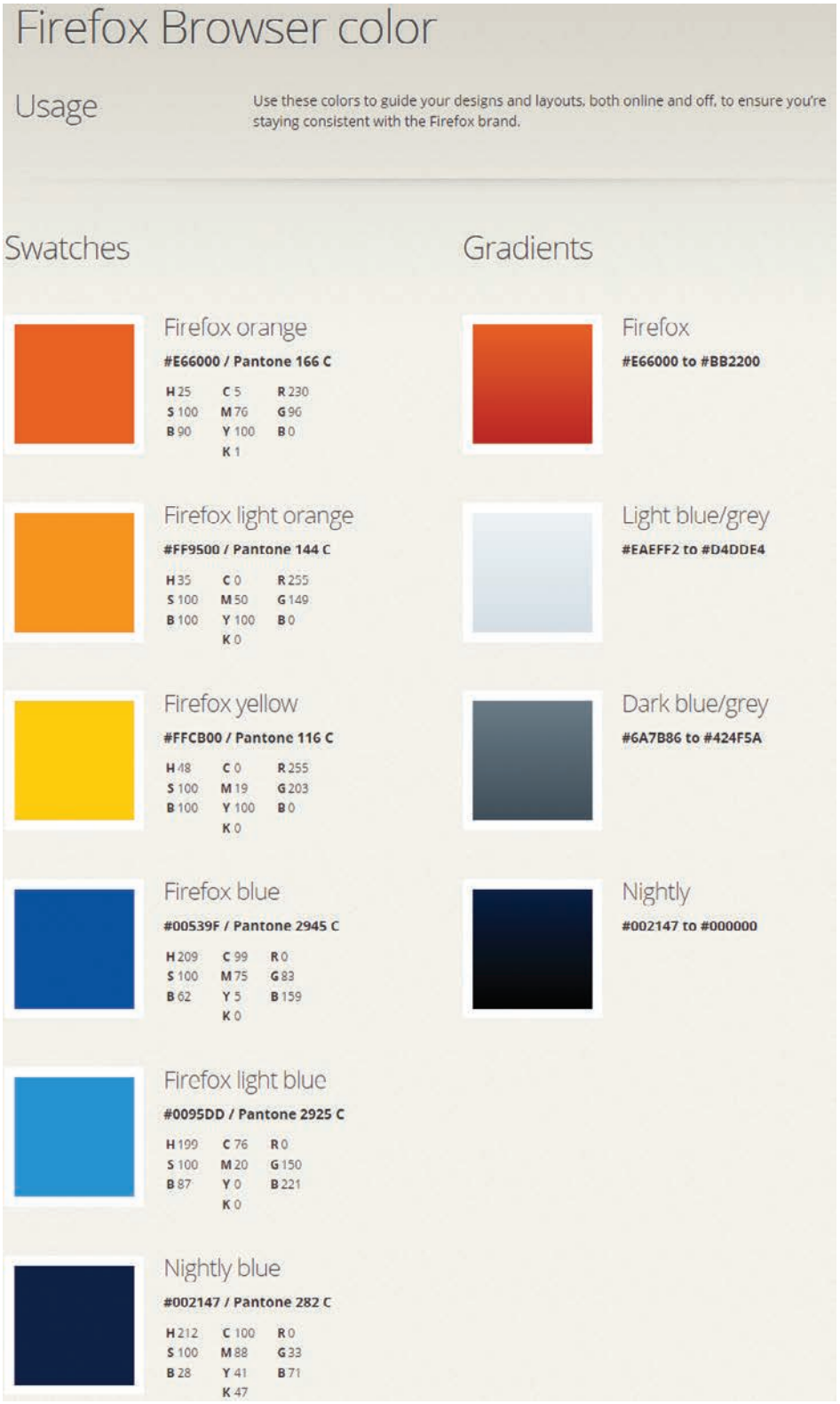


FIGURE 5.34 An extract from Mozilla Firefox's style guide

Developing websites

The development stage of a problem-solving methodology involves using the appropriate software to produce a solution as outlined in the design stage. There are four activities associated with this stage: manipulation, validation, testing and documentation.

During the design stage, planning techniques such as a site map and storyboards were used to conceptualise the solution. The development stage involves using appropriate software to apply the designs and build the solution.

Manipulation

Manipulation occurs when the data is transformed into information; it is the process of making sense of the data. Before computers existed, manipulation took place by hand and was subject to human error and interpretation. With the aid of computers, however, data manipulation now requires far less effort.

The following web-authoring functions and processes allow the user to manipulate data to create a webpage.

Buttons

A clickable image or a button is created by the website developer to allow users to navigate within a webpage, or to a different page or an external URL. Buttons need to be clearly identifiable to users. In some cases, buttons may have to be created in another program, for example Adobe Fireworks, and then imported back into the web authoring tool.

Hyperlinks

A hyperlink generally has two ends: one is called an anchor and the second is the direction. The anchor is the starting point of the link (source) often found in the original webpage and the other point is where the link leads to (target). The target point can be located on the same page as the source, or it can be found on another page in the same website, or it can link to an object, a document or URL.

Tagging

Meta tags assist webpage developers to provide search engines with information about their website. The type of text to be inserted into the source code of the webpage include important keywords about the content of the website. Often the title, keywords and description tags are used as meta tags. Meta tags assist with search engine optimisation and how the website is ranked within the search engine.

Sound editing

When sound grabs are used in a website, given the large file size, only portions can be used. Sound needs to be edited so that only the parts that are essential to the website are retained. Sounds, similar to images, need to be 'cropped'. That is, all superfluous parts of the sound file will be removed with only the portion that is needed kept. Applications such as Audacity are excellent for sound editing.

Text editing

Changing the text size or fonts, aligning headings and justifying text are all ways in which text can be manipulated. Copying data from a word-processed document, reformatting it and placing it on a webpage is another example of manipulating data into information.

Image editing

The inclusion of images into a website needs careful consideration. Images may need to be scaled or cropped when placed on a webpage so that they fit into the allocated space. If images need more attention, such as further editing, then a dedicated image editing package such as Photoshop or GIMP can be used.

Storage and retrieval

The user in the retrieval stage is the webpage creator.

Both data and information need to be stored so that they can be retrieved for later processing or communication. The best storage device to use is determined by the amount of information or data being stored, and the amount of time the data needs to be stored. In relation to websites, writeable CDs and DVDs, USB flash drives, and internal and external hard drives are the most common forms of storing data. It is important that files are stored using appropriate file name conventions.

A document can be retrieved easily if the user knows the file name and where the file is stored.

Retrieval is the process of accessing stored data or information. The retrieval process involves transferring a copy of the data or information from its place of storage – for example, the hard drive, or the cloud – to the computer's main memory.

Validation

Before data is validated, it needs to be entered so that it can be processed. In a web-based solution, the storyboards created during the design phase will indicate where elements are to be placed and the links that need to be made.

Validation can be done either manually or electronically:

- **Manual validation** refers to a person checking the data to ensure it is correct and/or reasonable by proofreading the information. This includes checking both for correct spelling, grammar and punctuation, and for accuracy of transcription and reasonableness.
- **Electronic validation** refers to the use of software features, such as spell- and grammar-checking, to verify accuracy.

Many spellcheckers favour American spellings and cannot be relied on to choose the correct word, especially if one word has several different meanings and spellings, such as bare and bear.

Testing

Testing is a necessary activity in problem solving: It is done to ensure that the solution is free of errors. Testing the solution is done through the development and the use of test data (also called **dummy data**.)

Test data is produced to test any error-handling, data-validation techniques or formulas that may be included in the product. Testing determines whether:

- the solution works within the scope of expected data and produces the required outcomes
- wrong or unexpected data needs to be rejected
- variations in graphics images fit templates, such as pictures fitting a particular space
- links work correctly
- fonts, sizes, styles and spacing are appropriate
- the message is clear. This particular test applies only to a small number of software tools, such as desktop publishing, word processing, webpage authoring and presentation software. Testing requires the creator of the product to ensure that the message they are conveying is not lost among other parts of the document and that the message is clear and concise.

There are a number of attributes, or properties, of a web solution that need to be tested once the solution has been built. Some of the attributes that should be focused on include:

- functionality
- presentation
- useability
- accessibility
- communication of message.

See Table 5.3 for examples of testing.

Functionality

The functionality of a website relates to the activities or actions it was designed to carry out. When testing functionality, it is important to look at the original problem and determine if the solution meets the organisation's needs.

When testing the functionality of a webpage it is wise to continually preview your site on a browser and test the links. This involves systematic testing using a variety of different browsers to see how the website functions. The testing of the website's functionality on a number of different browsers, such as Internet Explorer, Firefox and Apple's Safari, will reveal whether any of the popular browsers have problems supporting the website. Any difficulties identified with a browser accessing the website need to be addressed.

Presentation

During the design stage of the problem-solving methodology, a decision would be made about the appropriate format of the solution; for example, whether the solution should be a multimedia presentation, a website or a brochure. One of the most important considerations should be the intended audience: there is no point creating a web-based solution if the audience is unlikely to have easy access to the internet.

No matter what format is chosen, the presentation of the solution can be a difficult attribute to test – what looks good to one person may appear ugly to someone else.

A sample of formats and conventions appropriate to webpage presentation that can be tested include:

- ensuring that the webpage fits within the screen dimensions
- users of the website do not have to scroll any page more than two average screen lengths
- text styles (bolding and italics) are used with restraint
- hyperlinks are not confused with underlining
- the combination of colours used as backgrounds and text allows for easy reading
- each page in the website has consistent navigation buttons.

Useability

All presentations, whether they are brochures, posters or websites, need to be user-friendly. The information being conveyed should be easily accessible.

When testing the useability of a website, it is worth asking some of the following questions:

- Can the user navigate throughout the website without getting lost?
- Is it easy to get back to the home page?
- Are navigation buttons always visible and placed in a consistent location?
- Do all the hyperlinks work?

Accessibility

A web solution needs to be easily accessible via a search engine. It must also be easy to load, with small images that do not take too long to open.

Communication of message

Whatever the format, the important information presented in the solution should be clear and obvious. An advertisement on a brochure, poster or website that intends to advise the date, time and venue for a meeting must convey those details, without the readers getting lost among other less vital information. The purpose of the website should be obvious to users, and the message it is conveying should also be clear and simple.

CHAPTER SUMMARY

ESSENTIAL TERMS

accessibility a functionality design principle comprising navigation and error tolerance; accessibility of websites is primarily about making them easy for users to access, navigate and use, even in the face of errors or inexperience

brainstorming the collection of many people's ideas to devise or find a solution to a problem

collaboration where several members of a team work on parts of the same solution at the same time; team members may be separated geographically from one another

contingency plans a set of predetermined actions that a project team will take if some kind of disaster occurs

convention an accepted and standard way of formatting data; the way it is displayed

critical path the line that runs from the beginning of a project until its conclusion, and is the longest such path through the sequence of events constituting the project

dummy data a set of 'pretend' data used to establish how a product will respond

flowchart a chart used to indicate the essential procedures that are to be employed to create a solution, and to generate the required information; it uses symbols in a linear sequence to document each procedural step required

format altering the appearance of a document by changing features such as fonts, margins, spacing, columns, tables, graphics, borders, page numbers, headers and footers; also refers to the actual font, margin, spacing, etc., chosen

groupware a type of application software that enables workers to collaborate by enabling file sharing and 'real time' conferencing

hyperlink a connection/link to a website or webpage

juxtaposition being placed side by side

lossless a type of image compression that does not affect the quality of the image because all original data can be recovered when the file is uncompressed

lossy a type of image and audio compression in which bits of information deemed unnecessary are eliminated so the data file is much smaller

manipulation the process of making sense of data so that it is transformed into information

meta tag an information tag used to specify a page's title, description and keywords; essential in helping search engines locate the page

milestone the achievement of a significant stage in a project and has zero time duration; for example, completing the printing of an annual report so it can be distributed to shareholders would be a task of zero time and represents a milestone. This follows tasks in which the report has to be researched, written and proofread, all of which take time

orientation the direction and aspect of elements of an onscreen page; for instance, portrait (vertical) or landscape (horizontal), the positioning of frames at left or right on a website, text justification or the direction a graphic is facing

pixel short for picture element, a small dot of colour that forms part of a picture on a screen

plug-in a program that enhances the capability of an internet browser; used to enhance multimedia, such as Flash and Quicktime

project management the process of planning, organising and monitoring a project in order for it to be completed on time and within budget; another way of describing project management is that it is a type of collaborative problem-solving involving the coordination of tasks, people, technical resources and time

quality control checking results against identified quality standards; it is just as important to apply quality-control techniques to processes as it is to apply them to products or other end results

skeuomorphism where design cues are taken from the physical, real world; for example, using folder and file graphics for computer filing systems to make them appear recognisable to users

useability a functionality design principle comprising robustness, flexibility and ease of use; useability of websites is about maximising compatibility for a range of devices, allowing for them to continue functioning even if errors occur, supporting multiple ways of performing tasks, and providing a user-friendly experience

validation checking data for accuracy and completeness

version control managing changes to documents, applications, websites, and other collections of information; Wikipedia has version control to provide a history of the edits to articles

CHAPTER SUMMARY

IMPORTANT FACTS

1 An idea usually launches a project. An individual or a group of people decide that there is a need for a new product or service, a study is commissioned and then project planning begins. A project has the following characteristics:
   - a clearly defined purpose
   - a start time
   - a finite lifetime
   - a number of interdependent tasks.
2 A project manager must be skilled in human resource management, communication, quality control, time management, costing, accounting and contract management.
3 A project is broken down into a series of tasks. Each task should be substantial, but not so large and complex that it will affect the completion time of the whole project.
4 Resources are assigned to each task and include technical and human resources.
5 A schedule allows you to map the project tasks and display interdependencies. A Gantt chart is one common way of displaying a schedule.
6 Tasks that might cause a project to be delayed lie on the critical path of the project, and extra resources may need to be provided to ensure that they do not run over the time allocated.
7 Project management software, such as Timeline or Microsoft Project, enables the project manager to schedule and monitor complex projects. Information relating to starting dates, completion times, resources, costs and dependencies is entered and then displayed in graphic form.
8 Common tools used in project management include project tables and Gantt charts.
9 A project table enables a project manager to brainstorm key tasks and work out their dependencies before putting them into a formal chart.
10 Gantt charts provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format.
11 Visualising thinking tools assist with thinking processes and reflect on the thinking strategies to support understanding.
12 Information architecture refers to the structure of the website and its navigation pathways.
13 When planning navigation design, the following aspects should be considered: accessibility, meaning, comprehension and consistency.
14 User-centred design is a methodology that focuses on the needs and characteristics of users, and is applied at the beginning of the design process of the website to ensure that the website is useful and easy to use. The user interface is the screen that users see when they interact with a device.
15 Useability of a website is how easy the website is to learn and to use. Useability assessment is based on a set of characteristics aimed at designing usable and accessible websites constructed on user-centred design.
16 When designing mobile interfaces, the touch zones on the website need to be big so that users can easily and accurately tap the targets. Small touch zones or ones grouped closely together make it harder to manoeuvre.
17 Websites that are well designed should prevent users from making mistakes. Although mistakes will always occur, a tolerant user interface should let users recover from their mistakes.
18 Effective visibility provides prompts and cues that can assist users through an interaction, or guide them through a series of steps, indicate the possible options available to them and communicate the context of the situation.

CHAPTER SUMMARY

19 Consistency of user interface involves creating patterns in language, layout and design.

20 An affordance is a desirable property of a user interface. It logically and naturally leads people to take the appropriate steps to accomplish their goals. Affordances indicate what is achievable and can take many different forms such as shape, texture or size.

21 The problem-solving methodology provides a structured approach to problem solving and consists of the following stages: analyse the problem, design the solution, develop the solution and evaluate the solution.

22 Designing the solution involves describing the process of solving the problem and considering the layout of the output. Input data needs to produce the information required, and test data is needed to test that the solution produces the desired results.

23 Common design tools used to plan websites include flowcharts, IPO charts, site maps, storyboards and layout diagrams.

24 A flowchart might be used to show the process or procedure that the user needs to go through to create a website.

25 Also called a defining diagram, an IPO chart identifies a program's inputs, outputs and the processing steps required to transform the inputs into the outputs.

26 Layout diagrams provide a visual representation of how the final designed product should look. The designs indicate features such as variation in font size, colour and positioning of text. The placement of text and graphics must be planned so that a balanced visual effect is achieved.

27 Storyboards show general hand-drawn screen designs and the placement of graphics, and describe actions and links to other pages.

28 Testing of the solution involves the use of dummy or fictitious data to check that the solution is producing the expected output. The data, although fictitious, is similar to what the user will input. Test data includes both reasonable and unreasonable values.

29 A test plan shows all the elements that will need to be tested to ensure correct functionality and user acceptance.

30 File names should be kept short and meaningful. They are easier to read in lower case than in upper case. Every webpage must be saved with a unique file name. File names usually contain letters, numbers or the underscore symbol.

31 Alignment of text is when the text on a page is positioned to the left or right side of the margin, centred within the page or spaced out evenly between the left and right margins.

32 Serif fonts are usually easier to read in printed works than sans-serif fonts. Serif fonts, which have small tails at the end of some letters, are used to make it easier for the viewer to read, as they can guide the eye and reduce eyestrain when reading large blocks of text.

33 A graphic, or graphic image, is a digital representation of information, such as a drawing, chart or photograph. There are three universally supported image formats: GIF, PNG, and JPEG.

34 A graphic image saved as a GIF also uses compression techniques to reduce file sizes. The GIF format works best for images with only a few distinct colours, such as line drawings, single-colour borders and simple cartoons. GIF formats are limited to 256 colours and therefore not recommended for large blocks of solid colour in simple graphics. One of the disadvantages of using GIF is that it produces jagged edges when supporting transparency.

35 JPEG is the standard for photographic images and uses compression techniques to reduce the file size. These smaller sizes result in faster downloading of webpages. The more compressed the file, the smaller the file, but the lower the quality. The goal with JPEG files is to reach a balance between image quality and file size.

36 Compression doesn't affect the quality of PNG files. Unlike JPEGs, which blur images at a certain point, a PNG file will always look as sharp as the original image. PNG files tend to be slightly larger than JPG files, especially when they are high resolution.

37 Complementary colours are contrasting and stand out against one another. Often it is a good idea to use a complementary colour as the highlight colour.

38 Combining red, blue and green (RGB) colours creates white. Consequently, RGB colours are often known as additive colours. These are mainly used for lighting, optics, video and monitors.

39 Contrast in an onscreen product refers to the visual difference in colour or tone between items on the screen. Greater contrast will make items appear to stand out more from one another. If there is not enough contrast between two items, they may appear to blend into each other, making it difficult for a user to see them clearly.

CHAPTER SUMMARY

40 MP4 video formats are widely used for computers and mobile devices, and for downloading and streaming video. It is the default choice for smartphones and tablets and watching movies on computer.

41 MP3 (known as MPEG-1 or MPEG-2 Audio Layer III), is an audio coding format. It is commonly used to download digital music or audio streaming. Many digital audio players playback MP3s.

42 Style guides provide instructions to website developers about where to use different type sizes and fonts, and whether these should be in bold or italic. They can also contain information on colours and patterns to be used as backgrounds on webpages. Formats and conventions are also documented in the guides.

43 Common design elements to consider when planning a website include: proportion, orientation, clarity and consistency, colour and contrast, useability and accessibility, and appropriateness and relevance.

44 Proportion, or visual hierarchy, refers to the prominence of various elements on a screen. The most important elements, such as headings, should stand out visually on the screen.

45 Clarity is important for onscreen products. All elements on the screen should be able to be seen clearly to convey the message effectively to the user.

46 Consistency of navigation links, colour schemes and other repeatable features allow users to navigate an onscreen product comfortably with minimal confusion.

Review quiz

TEST YOUR KNOWLEDGE

APPROACHES TO PROBLEM-SOLVING METHODOLOGY

1. List the characteristics of a project.
2. List the important skills of a project manager.
3. If a task is said to be on the critical path, describe what will happen if the completion of this task is delayed.
4. Explain how a project table and a Gantt chart assist a project manager to plan and manage a project?
5. Why is it important to keep track of file versions when collaborating with others on a project?
6. How does groupware assist workers to collaborate?
7. List and describe the activities involved in the design and development stages of the problem-solving methodology.
8. Create a storyboard for the development of your school's website.
9. Create a layout diagram for the homepage of your school website so that it can be viewed on a mobile device.
10. What is the difference between a storyboard and a layout diagram?
11. What is the purpose of using a site map when creating a large website?
12. Why do solutions need to be tested using test data?
13. Why is it important to consider the elements of design when constructing a webpage on a website?
14. Describe and explain the purpose of at least one method of manual validation and one method of electronic validation when producing a website solution.
15. What is the difference between formats and conventions?
16. Why does particular attention need to be given to naming files?
17. Why are sans-serif fonts easier to read than serif fonts on websites?
18. Why is it important to ensure that light background colours are used in webpages?
19. Why is it necessary to give careful consideration to website navigation?

APPLY YOUR KNOWLEDGE

GANTT CHARTS

1 Examine the Project Table in Table 5.5. Create a Gantt chart to represent this project. Be sure to include simple dependencies and milestones.
2 Answer these questions based on the Gantt chart created in Question 1.
   a Which tasks are on the critical path?
   b How long is the critical path (in days)?
   c How is the critical path affected if Task C takes an extra three days?
   d What impact is there on the critical path if Task E takes four more days than planned?

TABLE 5.5

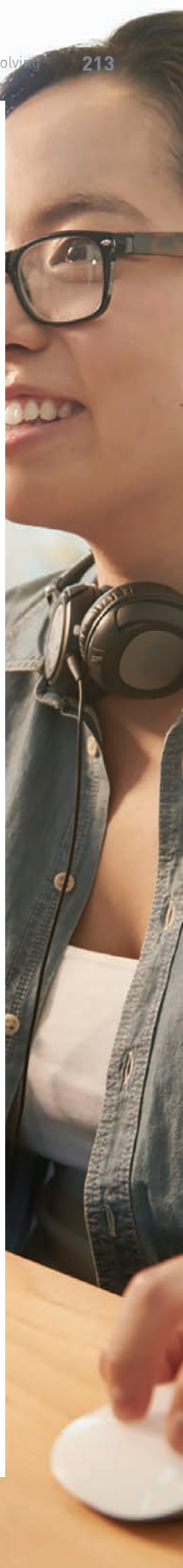
Task name	Duration (days)	Task milestone?	Predecessors
A	5		
B	5		A
C	4		B
D	3		A
E	5		D
F	2		E
G	4		F
M1	0	YES	C, G
H	2		M1
I	3		M1
J	2		H
M2	0	YES	I, J
K	4		M2
M3	0	YES	K

CHARLOTTE – ONLINE SAFETY PREFECT

Charlotte works alongside students at her school providing guidance and leadership in online safety. Her school has an iPad program where all students have access to their own device. She wants to set up a website for students to assist with issues they might encounter and places to get help, while at school and outside of school. She wants the website to be viewed on mobile devices.

Questions about the development of the student-support website

1 Create a layout diagram for the first three pages of the website.
2 Create a detailed storyboard for the first three pages of the website.
3 Create a site map for the entire website.
4 Draw a flowchart and an IPO chart to help plan the solution.
5 List five formats and conventions that will be applied to the website.
6 Identify the file names that will be used for the first three pages of this website.
7 Nominate the colour scheme that could be used in this website, and justify the choice of colours for the background and text.



PREPARING FOR UNIT 1 OUTCOME 3

Design and develop a website collaboratively with others that presents an analysis of a contemporary issue and the team's point of view on the issue

Working in teams (virtual and face-to-face), you will use web-authoring software to create a website that is designed to be viewed on mobile devices. The website will present an overview of a contemporary issue associated with a particular field, such as entertainment, agriculture, finance, sport or health. Your website should be informed by your knowledge of information architecture. You should focus on:

- the nature of the issue associated with the use of information systems
- legal, social, environmental or ethical reasons for a contentious issue
- types and capabilities of digital systems associated with the field and issue
- key stakeholders such as individuals, organisations and governments, and their responsibilities
- positive and negative opinions of each stakeholder about the issue.

OUTCOME MILESTONES

1. Select and apply appropriate methods and techniques to acquire and reference data and information.
2. Use digital systems to document and monitor project plans when creating team solutions.
3. Analyse the causes and effects of issues using visualising thinking tools.
4. Synthesise viewpoints to formulate your team's point of view.
5. Evaluate cloud computing as a data storage solution.
6. Select and use digital system components appropriate to your team's needs.
7. Select appropriate design tools and represent the appearance and functionality of solutions, taking into account user interactions.
8. Recommend online techniques for encouraging end-users' support of published viewpoints.
9. Use web-authoring software and select and apply functions and techniques to manipulate data and create solutions.

STEPS TO FOLLOW

1. Create a team to work collaboratively to research an issue.
2. Conduct preliminary research into issues that are affected by the use of information systems.
3. Select one particular field to study in detail.
4. Develop a project plan to document and monitor the project.
5. Acquire primary and/or secondary data and information about the issue.
6. Reference the data and information collected.
7. Use visualisation thinking tools to analyse the causes and effects of the issue.
8. Blend individual team members' opinions to formulate a team point of view on the issue.
9. Evaluate the use of cloud computing as a data storage solution.
10. Select appropriate design tools to represent the appearance and functionality of the solution.
11. Recommend techniques to allow end-users to express their opinions on websites.
12. Select and use the appropriate digital system components.
13. Use web-authoring software to manipulate the data and create the solution.

DOCUMENTS REQUIRED FOR ASSESSMENT

1. Project plan annotated with progress made and any changes that occurred during the project
2. List of tasks completed by each member of the team
3. Primary and secondary data collected regarding the study
4. Visualising thinking tool used to analyse the issue
5. Documentation used to formulate the team's point of view
6. Evaluation of cloud computing as a data-storage solution
7. List of design tools used for the appearance and functionality of the solution
8. Recommendations of techniques used to allow users to express opinions
9. List of the digital system components used to complete the solution
10. Completed website solution

ASSESSMENT

Assessment for the task will be based on the quality of the analysis of the subject involving the use of information systems, the quality of the website solution developed and other required documentation. A set of assessment criteria will be prepared and distributed by your teacher prior to the commencement of the task.