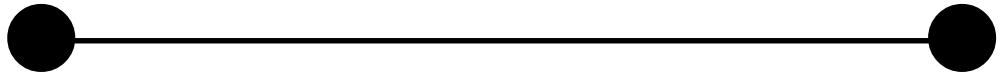




Bachelor of Information Technology, and Bachelor of Software Engineering

Fundamentals of Web Programming

Module BSEH263



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Foreword

To the student

The demand for skills and knowledge and the requirement to adjust and change with changing technology, places on us a need to learn continually throughout life. As all people need an education of one form or another, it has been found that conventional education institutions cannot cope with the demand for education of this magnitude. It has, however, been discovered that distance education and open learning, now also exploiting e-learning technology, itself an offshoot of e-commerce, has become the most effective way of transmitting these appropriate skills and knowledge required for national and international development.

Since attainment of independence in 1980, the Zimbabwe Government has spearheaded the development of distance education and open learning at tertiary level, resulting in the establishment of the Zimbabwe Open University (ZOU) on 1 March, 1999.

ZOU is the first, leading, and currently the only university in Zimbabwe entirely dedicated to teaching by distance education and open learning. We are determined to maintain our leading position by both satisfying our clients and maintaining high academic standards. To achieve the leading position, we have adopted the course team approach to producing the varied learning materials that will holistically shape you, the learner to be an all-round performer in the field of your own choice. Our course teams comprise

academics, technologists and administrators of varied backgrounds, training, skills, experiences and personal interests. The combination of all these qualities inevitably facilitates the production of learning materials that teach successfully any student, anywhere and far removed from the tutor in space and time. We emphasize that our learning materials should enable you to solve both work-related problems and other life challenges.

To avoid stereotyping and professional narrowness, our teams of learning materials producers come from different universities in and outside Zimbabwe, and from Commerce and Industry. This openness enables ZOU to produce materials that have a long shelf life and are sufficiently comprehensive to cater for the needs of all of you, our learners in different walks of life. You, the learner, have a large number of optional courses to choose from so that the knowledge and skills developed suit the career path that you choose. Thus, we strive to tailor-make the learning materials so that they can suit your personal and professional needs. In developing the ZOU learning materials, we are guided by the desire to provide you, the learner, with all the knowledge and skill that will make you a better performer all round, be this at certificate, diploma, undergraduate or postgraduate level. We aim for products that will settle comfortably in the global village and competing successfully with anyone. Our target is, therefore, to satisfy your quest for knowledge and skills through distance education and open learning

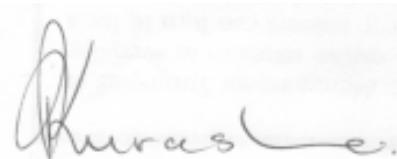
Any course or programme launched by ZOU is conceived from the cross-pollination of ideas from consumers of the product, chief among whom are you, the students and your employers. We consult you and listen to your critical analysis of the concepts and how they are presented. We also consult other academics from universities the world over and other international bodies whose reputation in distance education and open learning is of a very high calibre. We carry out pilot studies of the course outlines, the content and the programme component. We are only too glad to subject our learning materials to academic and professional criticism with the hope of improving them all the time. We are determined to continue improving by changing the learning materials to suit the idiosyncratic needs of our learners, their employers, research, economic circumstances, technological development, changing times and geographic location, in order to maintain our leading position. We aim at giving you an education that will work for you at any time anywhere and in varying circumstances and that your performance should be second to none.

As a progressive university that is forward looking and determined to be a successful part of the twenty-first century, ZOU has started to introduce e-learning materials that will enable you, our students, to access any source of information, anywhere in the world through internet and to communicate, converse, discuss and collaborate synchronously and asynchronously, with peers and tutors whom

you may never meet in life. It is our intention to bring the computer, email, internet chat-rooms, whiteboards and other modern methods of delivering learning to all the doorsteps of our learners, wherever they may be. For all these developments and for the latest information on what is taking place at ZOU, visit the ZOU website at www.zou.ac.zw

Having worked as best we can to prepare your learning path, hopefully like John the Baptist prepared for the coming of Jesus Christ, it is my hope as your Vice Chancellor that all of you, will experience unimpeded success in your educational endeavours. We, on our part, shall continually strive to improve the learning materials through evaluation, transformation of delivery methodologies, adjustments and sometimes complete overhauls of both the materials and organizational structures and culture that are central to providing you with the high quality education that you deserve. Note that your needs, the learner 's needs, occupy a central position within ZOU's core activities.

Best wishes and success in your studies.

A handwritten signature in black ink, appearing to read "Primrose Kurasha".

Prof. Primrose Kurasha
Vice Chancellor



The Six Hour Tutorial Session At Zimbabwe Open University

As you embark on your studies with Zimbabwe Open University (ZOU) by open and distance learning, we need to advise you so that you can make the best use of the learning materials, your time and the tutors who are based at your regional office.

The most important point that you need to note is that in distance education and open learning, there are no lectures like those found in conventional universities. Instead, you have learning packages that may comprise written modules, tapes, CDs, DVDs and other referral materials for extra reading. All these including radio, television, telephone, fax and email can be used to deliver learning to you. As such, at ZOU, we do not expect the tutor to lecture you when you meet him/her. We believe that that task is accomplished by the learning package that you receive at registration. What then is the purpose of the six hour tutorial for each course on offer?

At ZOU, as at any other distance and open learning university, you the student are at the centre of learning. After you receive the learning package, you study the tutorial letter and other guiding documents before using the learning materials. During the study, it is obvious that you will come across concepts/ideas that may not be that easy to understand or that are not so clearly explained. You may also come across issues that you do not agree with, that actually conflict with the practice that you are familiar with. In your discussion groups, your friends can bring ideas that are totally different from yours and arguments may begin. You may also find that an idea is not clearly explained and you remain with more questions than answers. You need someone to help you in such matters.

This is where the six hour tutorial comes in. For it to work, you need to know that:

- **There is insufficient time for the tutor to lecture you**
- **Any ideas that you discuss in the tutorial, originate from your experience as you work on the materials. All the issues raised above are a good source of topics (as they pertain to your learning) for discussion during the tutorial**
- **The answers come from you while the tutor's task is to confirm, spur further discussion, clarify, explain, give additional information, guide the discussion and help you put together full answers for each question that you bring**
- **You must prepare for the tutorial by bringing all the questions and answers that you have found out on the topics to the discussion**
- **For the tutor to help you effectively, give him/her the topics beforehand so that in cases where information has to be gathered, there is sufficient time to do so. If the questions can get to the tutor at least two weeks before the tutorial, that will create enough time for thorough preparation.**

In the tutorial, you are expected and required to take part all the time through contributing in every way possible. You can give your views, even if they are wrong, (many students may hold the same wrong views and the discussion will help correct the errors), they still help you learn the correct thing as much as the correct ideas.

You also need to be open-minded, frank, inquisitive and should leave no stone unturned as you analyze ideas and seek clarification on any issues. It has been found that those who take part in tutorials actively, do better in assignments and examinations because their ideas are streamlined. Taking part properly means that you prepare for the tutorial beforehand by putting together relevant questions and their possible answers and those areas that cause you confusion.

Only in cases where the information being discussed is not found in the learning package can the tutor provide extra learning materials, but this should not be the dominant feature of the six hour tutorial. As stated, it should be rare because the information needed for the course is found in the

learning package together with the sources to which you are referred. Fully-fledged lectures can, therefore, be misleading as the tutor may dwell on matters irrelevant to ZOU course.

Distance education, by its nature, keeps the tutor and student separate. By introducing the six hour tutorial, ZOU hopes to help you come in touch with the physical being, who marks your assignments, assesses them, guides you on preparing for writing examinations and assignments and who runs your general academic affairs. This helps you to settle down in your course having been advised on how to go about your learning. Personal human contact is, therefore, upheld by ZOU.

The six hour tutorials should be so structured that the tasks for each session are very clear. Work for each session, as much as possible, follows the structure given below.

Session I (Two Hours)

Session I should be held at the beginning of the semester. The main aim of this session is to guide you, the student, on how you are going to approach the course. During the session, you will be given the overview of the course, how to tackle the assignments, how to organize the logistics of the course and formation of study groups that you will belong to. It is also during this session that you will be advised on how to use your learning materials effectively.

Session II (Two Hours)

This session comes in the middle of the semester to respond to the challenges, queries, experiences, uncertainties, and ideas that you are facing as you go through the course. In this session, difficult areas in the module are explained through the combined effort of the students and the tutor. It should also give direction and feedback where you have not done well in the first assignment as well as reinforce those areas where performance in the first assignment is good.

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The final session, Session III, comes towards the end of the semester. In this session, you polish up any areas that you still need clarification on. Your tutor gives you feedback on the assignments so that you can use the experience for preparation for the end of semester examination.

Note that in all the three sessions, you identify the areas that your tutor should give help. You also take a very important part in finding answers to the problems posed. You are the most important part of the solutions to your learning challenges.

Conclusion

In conclusion, we should be very clear that six hours is too little for lectures and it is not necessary, in view of the provision of fully self-contained learning materials in the package, to turn the little time into lectures. We, therefore, urge you not only to attend the six hour tutorials

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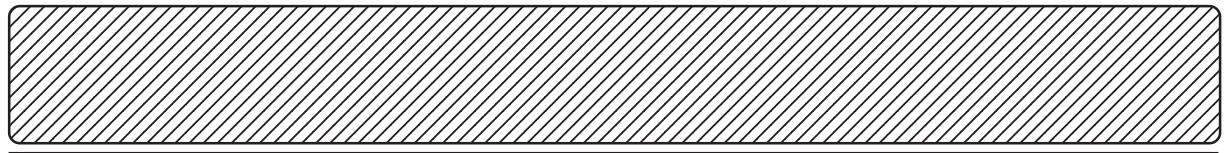
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Module Overview

You must read this Course Guide carefully from the beginning to the end. It tells you briefly what the course is about and how you can work your way through the course material. It also suggests the amount of time you are likely to spend in order to complete the course successfully. Please keep on referring to the Course Guide as you go through the course material as it will help you to clarify important study components or points that you might miss or overlook.

Introduction

Fundamentals of Web Programming is one of the courses offered by Faculty of Information Technology and Multimedia Communication at Zimbabwe Open University (ZOU). This course is worth 4 credit hours and should be covered over 8 to 15 weeks.

Course Audience

This course is offered to all students taking the Bachelor of Information Technology and Software Engineering. This module aims to impart the knowledge on web design and development.

As an open and distance learner, you should be able to learn independently and optimise the learning modes and environment available to you. Before you begin this course, please confirm the course material, the course requirements and how the course is conducted.

Course Synopsis

There are eight units in the module.

Units 1 and 2: Web Design Basics and Process introduce basic design guidelines used in building and evaluating websites, the common tools and technologies for constructing websites, and the stages of the website development process.

Units 3 and 4: Introduction to E-Commerce and Its Concepts provide an overview of how e-commerce applications are being conducted and managed over the Internet. The design and implementation issues that apply to e-commerce sites are also highlighted.

Units 5 and 6: Analysis, Design and Planning present the initial planning and preparation work that takes place before the website is actually built. During this preliminary stage, the goals and scope of the project are defined and agreed upon, a work plan and schedule is developed, and site-wide architectural decisions are made. The output of this step will feed into the succeeding steps in the process.

Units 7 and 8: Interface Design and Page Layout Design we discuss the structuring and organisation of content on a webpage and the use of mock-ups and prototyping techniques in presenting the layout.

Text Arrangement Guide

Before you go through this module, it is important that you note the text arrangement. Understanding the text arrangement should help you to organise your study of this course to be more objective and more effective. Generally, the text arrangement for each unit is as follows:

Objectives: This section refers to what you should achieve after you have completely gone through a unit. As you go through each unit, you should frequently refer to these objectives. By doing this, you can continuously gauge your progress of digesting the unit.

Activity: Activities are placed at various locations or junctures throughout the module. An Activity can appear in various forms such as questions, short case studies or it may even ask you to conduct an observation or research. Activity may also ask your opinion and evaluation on a given scenario. When you come across an Activity, you should try to widen what you have gathered from the module and introduce it to real situations. You should engage yourself in higher order thinking where you might be required to analyse, synthesise and evaluate instead of just having to recall and define.

Summary: You can find this component at the end of each unit. This component helps you to recap the whole unit. By going through the summary, you should be able to gauge your knowledge retention level. Should you find points inside the summary that you do not fully understand, it would be a good idea for you to revisit the details from the module.

References: References is where a list of relevant and useful textbooks, journals, articles, electronic contents or sources can be found. This list appears at the end of every unit. You are encouraged to read and refer to the suggested sources to elicit the additional information needed as well as to enhance your overall understanding of the course.

Prior Knowledge

The broad prerequisites for this course are familiarity with connection to the Internet, the Windows operating system, using email and Web browsers, as well as basic knowledge of HTML. Activities, reading texts and references are placed in the module to give the student lessons into HTML so that prior knowledge of can only be an added advantage. For readers without prior HTML knowledge there is need to refer to references and texts given to ensure that by the end of the course you are proficient and conversant with HTML and other web technologies given in this course.

Course Objectives

By the end of this course, you should be able to:

- ❖ discuss the steps in the website design process
- ❖ use software tools to develop and test web-pages, images and multimedia
- ❖ describe the characteristics of good and bad website design
- ❖ critique the design qualities of websites
- ❖ relate the strategic and operational elements of an e-commerce site to its Web design, content and features
- ❖ establish, together with the owners, the founding requirements for a website; its scope, content and intended features
- ❖ apply recommendations for ethical, accessibility and intellectual property considerations as a designer
- ❖ design the interface, navigation and functionality of a website based on the project requirements and on basic design guidelines



Web Design Basics

1.0 Introduction

In this unit we highlight that the Internet services company Netcraft found 101 435 253 websites on the World Wide Web during their Web survey in November 2006 and 366 848 493 by December 2011. If you stop to think about it, it is amazing how quickly the Web has surpassed the 100 million mark in just over a decade of its use and multiplied to 3 ½ times as much in a space of 5 years, that is, between 2006 and 2011. Indeed, one of the major factors behind the explosive growth of the Web has been the relative ease with which pages can be created for it.

The earliest websites were written in basic Hypertext Markup Language (HTML), a markup language which gave web pages their basic structure in the form of headings, paragraphs, lists and so on. HTML also came with the revolutionary ability to include hyperlinks which users could click on to view other pages. In those early days, it was sufficient to have a background in graphic design, working knowledge of a graphics editing programme, and sufficient understanding of HTML for someone to earn the title 'Web Designer'. Most end users and even Web professionals considered good Web design as consisting mainly of creating a website with pleasing graphics.

1.1 Objectives

By the end of this unit, you should be able to:



- outline the general principles of web design
- evaluate websites based on these principles
- describe the common tools and technologies for designing and producing websites

1.2 What is Web Design?

Web design as a practice and as a profession has been around for a little more than a couple of decades. It all started when Tim Berners-Lee, the inventor of the Web, posted the first webpage in August, 1991. The earliest web pages looked and felt very different from the ones you see nowadays. Surfing Yahoo! and purchasing a book on Amazon in the mid-1990s, sites were mostly text-based with minor graphics and minimal interactive features, absent were the rich multimedia interfaces that are commonplace in today's websites.

Web design may have evolved tremendously in the intervening years, but its basic definition, principles and scope remain the same. On an elementary level, Web design involves creating and putting up pages on the Web. On a more comprehensive level, it refers to the continuous process of planning, designing, developing, and deploying websites that meet the needs and expectations of their users.

The clients who hire Web designers may not be aware of the nature and scope of the Web design profession. The truth is, Web designers aren't just HTML coders, database programmers, graphic designers or multimedia artists. They aren't just there to listen blindly to the client's dictates and implement everything they ask for. They are primarily business consultants whose purpose is to help their clients gain a 'true understanding of their customer needs' and help them build a website centred around those needs. Sometimes, it may be up to you as the Web designer to educate your clients on the comprehensive set of services that may be offered.

1.2.1 Essential skills

Spiro (2006) states that Web design is 'a balance between marketing, design, usability and technology'. That is a lot of ground to cover! The following are the disciplines you may draw from.

Graphic and multimedia design

You will make decisions about all the elements on a webpage. This could include colours, layout, typography, photographs and graphics. If you are keen on designing commercial sites as a professional, you will benefit greatly from formal graphic design training as well as a strong background in image editing software, such as Adobe Photoshop and Macromedia Fireworks.

Other types of content, such as audio, video and animation, may also be integrated on your website. You may need to digitise multimedia content using a combination of hardware and software tools. You will also have to optimise the content for timely delivery over the Web. A background in sound and video production, as well as strong familiarity with tools, such as Macromedia Flash and Director, would be very helpful.

Information design

Information design involves organising website content and functions into their proper categories, naming these categories appropriately and designing obvious and effective navigation to access these categories. It also involves combining and structuring the elements on individual web pages. This is similar to how a librarian organises the books into categories and bookshelves so that users can locate what they want easily and comfortably.

Information design is heavily influenced by human-computer interface design, interaction design and usability testing.

Technical design

Websites are becoming 'software-like' nowadays, allowing people to do useful tasks, such as filing income taxes, paying bills, and ordering goods and services. Although the users only get to see the web pages that they are interacting with, the real workhorses are the programmes running behind the pages which process and respond to user requests. Technical design makes all this possible.

You will need back-end programming skills if your website offers advanced functions such as interactive shopping carts, order processing or payment processing. You will also need network and system administration skills if your client wants you to host and administer its websites.

Marketing

Websites serve as an important marketing tool for businesses. Web designers should therefore, possess an understanding of the concepts of selling and promotion so that they can help clients implement customer-focused marketing strategies and reinforce their brand image online. They will need to run online marketing campaigns using search engines, direct email, banner advertising, and so on, to promote their clients' websites and attract repeat visitors.

Project management

Whether you are designing websites as a hobby or as a profession, you will also need to manage your time, schedule and budget as you proceed. You may do this on your own if you are working as a one-person team, but once a project goes beyond a certain size, it is beneficial to have a full-time project manager to coordinate between users, clients and team members on various issues so that designers and developers can be freed up to do the actual work of designing and producing the site. Project management skills are also needed to ensure that the project is on time, on budget, and has the resources needed to ensure its success.

Activity 1.1



- Visit the following web sites of Web design firms:
- i. Kirsanov at <http://www.kirsanov.com>
 - ii. Akimbo Design at <http://www.akimbodesign.com>
 - iii. Willardesigns at <http://www.willardesigns.com>
 - iv. Lemon at <http://www.lemon.com.hk>
- a) Search for the client portfolio or list of services
 - b) Determine which of these disciplines each of the Web design firms are involved in: graphic design; multimedia design; information design; technical design and project management.

1.3 Website Review and Evaluation

We have all been there. We are surfing the Web, clicking one link after another, when we come across a site that impresses us, whether it is due to visual appeal, or the usefulness of the functions and content on offer, or indeed, for a variety of other reasons. We stay on the site for a long while, and even go as far as bookmarking it so we can return in the future. What is it about these sites that attracts us and compels us to keep coming back? It is a good question to ask ourselves as we embark on our study of Web design, since one of the best ways to start is by learning from the successful practices of other designers.

1.3.1 Basic design principles

Now let us have a quick rundown of the generally accepted design principles that govern the field of Web design.

User-centred design

Your website's ultimate success depends on whether it meets the demands and expectations of its users or target audience. It can sometimes be a challenge to observe this principle since clients may not always want to invest the time to understand and build the site from the user's perspective. Clients tend to approach Web design from a technology perspective, dictating their demands in terms of 'I want more Flash animations' or 'I want to build the pages from a database' and so on.

Quick loading time

Web pages must be designed with speed in mind. Usability expert Dr Jakob Nielsen states that '10 seconds is about the limit for keeping the user's attention focused on the dialogue' (Nielsen 2006). This means that all your web pages must load within ten seconds if you do not want to lose your customers' interest and attention.

There is not much you can do about the type of hardware or software your visitors use when they view your site, as well as the speed of their Internet connection, and even how many hops away their Internet Service Provider is from the actual website. But do not despair!

Ease of navigation

We all expect shopping malls, libraries, train stations and other public venues to have directories or floor maps to show us the fastest way to get to where we want to go. In much the same way, once visitors arrive at your site, you must give them all the means and ways to get to the information or the functions that they came for, as easily and as painlessly as possible.

Visual quality

The floodgates to the World Wide Web were thrown wide open with the introduction of the graphical Mosaic browser back in 1993. Suddenly, the Web was transformed from a primarily text-based to a visual medium. It is this visual and graphical nature which has captivated the public and turned the Web into a major part of mainstream culture in such a short time.

There is really no uniform set of rules to judge how visually appealing a site is or not. In a lot of respects, the beauty of a site is in the eye of the beholder. Many times when working with clients, their feedback about a proposed design amounts pretty much to this: 'I don't really know what I'm looking for, but I'll know it when I see it!'

The key is to make sure that the look and feel of your website is appropriate and complementary to your content.

Effectiveness of content

Content is king when it comes to the Web. When all is said and done, what you have to say and your credibility is still more important than how fast or how attractively your pages appear. You must ensure that you are serving

content that is timely, reliable and relevant to your target audience. Take an e-commerce site selling baby-related goods, for example. Its online product catalogue must be kept up-to-date with the latest items, prices and availability information. It could provide value-added services that cater to its customers' concerns, such as discussion boards, feature articles or expert advice columns on parenting and educational matters. It should also verify the information posted on its site for accuracy and correctness.

Activity 1.1



Visit the following sites:

- 1) ZIMRA at <http://www.zimra.co.zw/>
- 2) YesAsia - Online Entertainment Store at <http://www.yesasia.com>
- 3) The Beatles at <http://www.beatles.com/>
- 4) Walt Disney at <http://disney.go.com/park/homepage/today/html/index.html>
- 5) Tom.com at <http://www.tom.com>

Examine any interactive features they provide, such as database searching or animation. Spend no more than 20 minutes filling out the checklist for each of these sites.

1.4 Overview of Standard Web Technologies

In this section, we will take a tour of the standard languages and technologies commonly used to build websites today. Many of these standards are promoted by the World Wide Web Consortium (W3C), such as HTML, XML, XHTML, Cascading Style Sheets and standardised JavaScript. We have a greater chance of creating reliable and well-formed websites by observing and using these standards. Using these standards also helps ensure that our sites will keep working even when they are viewed in new browser versions or even new kinds of devices in the future.

1.4.1 Hypertext markup language (html)

HTML is the universal language spoken on the Web. Any Web browser running on any hardware platform can read and interpret your documents if they are written in HTML. It follows that writing HTML is the most basic skill you need as a Web designer.

HTML is a markup language. You may have heard this before, but what does it mean, exactly? Well, when we apply markup (that is, add HTML tags) to a document, we are essentially dividing the document into parts.

For example, within a document, we use the `<h1>` and `</h1>` tags to surround or contain all the level one headings, `<p>` and `</p>` to contain paragraphs, `` and `` to contain a list, `` and `` to mark the items within a list, and so on. These are examples of structural markup tags, since they describe the purpose of text without specifying how they should be displayed.

Please refer to our
[website](http://www.speedyoffice.com.hk) for more
details.

Figure 1.1: Examples of Structural Markup Tags

On the other hand, HTML also contains markup tags that describe how the content is supposed to look rather than what part of the document it is. Examples of this would be the `` and `` tags used to apply boldface to text, the `<i>` and `</i>` tags used to italicise text, the `
` tag used to insert a new line, the `` and `<emphasis>` tags to emphasise text, and the `` and `` tags used to specify text styles, sizes and colour. These types of tags are called presentation tags.

If I wanted this line to be displayed in `<i>italics</i>`
I would use italic tags.

Figure 1.2: Presentation Tags

There is another set of tags that requires the browser to perform special functions associated with the element. Examples of this would be the `<a>` and `` tags used to mark up hyperlinks, the `` tag used to include any inline images in the document, and the `<input>` tag used to define any form elements. The browser not only needs to know how to display such elements, it also needs to know how to process the interaction between the user and these elements. These types of tags can be classified as processed and interactive markup.

Please refer to our
website for more
details.

Figure 1.3: Processed and Interactive Markup

HTML was invented by Tim Berners-Lee, who based it on Standard Generalized Markup Language (SGML), an international standard for marking up text for presentation on a variety of physical devices. The basic idea of SGML is that the document's structure should be separate from its presentation.

If this is the case, you may be wondering why HTML includes presentation tags and attributes. Well, there were no clear standards for the HTML language during its early years. Browser software companies added many non-standard features into the language, and these features eventually found their way into the standard specification.

Most presentational markup elements have become deprecated under the HTML 4.01 specification. Deprecated tags will no longer be supported in current and future specifications of a markup language, so we need to avoid using such tags. The HTML 4.01 specification recommends using Cascading Style Sheets (CSS) for designing page layout and appearance instead.

Activity1.2



Visit the following site and do the HTML tutorial given http://www.w3schools.com/html/html_intro.asp

- 1) What does HTML stand for?
 - a) Hyperlinks and Text Markup Language
 - b) Hyper Text Markup Language
 - c) Home Tool Markup Language

 - 2) Who is making the Web standards?
 - a) Google
 - b) Microsoft
 - c) The World Wide Web Consortium
 - d) Mozilla

 - 3) Choose the correct HTML tag for the largest heading
 - a) <h6>
 - b) <h1>
 - c) <heading>
 - d) <head>

 - 4) What is the correct HTML tag for inserting a line break?
 - a)

 - b) <break>
 - c) <lb>

 - 5) What is the preferred way for adding a background colour in HTML?
 - a) <background>yellow</background>
 - b) <body style="background-color:yellow;">
 - c) <body background="yellow">

 - 6) Choose the correct HTML tag to make a text bold
 - a) <bold>
 - b)

- 7) Choose the correct HTML tag to make a text italic
- a) <i>
 - b) <italic>
- 8) What is the correct HTML for creating a hyperlink?
- a) W3Schools
 - b) <a>http://www.w3schools.com
 - c) W3Schools.com
 - d) W3Schools.com
- 9) How can you create an e-mail link?
- a)
 - b) <mail>xxx@yyy</mail>
 - c) <mail href="xxx@yyy">
 - d)
- 10) How can you open a link in a new tab/browser window?
- a)
 - b)
 - c)
- 11) Which of these tags are all <table> tags?
- a) <table><tr><tt>
 - b) <table><tr><td>
 - c) <thead><body><tr>
 - d) <table><head><tfoot>
- 12) In HTML, inline elements are normally displayed without starting a new line.
- a) False
 - b) True
- 13) How can you make a numbered list?
- a) <list>
 - b) <dl>
 - c)
 - d)
- 14) How can you make a bulleted list?
- a) <list>
 - b)

- c)
- d) <dl>

15) What is the correct HTML for making a checkbox?

- a) <checkbox>
- b) <input type="check">
- c) <check>
- d) <input type="checkbox">

16) What is the correct HTML for making a text input field?

- a) <input type="textfield">
- b) <input type="text">
- c) <textfield>
- d) <textinput type="text">

17) What is the correct HTML for making a drop-down list?

- a) <input type="list">
- b) <input type="dropdown">
- c) <select>
- d) <list>

18) What is the correct HTML for making a text area?

- a) <input type="textbox">
- b) <textarea>
- c) <input type="textarea">

19) What is the correct HTML for inserting an image?

- a)
- b) image.gif
- c)
- d) <image src="image.gif" alt="MyImage">

20) What is the correct HTML for inserting a background image?

- a)
- b) <body background="background.gif">
- c) <background img="background.gif">

1.4.2 Cascading style sheets (css)

As you have seen earlier, HTML is made up of tags that define the structure of documents (e.g. titles, headings, paragraphs, lists) as well as tags that describe the way an element should be displayed in the Web browser (for example, fonts). Mixing up structural tags and presentation tags, the way HTML does, can lead to code that is difficult to understand and maintain.

Think of the work involved if you wanted to change the font colour to blue and size to '+2' for all headings in the HTML code below.

```
<font size='+1' color='green'><h3>Heading One</h3></font>
<p>This text appears under Heading One.</p>
<font size='+1' color='green'><h3>Heading Two</h3></font>
<p> This text appears under Heading Two.</p>
<font size='+1' color='green'><h3>Heading Three</h3></font>
<p> This text appears under Heading Three.</p>
```

Figure 1.4: Changing Colour and Font Size Tags

You would have to update the `` tags on all three headings separately. Here is the updated code for the first heading.

```
<font size='+2' color='blue'><h3>Heading One</h3></font>
```

Figure 1.5: The Updated Code for the First Heading

Now think of all the work to be done if this update needs to be made over and over again on all the pages on your site! This is not just very tedious work. It is also very easy to miss one or two spots, leading to an inconsistent appearance of level-three headings on your site.

Now let us see what happens if we use style sheets instead. If you have worked with desktop publishing or word processing software, chances are you have used styles to format your document. Styles are formatting rules that

you apply to the elements in your documents. Here is the example in Figure 1.6 using style sheets for formatting:

```
<html>
<head>
<title>CSS Example</title>
<style type='text/css'>
    h3 {font: large; color: green}
</style>
</head>
<body>
    <h3>Heading One</h3>
    <p>This text appears under Heading One.</p>
    <h3>Heading Two</h3>
    <p> This text appears under Heading Two.</p>
    <h3>Heading Three</h3>
    <p> This text appears under Heading Three.</p>
</body>
</html>
```

Figure 1.6: Using Style Sheets for Formatting

The style sheet is surrounded by the `<style>` and `</style>` tags within the head of the HTML document. The `h3` element is followed by a list of the formatting rules that will be applied to it, which would display all level three headings as large green text. Since all the formatting rules are confined to a single location, you can update the style for level three headings in one place only. No more mixing up your structural and your presentation tags in the body of the HTML page.

```
<head>
<title>CSS Example</title>
<style type='text/css'>
  h3 {font: x-large; color: blue}
</style>
</head>
```

Figure 1.7: All Level Three Headings as Large Green Text

If you need to use the same style on multiple pages, you can even save the styles in a separate style sheet file (called 'styles.css', for example) and have multiple web pages link to the same style-sheet, as follows:

```
<HEAD>
<TITLE>CSS Example</TITLE>
<link rel='stylesheet' type='text/css' href='styles.css'
media='screen'>
</HEAD>
```

Figure 1.8: Style.css

Style sheets bring an explicit separation between the structure of a document and its presentation. To modify the presentation, the change can be restricted to the style sheet alone. Style sheets also offer greater control over fonts, colours, indents, margins, and the general look and layout of your web pages.

Activity 1.3

- 1) What does CSS stand for?
 - a) Colourful Style Sheets
 - b) Cascading Style Sheets
 - c) Creative Style Sheets
 - d) Computer Style Sheets

 - 2) What is the correct HTML for referring to an external style sheet?
 - a) <stylesheet>mystyle.css</stylesheet>
 - b) <link rel="stylesheet" type="text/css" href="mystyle.css">
 - c) <style src="mystyle.css">

 - 3) Where in an HTML document is the correct place to refer to an external style sheet?
 - a) At the end of the document
 - b) At the top of the document
 - c) In the <head> section
 - d) In the <body> section

- 4) Which HTML tag is used to define an internal style sheet?

 - a) <style>
 - b) <script>
 - c) <css>

5) Which HTML attribute is used to define inline styles?

 - a) class
 - b) style
 - c) styles
 - d) font

6) Which is the correct CSS syntax?

 - a) body:color=black;
 - b) body {color: black;}
 - c) {body:color=black;}
 - d) {body;color:black;}

7) How do you insert a comment in a CSS file?

 - a) // this is a comment
 - b) /* this is a comment */
 - c) 'this is a comment
 - d) // this is a comment //

8) Which property is used to change the background colour?

 - a) colour
 - b) bgcolour
 - c) background-colour

9) How do you add a background colour for all <h1> elements?

 - a) h1 {background-colour:#FFFFFF;}
 - b) h1.all {background-colour:#FFFFFF;}
 - c) all.h1 {background-colour:#FFFFFF;}

10) Which CSS property is used to change the text colour of an element?

 - a) text-colour
 - b) colour
 - c) fgcolour

- 11) Which CSS property controls the text size?
 - a) text-size
 - b) font-style
 - c) font-size
 - d) text-style

- 12) What is the correct CSS syntax for making all the <p> elements bold?
 - a) p {text-size:bold;}
 - b) <p style="font-size:bold;">
 - c) p {font-weight:bold;}
 - d) <p style="text-size:bold;">

- 13) How do you display hyperlinks without an underline?
 - a) a {decoration:no-underline;}
 - b) a {text-decoration:none;}
 - c) a {underline:none;}
 - d) a {text-decoration:no-underline;}

- 14) How do you make each word in a text start with a capital letter?
 - a) text-transform:capitalise
 - b) You cannot do that with CSS
 - c) text-transform:uppercase

- 15) Which property is used to change the font of an element?
 - a) Both font-family and font can be used
 - b) font-family
 - c) font

- 16) How do you make the text bold?
 - a) style:bold;
 - b) font-weight:bold;
 - c) font:bold;

- 17) How do you display a border like this:
 - a) The top border = 10 pixels
 - b) The bottom border = 5 pixels
 - c) The left border = 20 pixels
 - d) The right border = 1 pixel?
 - e) border-width:5px 20px 10px 1px;
 - f) border-width:10px 5px 20px 1px;

- g) border-width:10px 1px 5px 20px;
 - h) border-width:10px 20px 5px 1px;
- 18) Which property is used to change the left margin of an element?
- a) margin-left
 - b) indent
 - c) padding-left
- 19) When using the padding property; are you allowed to use negative values?
- a) Yes
 - b) No
- 20) How do you make a list that lists its items with squares?
- a) list-style-type: square;
 - b) list-type: square;
 - c) list: square;

1.4.3 Extensible markup language (xml)

HTML is the most successful markup language of all time. You can view the simplest HTML tags on virtually any device, from palmtops to mainframes. Given the success of HTML, why did the W3C create XML? To answer that question, take a look at this document:

```
<h3>Fist of Fury</h3>
<p>Starring:</p>
<li>Bruce Lee</li>
<li>Nora Miao</li>
<p>Directed by:</p>
<li>Wei Lo</li>
<p>Country:</p>
<li>Hong Kong</li>
<p>Year:</p>
<li>1972</li>
```

Figure 1.9: HTML, the Most Successful Markup Language

HTML was designed to be user-friendly. Without any special software, you and I can view this code in a text editor and understand that its content refers to the movie Fist of Fury and its related information, such as the country of origin, year of release, leading actors and director.

While the tags in this document tell the browser that this document is made up of headings, paragraphs and lists, it does not tell the browser what the information is. Humans have the native intelligence to understand the meaning of this document, but computers do not. Now why would this be a problem? Well, the Web would be a lot more useful if computers could also extract information directly from web pages, without waiting for any human assistance to help them understand and process the contents.

XML is a markup language which allows you to create your own tags, which can then be used to produce self-describing documents. Unlike HTML, which is a language just for creating web pages, XML is a language that lets you create other languages, hence the term 'extensible' in its name. By designing your own customised markup language, you are free to create and attach your own markup tags to the data in your own documents.

Here is the same code fragment shown earlier. This time, the HTML tags have been replaced with XML tags that describe the meaning of the data instead. By using XML to describe the meaning of data found on web pages, you and I can make it easier for computers to process the information on

```
<?xml version='1.0' encoding='UTF-8'?>
<movie>
  <title>Fist of Fury</title>
  <actorlist>
    <actor>Bruce Lee</actor>
    <actor>Nora Miao</actor>
  </actorlist>
  <director>Wei Lo</director>
  <country>Hong Kong</country>
  <release_year>1972</release_year>
</movie>
```

Figure 1.10: XML Tags that Describe the Meaning of the Data

XML also acts as the foundation for Web protocols including Scalable Vector Graphics (SVG), Synchronized Multimedia Integration Language (SMIL), Wireless Markup Language (WML) and Really Simple Syndication (RSS). These are all protocols used by computer applications to transmit data over the Web.

When editing XML documents, you must keep in mind the following rules: XML documents that observe the rules above are considered well-formed. It takes a while to get used to XML's strictness when you have been spoiled by HTML's leniency. Just remember that this newfound discipline will pay off in the form of pages that are less error-prone and easier to maintain.

1. The document begins with a processing instruction <?xml...?>. This identifies the file as an XML document and states the encoding scheme used.
 2. Opening tags must have closing tags.
 3. Tags must be nested properly.
 4. Values in a tag must be enclosed in quotation marks.

Activity 1.4



- 1) What does XML stand for?
 - a) eXtensible Markup Language
 - b) X-Markup Language
 - c) Example Markup Language
 - d) eXtra Modern Link

 - 2) There is a way of describing XML data, how?
 - a) XML uses XSL to describe data
 - b) XML uses a description node to describe data
 - c) XML uses a DTD to describe the data

 - 3) XML's goal is to replace HTML
 - a) True
 - b) False

- 4) What is the correct syntax of the declaration which defines the XML version?
- a) <xml version="1.0" />
 - b) <?xml version="1.0" />
 - c) <?xml version="1.0"?>
- 5) What does DTD stand for?
- a) Do The Dance
 - b) Direct Type Definition
 - c) Dynamic Type Definition
 - d) Document Type Definition
- 6) Is this a "well formed" XML document?
- ```
<?xml version="1.0"?>
<note>
<to>Tove</to>
<from>Jani</from>
<heading>Reminder</heading>
<body>Don't forget me this weekend!</body>
</note>
```
- a) Yes
  - b) No
- 7) Is this a "well formed" XML document?
- ```
<?xml version="1.0"?>
<to>Tove</to>
<from>Jani</from>
<heading>Reminder</heading>
<body>Don't forget me this weekend!</body>
```
- a) Yes
 - b) No
- 8) Which statement is true?
- a) All XML elements must be properly closed
 - b) All XML elements must be lower case
 - c) All XML documents must have a DTD
 - d) All the statements are true

- 9) Which statement is true?
- a) XML elements must be properly nested
 - b) All the statements are true
 - c) XML tags are case sensitive
 - d) XML documents must have a root tag

- 10) XML preserves white spaces
- a) False
 - b) True

- 11) Is this a "well formed" XML document?

```
<?xml version="1.0"?>
<note>
<to age="29">Tove</to>
<from>Jani</from>
</note>
```

- a) Yes
- b) No

- 12) Is this a "well formed" XML document?

```
<?xml version="1.0"?>
<note>
<to age=29>Tove</to>
<from>Jani</from>
</note>
```

- a) No
- b) Yes

- 13) XML elements cannot be empty

- a) False
- b) True

- 14) Which is not a correct name for an XML element?

- a) <Note>
- b) All 3 names are incorrect
- c) <h1>
- d) <1dollar>

- 15) Which is not a correct name for an XML element?
- a) <Note>
 - b) All 3 names are incorrect
 - c) <h1>
 - d) <1dollar>
- 16) Which is not a correct name for an XML element?
- a) All 3 names are incorrect
 - b) <first name>
 - c) <age>
 - d) <NAME>
- 17) Which is not a correct name for an XML element?
- a) <phone number>
 - b) All 3 names are incorrect
 - c) <7eleven>
 - d) <xmldocument>
- 18) XML attribute values must always be enclosed in quotes
- a) False
 - b) True
- 19) What does XSL stand for?
- a) eXpandable Style Language
 - b) eXtra Style Language
 - c) eXtensible Stylesheet Language
 - d) eXtensible Style Listing
- 20) What is a correct way of referring to a stylesheet called "mystyle.xsl" ?
- a) <stylesheet type="text/xsl" href="mystyle.xsl" />
 - b) <?xml-stylesheet type="text/xsl" href="mystyle.xsl" ?>
 - c) <link type="text/xsl" href="mystyle.xsl" />
- 21) For the XML parser to ignore a certain section of your XML document, which syntax is correct?
- a) <xml:CDATA[Text to be ignored]>
 - b) <PCDATA> Text to be ignored </PCDATA>
 - c) <![CDATA[Text to be ignored]]>
 - d) <CDATA> Text to be ignored </CDATA>

1.4.4 xhtml

HTML has contributed greatly to the growth of the Web because it is easy to learn and very forgiving of errors and non-standard markup. A webpage may look perfect in a Web browser even though its underlying HTML is incorrectly formed. Take a look at the following example:

```
<p>If you load this HTML into a Web browser, it will <em>display  
correctly even though there are two mistakes in the code.</p></em>  
<p>Can you find the mistakes?
```

Figure 1.11: Flexibility of HTML

HTML's tolerance for such inconsistencies has made it accessible to everyone, from professional Web developers to beginning Web designers. However, its flexibility comes with a price.

The truth is that browsers need to perform additional processing in order to get around the errors that are left behind by Web developers who have grown used to undisciplined and sloppy coding. Browsers running on desktop computers may have the processing power necessary to do the extra work. However, we should not forget less powerful devices, such as mobile phones, handheld computers, and Braille readers for the visually impaired. On top of that, Web browsers are being installed in more and more places, such as household appliances and automobiles. There is no way you can test each page you produce in all the possible devices that may be used to browse them.

Due to these limitations, the World Wide Web Consortium (W3C) now recommends using XHTML instead of HTML to write your web pages. XHTML is still the HTML that you know but written according to the rules of XML, which is much stricter. As a result, XHTML produces valid, well-formed web pages which can be viewed consistently regardless of the browser and hardware platform used.

You will see that many of the HTML tags you know are still used in XHTML. You just have to be more consistent and disciplined in how you code these tags.

Now let us look at a basic template for producing XHTML documents. Do not worry if you do not understand the details of each statement within the code. Everything will be explained in the next reading. In the meantime, just

focus on the structure of the XHTML document.

```
<!DOCTYPE html PUBLIC '-//W3C//DTD XHTML 1.0 Transitional//EN'
'http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd'>

<html xmlns='http://www.w3.org/1999/xhtml'>

<head>
<title>
</title>
</head>
<body>
</body>
</html>
```

Figure 1.12: The Structure of the XHTML Document

As you can see, the structure of an XHTML document is almost the same as an HTML document. It includes both the head and the body elements. The main difference you may have spotted would be the DOCTYPE declaration at the start of the document and the xmlns attribute of the html element.

The DOCTYPE tag tells the Web browser what version of XHTML is used. XHTML 1.0 has three versions - transitional, strict and frameset. Out of these versions, XHTML 1.0 Transitional works well in both old and new browsers.

As you can see, XHTML produces valid, well-formed web pages which can be viewed consistently and accurately no matter which platform is used - whether it is a desktop computer, wireless handheld device, mobile phone or Braille reader.

You may think that having your pages display properly on non-PC devices is too far off in the future for you to worry about right now, and perhaps you are right. In fact, browsers will probably have to support HTML pages the way they are currently written for a long, long time, because it is going to take a long, long while for folks to get around to converting their web pages into XHTML.

Although you may choose between HTML 4.01 and XHTML 1.0 when building your pages in CMWD5103, It is good to get started on the right foot with XHTML since it does not take a lot of effort once you get used to it. It also comes with the added bonus of producing pages that work more consistently on all browsers.

Activity 1.5



- 1) What does XHTML stand for?
 - a) EXtensible HyperText Marking Language
 - b) EXtensible HyperText Markup Language
 - c) EXtreme HyperText Markup Language
 - d) EXtra Hyperlinks and Text Markup Language

- 2) XHTML is a Web standard
 - a) False
 - b) True

- 3) XML and HTML will be replaced by XHTML
 - a) True
 - b) False

- 4) What is correct XHTML for a horizontal line?
 - a) <hr>
 - b) <hr />

- 5) What is the correct XHTML for a paragraph?
 - a) </p><p>
 - b) <P></p>
 - c) <P></P>
 - d) <p></p>

- 6) What is correct XHTML for a line break?
 - a)

 - b)

 - c) <break/>

- 7) What is the correct XHTML for an attribute and its value?
- a) WIDTH=80
 - b) WIDTH="80"
 - c) width=80
 - d) width="80"

- 8) All elements in XHTML must be closed
- a) False
 - b) True

- 9) Is this correct XHTML?

```
<ul>
<li>Coffee</li>
<li>Tea
<ul>
<li>Black tea</li>
<li>Green tea</li>
</ul>
<li>Milk</li>
</ul>
```

- a) Yes
- b) No

- 10) The DOCTYPE declaration has no closing tag

- a) True
- b) False

- 11) What elements are mandatory in an XHTML document?

- a) doctype, html, head, and body
- b) doctype, html, head, body, and title
- c) doctype, html and body

- 12) XHTML documents must be "well-formed"

- a) False
- b) True

- 13) What XHTML code is "well-formed"?

- a) <p>A <i>short</i> paragraph</p>
- b) <p>A <i>short</i> paragraph
- c) <p>A <i>short</i> paragraph</p>

- 14) Which of the following is the right use of the lang attribute?

 - <div xml:language="en">Hello World!</div>
 - <div language="en">Hello World!</div>
 - <div lang="en" xml:lang="en">Hello World!</div>

15) Which attribute replaces the name attribute for the following elements: a, applet, frame, iframe, img, and map?

 - The src attribute
 - The class attribute
 - The id attribute

16) Is attribute minimisation allowed in XHTML?

 - Yes
 - No

17) Do all XHTML documents require a doctype?

 - No
 - Yes

18) What are the different DTDs in XHTML?

 - Strict, Transitional, Loose, Frameset
 - Strict, Transitional, Frameset
 - Strict, Transitional, Loose

19) What is the most common XHTML DTD?

 - Loose
 - Frameset
 - Normal
 - Transitional

20) All XHTML tags and attributes must be in lower case

 - True
 - False



1.4.5 JavaScript

HTML gives you a certain degree of interactivity through hyperlinks. JavaScript takes this interactivity a whole lot further by making things happen as a result of your actions. For example, you could display a second browser window pop-up with a welcome message when a page is initially loaded. Or you could navigate to a specific page within your site when a visitor makes a selection from a drop-down list. Or you could display a message in an alert window when a visitor clicks on a submit button in your form.

JavaScript is a lightweight programming language that is used to write the code that makes all this happen. The code can be embedded right inside an HTML page or it can be found in an external file (with a '.js' extension) that the webpage links to, similar to the way we linked web-pages to style sheets. Along with displaying a webpage, the browser is also responsible for interpreting and executing the JavaScript code that is included on it.

Figure 1.13 below shows how JavaScript integrates with a webpage.

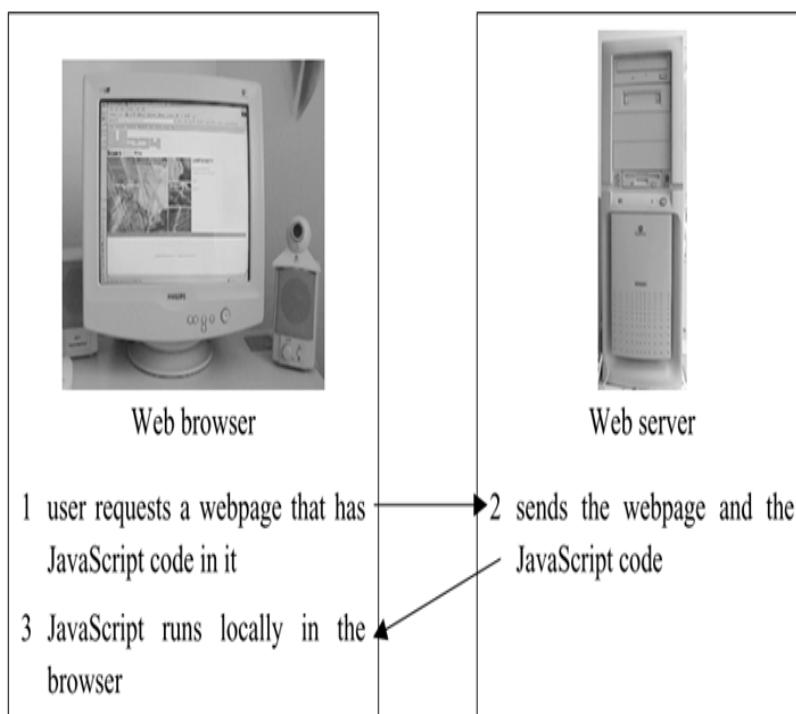


Figure 1.13 How JavaScript Integrates with a Webpage

JavaScript was created by Netscape and Sun Microsystems at the height of the browser wars in the mid-1990s. Microsoft quickly followed suit by introducing its own flavour of JavaScript, called Jscript, which only worked in Internet Explorer. The two languages were roughly compatible but were not interoperable. This meant that a developer might have to write two versions of a script so that the same action could be seen on both browsers. This led to a lot of extra work and frustration for developers, as you can imagine!

Netscape eventually submitted the JavaScript specification to ECMA International for standardisation. ECMAScript is the name of the standardised scripting language derived from JavaScript and Jscript. Due to the popularity of JavaScript, hardly anyone ever refers to its standard version as 'ECMAScript'.

Activity 1.6

- ?

 - 1) Inside which HTML element do we put the JavaScript?
 - a) <js>
 - b) <javascript>
 - c) <script>
 - d) <scripting>
 - 2) What is the correct JavaScript syntax to write "Hello World"?
 - a) document.write("Hello World");
 - b) ("Hello World");
 - c) response.write("Hello World");
 - d) echo "Hello World";
 - 3) Where is the correct place to insert a JavaScript?
 - a) The <head> section
 - b) The <body> section
 - c) Both the <head> section and the <body> section are correct
 - 4) What is the correct syntax for referring to an external script called "xxx.js"?
 - a) <script name="xxx.js">
 - b) <script src="xxx.js">
 - c) <script href="xxx.js">
 - 5) The external JavaScript file must contain the <script> tag.
 - a) False

- b) True

6) How do you write "Hello World" in an alert box?
a) msg("Hello World");
b) msgBox("Hello World");
c) alert("Hello World");
d) alertBox("Hello World");

7) How do you create a function in JavaScript?
a) function=myFunction()
b) function:myFunction()
c) function myFunction()

8) How do you call a function named "myFunction"?
a) call myFunction()
b) myFunction()
c) call function myFunction()

9) How to write an IF statement in JavaScript?
a) if(i==5)
b) if i=5
c) if i=5 then
d) if i==5 then

10) How to write an IF statement for executing some code if "i" is NOT equal to 5?
a) if(i != 5)
b) if i!= 5 then
c) if(i <> 5)
d) if i<>5

11) How does a WHILE loop start?
a) while (i<=10;i++)
b) while (i<=10)
c) while i=1 to 10

- 12) How does a FOR loop start?

 - a) for i = 1 to 5
 - b) for (i <= 5; i++)
 - c) for (i = 0; i <= 5)
 - d) for (i = 0; i <= 5; i++)

13) How can you add a comment in a JavaScript?

 - a) //This is a comment
 - b) <!--This is a comment-->
 - c) 'This is a comment'

14) How to insert a comment that has more than one line?

 - a) //This comment has more than one line//
 - b) /*This comment has more than one line*/
 - c) <!--This comment has more than one line-->

15) What is the correct way to write a JavaScript array?

 - a) var txt=new Array="tim","kim","jim"
 - b) var txt=new Array:1=("tim")2=("kim")3=("jim")
 - c) var txt=new Array("tim","kim","jim")
 - d) var txt=new Array(1:"tim",2:"kim",3:"jim")

16) How do you round the number 7.25, to the nearest integer?

 - a) round(7.25)
 - b) Math.round(7.25)
 - c) Math.rnd(7.25)
 - d) rnd(7.25)

17) How do you find the number with the highest value of x and y?

 - a) Math.max(x,y)
 - b) top(x,y)
 - c) Math.ceil(x,y)
 - d) ceil(x,y)

18) What is the correct JavaScript syntax for opening a new window called "w2"?

 - a) w2=window.open("http://www.w3schools.com");
 - b) w2=window.new("http://www.w3schools.com");

- 19) JavaScript is the same as Java.
 - a) False
 - b) True

- 20) How can you detect the client's browser name?
 - a) navigator.appName
 - b) browser.name
 - c) client.navName

1.4.6 Server-side scripting

All the technologies that we have previously seen, such as HTML, JavaScript and Cascading Style Sheets, are technologies that run inside your browser. Once a web page has been loaded, along with any accompanying JavaScript or style sheet code, you are good and ready to go.

But what if you need to access a resource that is beyond the limits of your browser? You may want to search a website's catalogue for the latest and greatest digital camera from Sony, for example. In order to do this, you have to submit your search request via the web page and send it to the Web server by clicking the Submit button.

Web servers are programmed to do one thing, which they do very, very well. Their main purpose in life is to serve files, whether it is an HTML document, a style sheet or an image file.

Web servers are not designed to handle application-specific processes, such as shopping carts, online banking, or search engines. When the Web server receives a request such as the above catalogue search criteria, for example, it needs to hand it off to the program or application that has been written specifically to handle such requests.

The Common Gateway Interface, or CGI, allows Web servers to communicate with other programs running on the server so that these programs can process these user requests and send back the answers, usually in the form of a dynamically constructed webpage (as opposed to a static HTML document that is just residing on your Web server's disk). The following Figure 1.14 (adapted from Gundavaram 1996) illustrates how this works.

Figure 1.14: How the Common Gateway Interface Works (*Adapted from Gundavaram, 1996*)

CGI, in effect, allows the functionality of your Web server to be extended, so that it doesn't just serve files, but is also capable of running applications in response to user requests and then giving them back a response. This is what makes the Web truly interactive.

Perl is often mentioned in the same breath as CGI, but they are not one and the same. CGI is the protocol which defines how application software can receive data and send responses back to a Web server. Any programming language can be used to generate web pages through the CGI protocol, although Perl is one of the most popular.

Due to the performance limitations of CGI, more efficient technologies such as Active Server Pages (ASP), Java Server Pages (JSP) and PHP are commonly used nowadays.

Activity 1.7

- 1) Describe at least three benefits of using style sheets instead of HTML tags for formatting your Web pages.
 - 2) Identify at least three rules that you must follow to ensure that your HTML is written in valid XHTML
 - 3) Describe some Web-based functions offered on Web sites that require programs or applications to be executed on the server-side. One common example is Web-based email

1.4.7 Web authoring tools

A website is made up of a combination of various types of computer files. Some are HTML documents. Others are image files. Yet others are multimedia files like Flash animations, MP3 audio and Acrobat documents. Unfortunately, no single software package gives you the tools to do everything from designing your pages to creating images and multimedia to previewing and testing your site.



Code editors

A code editor is software that enables you to build web pages. It includes tools for organising your pages into a site and then publishing your site on the World Wide Web. It serves as the centre of production for your site, where you will add text, images and multimedia files to your page layouts, then connect these individual pages into an entire website. Code editors can be classified as text-based HTML editors and What You See Is What You Get (WYSIWYG, pronounced wizzywig) editors.

Visually-oriented people like designers and graphic artists prefer WYSIWYG editors because they simply draw their webpage layouts on the screen, add the text, connect the links, and position the images and multimedia files, much like drawing on a piece of paper. The editor translates the design into HTML code behind the scenes. You also have the option to view and make changes to the HTML code directly as you gain more experience. Examples of commercial WYSIWYG editors are Macromedia Dreamweaver, Microsoft FrontPage and Adobe GoLive.

Text-based editors require HTML knowledge in order to use them, so they appeal to more intermediate and expert users who want to be in full control of the HTML behind their pages. However, it does not mean that you will be entering all the code yourself from scratch. These editors come with assorted buttons, drop-down menus and short-cut keys to save you from typing all the HTML tags yourself. Examples of text-based editors are Allaire HomeSite, Bare Bones BBEdit and Visual Interdev.

Most office suites nowadays can also generate HTML documents from a word processor or spreadsheet editor. For example, you can build your CV in Microsoft Word and save it as a webpage. The resulting HTML is often less than ideal in terms of readability and conformance to standards, but is an excellent way for non-technical beginners to start publishing on the Web.

Image editors

We will be using image editors when we discuss graphics and multimedia. You may want to note that there are a few open source image editors available. The most full-featured and supported open source application is the GNU Image Manipulation Program (GIMP). This free software is a great alternative to the more expensive Photoshop or even Fireworks. You can check out GIMP at <http://www.gimp.org>.

Web browsers

Lastly, you will need to test the visual appearance and functionality of your websites in different browser software and browser versions. The most popular browsers in the market nowadays are Internet Explorer and Mozilla Firefox. Browser applications and issues will be discussed in more detail in a later section.

1.5 Summary

We have covered a lot of ground in this unit so far.

First, we defined what Web design is all about and the various disciplines that it draws from. We established the basic design principles that generally apply to any website, regardless of its nature or purpose. We got some practical experience in reviewing and evaluating existing websites, and hopefully learnt from the successful implementation of other sites as well.

We then went on a tour of the most common Web technologies, languages and development tools. Designers who primarily focus on the front-end must know HTML or XHTML for coding and marking up web pages, Cascading Style Sheets for formatting and layout, and JavaScript for implementing interactive features running on the browser. For those who want to branch out to developing dynamic web pages, knowledge of how HTML integrates with server-side technologies, such as CGI, PHP or PERL is required. Code editors and image editors are a must-have for building and producing websites and graphics. It is also necessary to maintain copies of multiple browser versions and plug-ins for testing your site and any external multimedia.

References

- Darlington, K. (2005). *Effective Website Development: Tools and Techniques*. Addison Wesley; (1st Edition) (3 Mar 2005).
- Niederst, J. (2001). *Learning Web Design*, O'Reilly.
- Powell, T.A. (2000). *Web Design: The Complete Reference*. Osborne: McGraw-Hill.
- Schafer, S.M. (2005). *Web Standards: Programmer's Reference*. Wrox Press.
- Spiro, S. (2006). 'Companies' awareness of Web design is "lagging"". <http://www.scmp.com/node/565882>, accessed 13 March 2014
- Willard, W. (2001). *Web Design: A Beginner's Guide*, Osborne/McGraw Hill.
- World Wide Web Consortium: *Web Design and Applications*. Retrieved from <http://www.w3c.org> , accessed 13 March 2014.



Web Design Process

2.0 Introduction

In this unit we discuss that nowadays, a Web designer has evolved into a well-rounded professional with skills that encompass multiple disciplines. Creative, marketing, technical, communication and project management skills are needed in order to do an effective job on behalf of clients who will have many different demands and come from different industries.

2.1 Objectives

By the end of this unit, you should be able to:

-

- discuss how ethical, accessibility, browser compatibility and intellectual property issues may affect Web design decisions
 - outline the primary requirements for establishing a presence on the World Wide Web

2.2 Other Design Issues

Aside from technical and design issues, Web designers should also be aware of legal and ethical issues when making decisions about the websites they design. In this section, you will be given guidelines on how to practise Web design in an ethical and professional manner. You will learn the importance of respecting other parties' intellectual property, as well as ensuring that your own rights are protected. You will also learn some basic rules to follow in order to make your website accessible to the widest possible audience.

2.2.1 Intellectual property rights

A wealth of graphic and multimedia elements are literally at our fingertips as we surf the Web, just ours for the taking. Right-click a picture or a music file, and you can download it merrily to your own disk to do with as you wish.

We must be aware, however, of intellectual property issues when using content created by third parties for our own enjoyment or for inclusion in our website projects. Similarly, we need to know what protection is available to our original works the minute we post them on the Internet.

Intellectual property (IP) is an umbrella term for the legal protection, rights and entitlements given to the creators of 'certain types of information, ideas or other intangibles in their expressed form' (Wikipedia). It is very easy for people to ignore intellectual property rights on the Internet since they do not get to see, touch and hold the bits and bytes that make up the web pages they view. The digital nature of Web content somehow makes it feel less real and tangible. This has led to the mistaken notion that most content on the Web is free. For example, most Web users have grown accustomed to downloading files, playing online games or reading online content without paying a cent.



Copyright protection is one of the areas within IP that Web designers must be familiar with. In general, copyright ensures that only the owner of any piece of work can control who may print, distribute, make copies and profit from it. So what should responsible Web designers do if they wish to make use of third-party creations in their sites? How can they avoid mistakes in dealing with copyright issues on Web content? The next reading tells you more.

Although the copyright of HTML pages and images is automatically protected online, the previous reading recommends that you include a copyright notice on your site. This often includes the word 'copyright' or the symbol ©, the year of publication, and the copyright owner's name. For example, the copyright notice at the bottom of the previous reading is as follows:

©2006 About Inc. A part of The New York Times Company . All rights reserved.

Figure 2.1: Copyright Notice at the Bottom of the Previous Reading

You could also include a policy statement on what you consider to be acceptable use of your website content and link to this statement from your copyright notice. For example, you may allow users to print out the text but you may not allow them to use any graphics. You should also identify the owner of any copyrighted materials (this would usually be yourself) and let your visitors know whom to contact for permission to use such materials.

2.2.2 Ethical issues

Ethics is concerned with what is acceptable and what is not when it comes to our personal and professional obligations. The rapid growth of the Web has given rise to situations that traditional laws are not equipped to handle or address. As a result, It is often unclear whether certain behaviour or strategies are ethical or not.

You may have to rely on your own judgement in such cases, and it might help to keep in mind the golden rule, 'Do not do unto others what you do not want others to do unto you.'

Here are some ethical issues confronting Web designers and administrators.

Maintaining data privacy and confidentiality

If your site collects any personal or confidential information, such as identification numbers, passwords and credit card information, you should provide a privacy statement that explains how this information will be used and stored. Your company should adopt security measures when storing and accessing this information in databases. Employees should also be trained in the proper ways to handle and safeguard confidential information.

Framing websites

Frames are used to divide the Web browser's display area into two or more areas, with each area displaying a different webpage. If your design strategy includes displaying pages from another site within a frame in your own site, you should do so only with the knowledge and consent of the original site owner. There may be an ethical issue here because the use of frames may mislead viewers of your website into thinking that the external page also belongs to your own site.

Manipulating search engine results

The success of a retail store in the physical world depends on three things - location, location, location. Similarly, the success of your online venture also depends on whether people arrive at your site. Search engines can direct a lot of traffic to your site, and as such, you may be tempted to use unethical practices in order to artificially boost your site ranking in the search results.

For example, an unethical webmaster might repeatedly include trademarked product names or competitor names in invisible 'ink' (for example, white text colour on white background) on web pages. The purpose would be to deceive the search engine into diverting visitor traffic to his/her own website based on these unrelated keywords.

Such questionable tactics should be avoided at all costs. Unethical search engine optimisation (SEO) practices can only lead to damaged reputations and disgruntled customers. In extreme cases, search engine companies may remove company listings from their index or directory once they are found guilty of such deceptions.

Search engines are continually improving their site ranking algorithms in order to defeat spamming techniques. They are also vigilant in joining hands with the online community in detecting and reporting search engine abuses. They have to do this in order to maintain the accuracy and integrity of their own indexes at a high standard.

2.2.3 Designing for accessibility

Just as builders and architects need to incorporate specially designed structures and walkways for people with disabilities and other special needs, we also need to make our website design accessible to visitors with vision and hearing limitations. This means you have to make conscious decisions to test your site not just in the most popular browsers, but also in text-based browsers and screen readers (for vision-impaired users). This is not just a matter of good design; in some cases, it is also a matter of complying with the law.

In 1998, the United States Government passed the US Accessibility Regulations Act for the Web. This law requires all United States federal agencies with websites to make those sites accessible to individuals with disabilities, within 24 months from when the law was enacted. Although most of us do not work for the US Government, it is still worth paying attention to this development. Even if there is no law requiring us to do so, building accessible websites is simply good for business.

Given that the Web is a highly visual medium, this might sound like a tall order, but there are guidelines set up by the Web Accessibility Initiative (WAI) that you can follow on the W3C's website at <http://www.w3.org/WAI/guid-tech.html>.

These guidelines are meant to instruct Web designers in creating websites which are accessible to everyone, regardless of their physical or technical abilities. There are currently 14 guidelines, with a total of 60 checkpoints that must be followed to ensure a site is accessible. It is a major effort to comply with all the guidelines, so the checkpoints are broken down into three different priority levels. Depending on their level of conformance to the guidelines, sites can display a logo attesting to the level of accessibility of their web pages.

Activity 2.1

- 1) How do the following issues affect Web design decisions?
 - a) intellectual property
 - b) ethical,
 - c) accessibility,
 - d) browser compatibility

 - 2) Open the website <http://www.w3.org/WAI/guid-tech.html>
 - a) What does the acronym WAI stand for
 - b) What are the Essential Components of Web Accessibility
 - c) How do these components relate

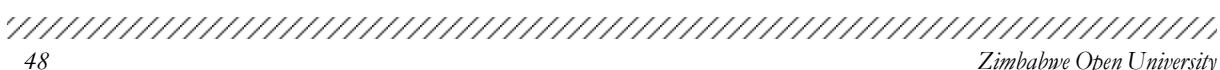
2.3 Establishing Your Web Presence

Do you know why does a web site require a different Web hosting requirement?

As you design and build your website, you will most likely be working on a computer with restricted access. Once you are ready to show it to the public, you need to move your website to another machine from where it can be viewed by anyone on the Internet.

This machine is called a Web server, because its main job is to serve web pages as they are requested. Web servers must be permanently connected to the Internet if you want them to be available 24 hours a day, seven days a week. Companies that allow you to host your site on their Web servers are called Web hosting companies. You also have the option of hosting your own Web server instead of outsourcing to a third party, if you have the resources and budget to do so.

The University will provide you with an account on a Web server where you can develop your case study websites and do the hands-on activities for this course. This account entitles you to disk space and allows you to run server-side scripts.



Activity 2.2

- 1) What is web server software?
 - 2) Mention three web server software that you know.
 - 3) Download and install
 - a) Apache Webserver,
 - b) PhP
 - NB: You can Wamp/Lamp server on your computer.
 - 4) What do you understand by the term
 - a) document root
 - b) script
 - 5) What are the following configuration files used for?
 - a) php.ini
 - b) httpd.conf
 - 6) How would you change the listening port for which the httpd daemon uses in your installation of apache. The default port is 80.

2.3.1 Types of website

You saw from the previous reading how a Web server responds to requests for web pages over a network. From your own Web surfing experience, you also probably realise that some web pages are built in advance while others are constructed specifically in response to your request.

The type of website, together with the site's purpose, will greatly influence your design, implementation and Web hosting decisions. Let us look at some common website categories in this section.

Static versus interactive sites

Browsing a static site can be compared to reading a paper-based magazine. You can flip and read through the pages in any order that you want, but there is no way to interact with the site other than viewing its contents, which are fixed.

Most sites are interactive in the sense that users can determine which content to view by choosing which link to click. A truly interactive site, however, will allow users to change the content that they view by sending data to the website, primarily through forms, or by manipulating the elements that they see, such as an animation. Sites that offer a sense of community among their members via online chats and discussion boards are also interactive.

Websites often contain a combination of static and interactive pages.

Dynamically-generated sites

These are sites that can change their content on the fly, based on the user's browsing conditions and preferences. You can compare this to buying a personal computer from a manufacturer who builds the machine according to your specifications, as opposed to buying a pre-built computer from a store.

Dynamically-generated web pages are constructed by getting the relevant content out of a database and merging it with page templates. These sites have a greater flexibility in satisfying users' needs since they are built in response to specific requests. These sites are also more complicated to design and build, typically requiring programming and database administration skills.

Search engines such as Google (<http://www.google.com>) and the Internet Movie Database (<http://www.imdb.com>) are examples of sites that are dynamically generated.

Another benefit of dynamically-generated content is that it enables sites to personalise the pages that a user sees. When you are a frequent customer of Amazon (<http://www.amazon.com>), and whenever you visit their site you see a homepage that is specially constructed for you, showing you books and music that are more suited to your taste and welcoming you with a personalised message to boot! Now that is the kind of treatment you wouldn't get in a physical store.

2.3.2 Domain name registration

With so many clients and servers connected to the Internet, how do computers identify which particular machine they are sending a request or response to? Well, all machines on the Internet are assigned a unique IP address, such as 218.102.213.38. IP stands for Internet Protocol, and these addresses are 32-bit numbers, normally expressed as four 'octets' in a 'dotted decimal number'.

Since human users find it impossible to remember all these numeric-based addresses, text-based addresses called 'domain names' were introduced. Think of a domain name as your brand name and your address on the Web rolled into one. Examples of prominent domain names are www.yahoo.com, www.google.com and www.amazon.com.

Activity 2.3



- 1) What is a Web Server?
- 2) Explain how the following work
 - a) Web servers
 - b) Domain names
 - c) Name servers
- 3) Find a webhosting company in Zimbabwe.
- 4) Can you find a free web hosting site and design a mini website using the skills you have acquired in previous activities.

Most Web hosting companies now offer domain name registration services for a fee. Companies such as ISP Services (<http://www.isp.co.zw/>) have input forms on their site that allow you to check whether your chosen domain name is available. They can also accept and forward your domain name registration for an added service fee so you do not have to go directly to the registrar yourself.

Other top-level domains include '.org', '.edu', '.info' and '.biz'. There are also regional Internet registries for administering country-specific top-level domains such as '.zw' (Zimbabwe), '.za' (South Africa), '.hk' (Hong Kong), '.uk' (United Kingdom) and so on.

Companies have the option of registering a domain name for one year or more. You must remember to renew your registration once your registration period lapses, or you could lose your domain name. Domain names are tied to trademarks, and it is now considered illegal to register a trademarked name that does not belong to you.

If the domain name that you wish to register is already taken by someone else, you have the option of trying to purchase it from the current owner. Registrars will also automatically offer a list of similar, alternative domain names if the one you want is not available.

Your website is accessible via the domain name for as long as it is registered under your name, even if the files are physically transferred to another machine. You just need to inform your Web hosting company or the domain name registrar that your domain name entry must be updated to point to a different machine IP address.

2.3.3 ***Web hosting***

The reliability and stability of your Web host has a significant impact on your company's brand and image. This is all more so if your customers primarily use the online channel to interact with your company.

Large corporations with dedicated IT staff may choose onsite hosting. With onsite hosting, businesses maintain their own Web server and their own Internet connection within their own premises. Another option is colocation. With colocation, you use your own Web server equipment and personnel, but you 'park' your computer in the Web hosting company's data centre. The Web hosting company provides you with the space for the equipment and maintains your Web server's connection to the Internet.

For most small to mid-size businesses, offsite hosting is the most cost-effective and popular solution. Offsite hosting can be on either a shared or a dedicated server. A shared server hosts multiple websites on a single machine. When using shared hosting, your site will have to share disk space and other processing resources with all the sites hosted on the same machine.

As your website expands and your needs become more complex, you may want to switch to a dedicated server. For example, some clients may switch to a dedicated server from a shared server after a year of operations, due to a steady stream of visitors and the slow response times experienced from the shared database server.

Location is one of the major decisions to be made when establishing a business in the physical world. Luckily, the physical location of your website does not have as big an impact in the virtual world. Nevertheless, there have been 'horror' stories circulating of website owners who have lost their data, emails and even their entire sites due to unscrupulous Web hosting providers. Choosing your Web hosting provider wisely and judiciously will help you avoid becoming one of these unfortunate statistics.

Activity 2.4



- 1) What is an IP address?
 - a) What is the loop back interface ip address
 - b) What do you see when you type `http://localhost`. You should have a working apache web server from previous activities.
- 2) What is
 - a) domain name registrar
 - b) Web host
 - c) What is the difference between the two
- 3) Visit http://www.101domain.com/co_zw.htm
 - a) Locate the information that needs to be provided when you register a domain name.

2.4 Web Browsers

As a Web designer, you will quickly realise that you have little control over the browsers that visitors will use to access your site. And yet, you are totally dependent on this piece of software to interpret and display your pages correctly and consistently, regardless of the hardware and operating system used.

Remember those days when websites would display a prominent sign saying 'Best viewed with Netscape and Internet Explorer' on their homepages. It is only natural for Web designers to make their pages look as good as possible in whatever browser software happens to have the largest market share. However, designers should not neglect to ensure that their site can still be viewed on other browsers and platforms. It is unacceptable to shut out a portion of your audience simply because they are not running the most updated version of the most popular Web browser.

In reality, many end users run browsers that are one or two versions behind the most updated version. Other users customise their browser settings for tighter security. Whatever the cause, the point is that not all browsers run alike, and a professionally designed site should anticipate and handle the differences gracefully.

2.4.1 Popular browsers

Internet Explorer (IE) emerged as the undisputed winner of the first round of the browser wars over Netscape in the 1990s. There has been no serious competitor to its dominance for a long time.

Thanks to the re-birth of Netscape technology in Mozilla Firefox, the browser market has grown a lot livelier in the past few years. Mozilla Firefox was created out of the same source code as Netscape Navigator, which was released as open-source software in 1998 after it had already lost considerable market share to IE. Mozilla Firefox has taken some market share away from IE mainly because users have become frustrated with IE's security vulnerabilities. IE's market share was above 80% by November 2003. Mozilla Firefox built on its momentum and overtook IE by December 2009 with a share of 47% against 38%. Other competitors came in with Google Chrome standing at 56%, fire fox 27%, and internet Explorer 9% as of December 2013. The remainder is shared across other browsers like Safari, Opera and so on.

Opera may be a distant third in the desktop browser market, but it is worth trying if you are looking for a browser that runs fast and does not use up as much memory and disk space. It is committed to supporting standard technologies and has versions for the usual platforms such as Windows, Macintosh, and Linux all the way to mobile phone and hand-held devices.

You can refer to http://w3schools.com/browsers/browsers_stats.asp for statistics on the market share of the most popular Web browsers. The next reading goes through the most important players in the browser market.

2.4.2 Browser issues for web designers

From the designer's viewpoint, the greatest challenge comes from designing pages that display properly and consistently when viewed on different browsers. Why is this so?

1. Different browsers may use different code engines to recognise and interpret HTML tags. They may not have the same level of support for the Web standards promoted by the W3C. There may also be some proprietary tags which work only on some Web browsers and not on the others, like the infamous `<blink>` and `<marquee>` tags from Internet Explorer and the `<iframe>` and `<layer>` tags.

2. Each successive version of a browser introduces more features and compatibility with newer Web technologies. Designers must ensure that their websites still work with older browsers that do not support these newer technologies. For example, Internet Explorer 5.0, Netscape Navigator 6.0, and Opera 5.0 all comply with the CSS, HTML, and JavaScript/ECMAScript standards promoted by the W3C. However, there may still be users out there who may be using version 4.0 browsers.
3. Many users customise the security settings on their Web browser to prevent cookies, ActiveX controls and Java applets from being downloaded to their machines. Websites which rely on these features will not work properly in these browsers.

The key is to know who your target audience is and which browsers and hardware platforms they are likely to use. Then design your website using the technologies that have a stable level of support on these target browsers and platforms. If you do use something that is browser-specific, choose a function that is not critical to your visitors' ability to view your site, like navigation.

What is the best way to ensure that your sites can be handled correctly by all browsers? Keep up with the latest statistics on browser use and which versions of each technology they currently support. You will also do well to stick with the W3C's specifications of XHTML, CSS and standardised JavaScript when building your sites.

Plug-ins

The Web isn't just for text and images anymore. Due to advances in technology and the relative affordability of broadband Internet access, users now welcome other types of media, such as audio, video and interactive animations, on the Web.

Browsers need the help of plug-ins to handle these other media types. Plugins are small applications that extend the capabilities of browsers by running on the Web client and handling non-native media types that the browser is incapable of displaying. Macromedia's Flash player is one of the most popular plug-ins. It allows for complex animation, interactive navigation and even entire website development through non-HTML content.

Plug-ins for some of the more popular media types, such as the Flash player, are automatically included with the Windows XP and Apple Macintosh operating systems. Some plug-ins are automatically distributed and installed along with Web browsers. However, if you use a plug-in which is not available on a user's platform, the user is responsible for taking the steps to download

and install that plug-in on his/her system. Less technical users may not know how or may not be willing to download extra software in order to view your site, so designers are advised to offer only those types of multimedia content whose plug-ins are already widely installed on most users' computers.

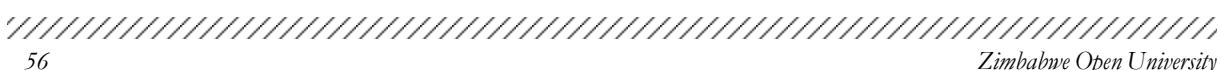
JavaScript and other client-side scripting technologies may also be used to detect which plug-ins are available on a user's platform. This knowledge may allow dynamic websites to serve different pages, depending on whether a plug-in is installed on the client side or not.

Activity 2.5

- 1) What is a browser plug-in?
 - 2) Give an example of a plug-in.
 - 3) What are Java applets and Active X objects?
 - 4) How do Java applets differ from JavaScripts?
 - 5) Visit Microsoft's Web site using both Internet Explorer and Firefox.
 - a) Do you see any difference in the level of interactivity or even in the appearance of the site?
 - b) Did Microsoft consider their target audience when designing this site?

2.5 Summary

Aside from technical and design issues, we also introduced the legal and ethical issues that all responsible Web designers must be aware of. We also looked at the difficulties that result from the incompatibilities among browsers and their uneven support for Web standards. We then introduced the design process that will guide us through the succeeding Units.



References

- Darlington, K. (2005). *Effective Website Development: Tools and Techniques*. Addison Wesley.
- Niederst, J. (2001). *Learning Web Design*. O'Reilly.
- Nielsen, J. (2006). 'Response time overview'. Retrieved January 13, 2014 from <http://www.useit.com/papers/responsetime.html>
- Powell, T.A. (2000). *Web Design: The Complete Reference*. Osborne: McGraw-Hill.
- Schafer, S.M. (2005). *Web Standards: Programmer's Reference*. Wrox Press.
- Willard, W. (2001). *Web Design: A Beginner's Guide*. Osborne: McGraw-Hill.
- The Web Standards Project: <http://www.webstandards.org>
- W3 Schools: <http://www.w3schools.com>
- Web Reference: <http://www.webreference.com>
- Web Style Guide: <http://www.webstyleguide.com>
- Wikipedia: <http://www.wikipedia.org>
- World Wide Web Consortium: <http://www.w3c.org>



Introduction to E-Commerce

3.0 Introduction

In this unit we discuss that retailers have long understood that our shopping environment has an impact on our purchasing decisions. A clean, brightly-lit, and well-ventilated store with a well-organised layout is obviously attractive to any shopper. The creativity of the store window display, the presentation of the store merchandise, the helpfulness of the staff, and even the music played may also entice the shopper to buy.

Other important factors include: the merchant's reputation; the strength of the product brand; the quality, price and availability of the products and services on offer; payment options; and the level of customer service and after-sales support.

Now let us transport our shopper into an e-commerce setting. The website now becomes the central point of contact between the customer and the merchant. For pure-play Internet retailers, it is the only point of contact. Thus, the customer's entire shopping experience is framed by the website design and architecture, from browsing the catalogue, searching for the goods or services required, filling up the shopping basket and paying for the order to seeking assistance during and after the sale.

3.1 Objectives

By the end of this unit, you should be able to:

- gain an operational and strategic perspective on business-to-consumer and business-to-business e-commerce models and technologies
 - discuss the security issues and technologies that facilitate secure e-commerce transactions and payments
 - develop an awareness of e-commerce website design issues, such as, data privacy and internationalisation
 - recognise the potential for mobile commerce
 - introduce the second generation of Web-based services, dubbed 'Web 2.0'
 - examine how it enables greater online collaboration and information sharing among users

3.2 Definition of E-commerce

What is e-commerce? If you were to search for an answer on any of the leading Web search engines, chances are you'd get a wide range of answers. Here are a few.

- ❖ E-commerce is the buying and selling of goods and services across the Internet. An e-commerce site can be as simple as a catalogue page with a phone number, or it can range all the way to a real-time credit card processing site where customers can purchase downloadable goods and receive them on the spot. Electronic commerce merchants can range from the small business with a few items for sale all the way



- ❖ Business that is conducted over the Internet using any of the applications that rely on the Internet, such as e-mail, instant messaging, shopping carts, among others.
- ❖ E-commerce (electronic commerce or EC) is the buying and selling of goods and services on the Internet, especially the World Wide Web. In practice, this term and a newer term, e-business, are often used interchangeably. For online retail selling, the term e-tailing is sometimes used.

As you can see, there is no simple and straightforward answer to the question 'What is e-commerce?' There are many valid definitions for e-commerce, depending on the perspective of the author (or website!) you are using as a reference. However, most sources do agree that e-commerce refers to buying and selling over the Web.

As a Web designer, you should be familiar with the most common online activities that fall within the scope of e-commerce. Here they are:

- ❖ E-shopping or e-tailing refers to Web-based storefronts that present information about a company's products and/or services, usually in the form of a product catalogue or a list of services provided. Such storefronts may also accept online ordering and payment.
- ❖ E-procurement refers to the purchasing activities that take place between businesses. This may involve specialised products, such as, raw materials and equipment needed to manufacture goods or to provide services. This may also refer to commodity items such as office furniture, office supplies, light bulbs, and basic services such as travel and cleaning services.
- ❖ Online sales activities regard the website as a channel for generating sales revenue, in the same way that manufacturers use wholesalers and retailers as a distribution channel for their products and services. Sales can be generated directly by allowing customers to purchase online, or generated indirectly by persuading customers to contact the company through other means, such as phone, fax or email.
- ❖ E-marketing aims to increase customer awareness of a company's products and services through content and functions offered online. Nowadays, search engine listings and online banner advertising are commonly used by businesses to market themselves in cyberspace.

Activity 3.1



Visit the following websites:

1. South travels at <http://www.southtravels.com/africa/zimbabwe/>
2. Marks and Spencer at <http://www.marksandspencer.com>
3. Pacific Place Mall at <http://www.pacificplace.com.hk>

Which of the following commercial activities are available on these websites: e-shopping, e-procurement, sales, and marketing?

3.3 E-commerce Business Models

Many concepts can be understood better through the use of models. Civil engineers model bridges and highways, architects model skyscrapers and housing estates, and city planners model traffic flow and population growth. Models allow us to concentrate on the particular aspects of the system that are important to the task at hand.

3.3.1 Business-to-consumer

Business-to-consumer (B2C) electronic commerce refers to the selling of products and services to individual shoppers and consumers. Traditional businesses such as Wal-Mart, Jet and Game have all established B2C storefronts. There have also been a number of successful Internet pure-play businesses, or businesses which exist only in the online world, such as Amazon, iTunes and Priceline.

Methods for generating sales revenues

Here are some general ways in which the B2C model can generate sales revenue:

1. Add extra value to existing products and services: Many newspapers and magazines now allow viewers to access or search their current issues or past issues online. This is a welcome, value-added feature which cannot be duplicated in their print edition. Publishers can also continue generating revenue from previously archived content by charging viewers or by selling advertising space.

2. Create new products and services using the Internet as the technology and delivery platform: A good example of this is digital music. Users are now able to sample a wide range of music clips from the comfort of their homes. If they wish, they can also purchase and download the music file into their computer's local storage or into a portable music player. This is a win-win situation both for consumers and music producers, who also save on the cost of distributing and selling music via the online channel.
3. Provide an existing product or service at a lower cost than traditional means: Online banking, online investing and online hotel/travel reservations are all examples of common services that can be done more cheaply and more conveniently over the Web, compared to traditional channels like phone, fax or face-to-face.

We now look at some of the content and functions usually exhibited by B2C websites.

Shopping carts

Shoppers feel more comfortable when their online shopping experience is similar to what it is like in real life. Hence, the majority of e-tailing sites use the shopping cart/basket and cash register/checkout analogy. (You can visit www.amazon.com to see a good example of how the shopping cart analogy is used.) Goods are selected and placed in the electronic basket as the shopper browses or searches through the catalogue. The contents of the cart can be viewed and changed at any time prior to checkout.

When customers have finished shopping, they go through a 'checkout' process to pay for the goods or services in the cart. Instead of a paper receipt, they will usually get a screen confirming their order details, followed by an order confirmation email.

You will have hands-on experience in building an online shopping cart for the Speedy Office Supplies case study website. This shopping cart will allow all the usual functions: adding, deleting, and updating the item quantities in the cart.

Detailed product or service information

People often want to see and touch the merchandise on offer before deciding whether to buy it. It is hard to imagine buying a pair of jeans or shoes without first trying them on. Similarly, you wouldn't want to buy a car unless you have taken it on a test drive. E-commerce sites try to compensate for the lack of physical access by providing as much detailed information as they can about their products and services.

Amazon.com, for example, offers the table of contents and pages of excerpts from the books it sells. iTunes offers a 30-second preview of any song in the iTunes Store before you buy, as well as customer reviews. Microsoft provides free audio tutorials that teach customers how to use their office suite, MS Office, right on their website. Lands' End even lets you try out the clothes on a body model to see how they fit (Figure 3.1).

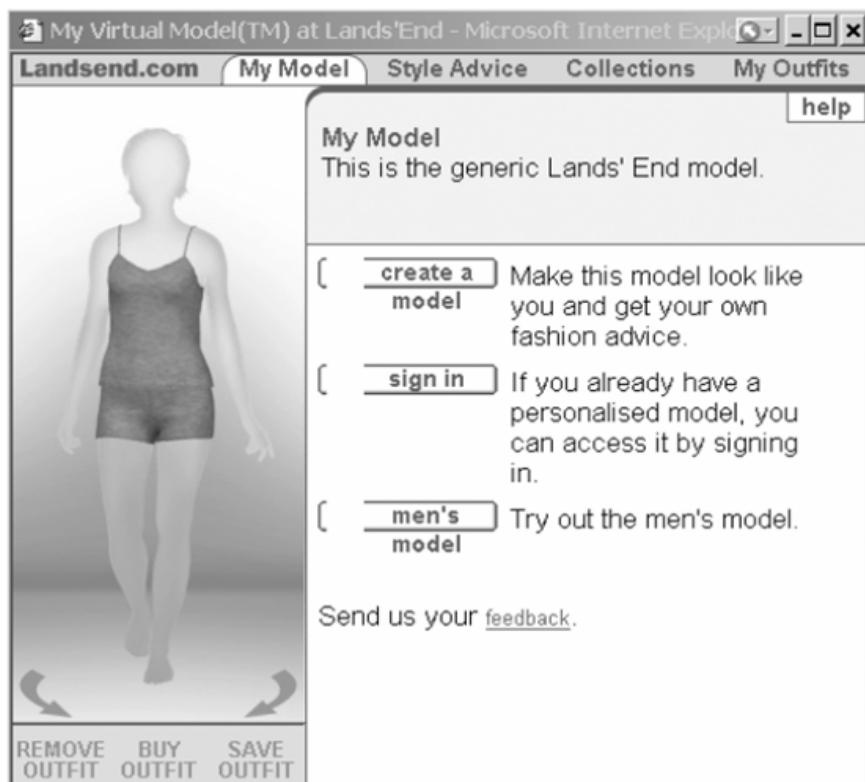


Figure 3.1: Lands' End Virtual Body Model

This information may sometimes be difficult, if not impossible, to duplicate in a physical setting. E-commerce sites should make every effort to offer innovative, value-added features such as this. This strategy can help them stand out from their competitors, both in online and offline channels.

Customer registration

Some websites require customers to provide information about themselves when they place orders or even just to access certain features and content online (for example, visit the South China Morning Post registration site at <https://register.scmp.com/>). When placing an online order, registering users will typically be asked for their name, billing and shipping address, phone number, email, and, in the case of online purchases, payment information. Their details would then be stored on a database which they could access by logging into the site next time.

Registration is meant to save customers from typing their details again on future visits. It is also used to serve content that is tailored to a visitor's preferences. Registration can be a double-edged sword, however. It may turn off other customers who find it inconvenient to enter a lot of personal details or who may feel uneasy about revealing those details in the first place.

Personalisation

Knowing your customers on a personal level is good for business. That is why we go back to the same hair stylist for our hair cuts or to the same doctor for our medical needs.

Personalisation similarly allows e-commerce sites to serve customised web pages to their customers. A detailed profile of a customer is built based on the previous orders or surfing patterns they've recorded on a website. The online store then uses the customer's profile and buying history to make further recommendations and provide discounts on products they are interested in. Personalisation is meant to give online stores an advantage over real-world shops where staff often do not know anything about their customers, let alone their names.

For instance, by tracking and analysing the activities of its website visitors, the Hyatt hotel chain found that Japanese users are most interested in their resorts' golf facilities. Hyatt is now using this valuable information to customise its website offerings and to shape its market strategies.

Community

Building a strong sense of community around a site is one way to differentiate it from its competitors. It gives visitors a reason to come back and re-connect with other users on the site. Anything that drives traffic to your site can only be good for business.

Yahoo! started out as a search directory but later expanded into email, instant messaging, shopping and gaming to increase the 'stickiness' of their site. Lonely Planet, a publisher of travel guides, now offers expert advice and hosts several discussion boards where users can exchange travel tips and information online. Online auction powerhouse eBay has a 'Community' section on its site where eBay users can communicate with other users, provide feedback on their trading experiences and even help each other out (see <http://hub.ebay.com/community> for details). The strong sense of belonging and community that results from such features has kept users loyal to eBay over the years.

Payment options

Credit cards are the most commonly accepted payment method online. Other payment methods include online gift certificates and cash/cheque upon delivery. Some e-commerce sites will let customers fill in the order form online and then ask them to fax or phone in their credit card information.

There is also a growing trend towards accepting smart cards and micropayments on the Web, but we will only focus on credit card payments. We will go through the steps of setting up a website to accept credit card payments in a later section titled 'Accepting payments'.

Security

When customers are asked to provide confidential data such as credit card numbers or passwords, they are usually taken to a 'secure' portion of the website. All the communication between the browser and the server within this secure area is encrypted so that it cannot be easily understood by unauthorised parties. The website behaves no differently from the user's point of view on the secure portion of the site. However, the download time may be a bit slower due to the extra processing going on behind the scenes.

Secure Sockets Layer, or SSL, is a technology designed by Netscape that enables browsers and servers to transmit encrypted data. The addresses of web pages which have been encrypted using SSL begin with 'https' rather than 'http'. Encryption and SSL are discussed further under the section 'Security concepts'.

Customer support and self-service

Customers may need assistance at any point during the shopping and ordering process. Even after the sale has been completed, they may need to follow up on issues such as delivery dates or merchandise returns.

Customers must be given a way to communicate and interact with companies through the online channel. At the very least, websites can include helpful information which customers can use to locate the answers they need. Basic forms of customer support include FAQs (Frequently Asked Questions), online documentation, discussion boards and online chat.

For example, using the 'Customer service' link of www.landsend.com, customers can have a live online chat with a sales assistant, and at the Langham Place Hong Kong Hotel website (<http://hongkong.langhamplacehotels.com>), customers can make phone calls to the hotel directly from the website.

Offering customers online tools to accomplish desired functions on their own further empowers them. For example, customers can be empowered by online self-service functions which reduce the need for human customer support experts or customer service representatives to handle enquiries. This results in operational cost savings and faster response times for the business.

Most major airlines have created websites where customers can review flight schedules and check frequent-flyer miles. Logistics companies such as FedEx (www.fedex.com) and DHL (www.dhl.com) now allow customers to track shipments and arrange for package pick-ups through their websites. Online e-tailer Amazon.com has an extensive user account management tool which can be used to track orders or make changes to existing orders.

Activity 3.2



- 1) Our objective is to visit a B2C site to see which of the above content and features it offers.
 - a) Visit ToyEast at <http://www.toyeast.com>
 - b) What features or functions on this website fall under the categories described in this section?

3.3.2 Business-to-business

Business-to-business (B2B) electronic commerce refers to the sale of goods and services among businesses. B2B commerce has been around since the 1960s, when companies started using closed, proprietary networks to exchange common business documents, such as, invoices and orders. With e-commerce, businesses are now turning to open, public systems, such as, the World Wide Web and the Internet to streamline their business processes.

B2B websites generate much larger purchasing volumes than business-to-consumer sites, although they do not get as much publicity since they tend to generate operational cost savings rather than revenues. Big corporations, such as, General Motors and Ford, now do most of their purchasing online due to the tremendous savings that can be generated.

Here are some ways in which businesses can participate in B2B e-commerce:

1. E-procurement software can help automate (to a certain extent) the paperwork, communications and approvals processing that take place between all parties during the procurement process. Ariba is a company that offers Web-based software for monitoring and streamlining the procurement process.
2. Companies can sell to other businesses directly from their own websites. For example, online travel agency Expedia has a corporate division (<http://corporate.expedia.com>) which caters for corporate travel departments.
3. Online marketplaces serve as a hub where many different buyers and sellers can meet online and conduct transactions. Such marketplaces may aggregate catalogues from multiple buyers on their site and then allow potential buyers to search these catalogues in one place.

Activity 3.3



In this activity, we will view a B2B site from the perspective of a buyer and a seller.

- 1) Visit Global Sources at <http://www.globalsources.com>.
 - 2) Pretend that you are a buyer who is looking for 'playground equipment'.
 - 3) Search for the keywords 'playground equipment' directly or look for the category by browsing through the directory.
 - 4) Now pretend that you are a supplier.
 - 5) Visit the supplier area of the site at <http://www.sellproducts.globalsources.com>.
 - 6) What services are available to suppliers at the Global Sources website that are typical of a B2B marketplace?

3.3.3 Online auctions

The e-commerce models discussed previously both involve business among participants. But what about if the two parties involved are individuals who wish to trade items or services among themselves? Such types of transaction fall within C2C, or consumer-to-consumer e-commerce.

Online auctions are the primary example of C2C e-commerce. Auction sites are essentially person-to-person trading communities created on the World Wide Web. Sellers are permitted to list items for sale, and buyers may bid on items of interest within a limited time period. The buyer who places the highest bid at the end of the auction period wins the right to buy the item at the successful bid price. Sellers may choose not to sell if none of the buyers are able to meet the minimum price they ask for.

Auction sites make money by charging sellers a listing fee and a commission fee, although some sites may offer free listings to gain a larger audience. Visit <http://auctions.yahoo.com/> for examples of online auctions.

eBay

eBay (www.ebay.com) is probably one of the first companies that come to mind when we hear the term 'online auction'. It started out from humble beginnings as a trading site where people could buy and sell second-hand or surplus goods, collectibles, antiques and other unwanted items lying around the house. Over the years, it has transformed into a global business hub where "30 million people will buy and sell well over \$20 billion in merchandise -- more than the gross domestic product of all but 70 of the world's

countries"(Businessweek, 2003). Nowadays, even established businesses and retailers are using eBay as a sales outlet, not just for remaindered goods but also for brand new items. Businesses are also using the site to trade with other businesses, so that it is no longer possible to classify eBay as purely B2C or B2B.

eBay does not hold any actual inventory or handle any of the payments exchanged on its site. To reduce this anonymity and uncertainty of dealing online, eBay introduced a system where users may submit compliments or criticism to the trading profile of the trading partner in a Feedback Forum. By reviewing a potential trading partner's feedback profile, the user will be able to estimate more accurately the trustworthiness of the trading partner.

Activity 3.4



In this activity, you will compare two leading auction sites in terms of ease of navigation and user interface design.

- 1) Visit eBay (<http://www.ebay.com>) and Yahoo! (<http://www.yahoo.com>).
 - 2) Compare the user interface design and ease of navigation on these two sites. Note two or three differences and similarities.

3.4 Security Concepts

According to an online user behaviour study, the top two reasons why customers do not complete a purchase are as follows:

1. Too much information needed to be filled in (52%); and
 2. Did not want to enter credit card details (46%).

The second reason is directly related to a customer's concern about the level of security built into a website. The first reason may also be influenced by security concerns, albeit to a lesser extent. Aside from the obvious hassle of entering in all this information, customers may not feel too comfortable having personal data such as addresses and phone numbers stored on a Web server that may be subject to attack by unauthorised intruders.

It is not easy to overcome customers' perceptions that e-commerce is unsafe and unreliable. Traditional companies with strong brand recall and established reputations have a built-in advantage since customers tend to trust them both online and offline. For businesses that are not well-known or are just starting out, paying close attention to security issues and implementing basic security features can go a long way in reassuring prospective customers.

This section introduces you to basic website security concepts such as encryption, Secure Sockets Layer (SSL) and digital certificates. Since we are approaching e-commerce from the point of view of a website designer, we would not go into specific technical details about these technologies.

3.4.1 Encryption

E-commerce sites collect all sorts of highly confidential information, such as passwords, bank account numbers, credit card numbers and other personal details. These websites rely on encryption technologies to transmit and store data in a form that cannot be easily read by unauthorised parties.

Encryption may sound like a highly technical term, but the concept behind it is fairly simple. Webopedia (<http://www.webopedia.com>) defines it as 'the translation of data into a secret code'. The translation is done using a common formula that is agreed upon by the sender and the receiver.

Internet Explorer, Mozilla Firefox and most other browsers are capable of encrypting data before they are transmitted over the Internet. The Web server software on the other end (for example, Apache, Internet Information Server) must also be capable of translating the data back into their original form so that they can be understood and processed. This reverse process is called decryption.

Encryption gives you a reasonable amount of confidence that only your intended recipient will be able to decrypt and understand your message. The stronger your encryption formula, the harder it will be for any unwanted intruders to crack it.

Activity 3.5

The objective of this activity is to show you a simple case of encryption and decryption. Note that this script only works in Internet Explorer.

- 1) Open up Internet Explorer and go to <http://javascript.internet.com/passwords/ascii-encryption.html>. Enter any of the test credit card numbers to be encrypted.

Visa	4242 4242 4242 4242
	4111 1111 1111 1111
MasterCard	5555 5555 5555 1111
	5500 0000 0000 0004
American Express	3782 8224 6310 005
	3400 0000 0000 009

- 2) These test credit card numbers were taken from the Sendsafe User Manual

 - a) Test the encrypt and decrypt functions.
 - b) Are you able to see the original credit card number that you entered after decrypting it?

3.4.2 Digital certificates

Businesses must gain their customers' trust in order to succeed. In the examples above, customers are shown endorsements and certificates given to the business by a trusted or known third party. Customers may be more inclined to believe in the quality of goods and services if a respected authority backs up the claims of the business. This practice has also been carried over to e-commerce websites, for which certification is even more important due to the faceless nature of e-commerce.

Digital certificates give people, businesses and computers on the Internet a way to verify each other's identity. A digital certificate is simply a file that contains information about its owner. It also includes the signature of a trusted third party, called a Certificate Authority (CA). The CA has already done the work of verifying the identity and background of the certificate owner in the offline world, such as examining business registration documents and contact information. As long as we trust the CA whose signature appears on the digital certificate, then we can confidently transact our business with the certificate owner.

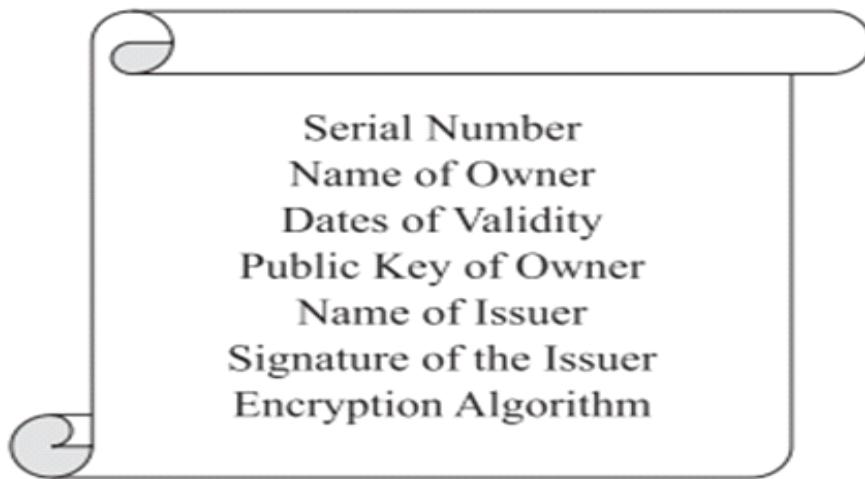


Figure 3.2: Some of the Data Fields Found on a Digital Certificate

Web browsers know how to use the public key of the certificate to encrypt the data sent to the website that owns it. You should 'trust a certificate only if you trust the person or organisation that issued it', according to Netscape's security panel. Certificates do not necessarily prove that people are who they claim to be, but they are a more secure alternative to usernames and passwords, which can be easily stolen or copied.

Let us say you are in the middle of placing an order on Amazon's website. To view their digital certificate, I can click the lock icon at the bottom of the browser window.

The certificate shows you the name of the organization that issued the certificate, called the Certification Authority (CA), and the validity period of the certificate: that is, when they need to renew their certificate with the certifying authority.

Web browsers come pre-installed with a list of the CAs that it recognises. Figure 3.3 below includes the list that is shown by Internet Explorer on my system. The authority that issued Amazon.com's certificate, Verisign (or RSA Data Security), has been highlighted on the list.

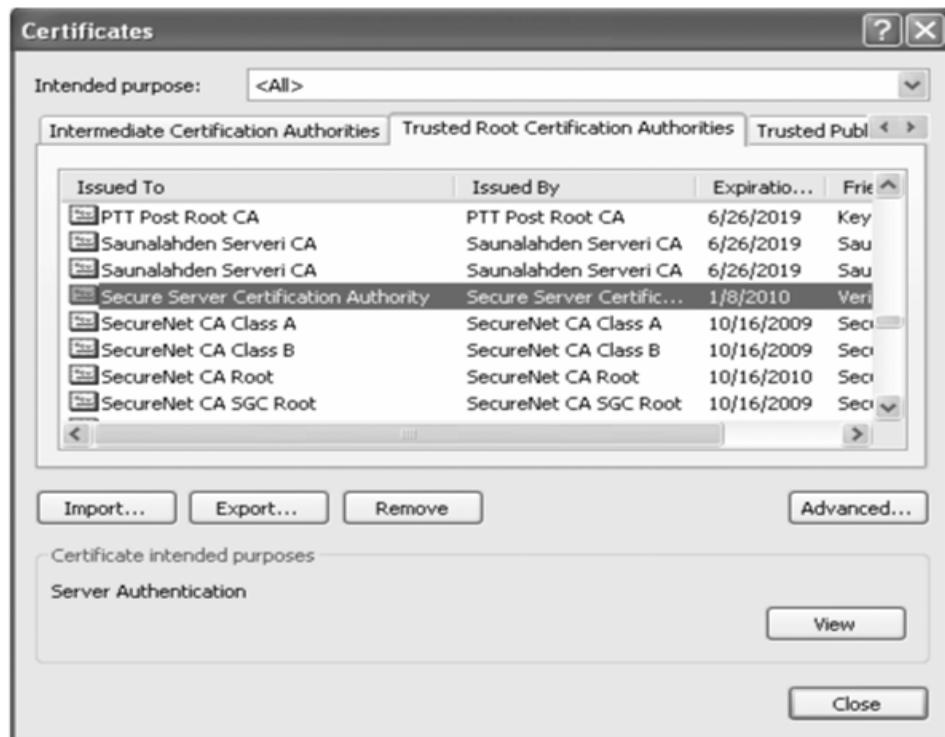


Figure 3.3: List of CAs Recognised by a Web Browser

Activity 3.6

Here we will view the digital certificate of a website in Internet Explorer.

- 1) Open up Internet Explorer and visit Hang Seng Bank at <http://main.hangseng.com/eng/onl/hsebs/index.html>.
 - 2) Click to display the log-on screen for online banking.
 - 3) Click the lock icon at the bottom of the browser window to view Hang Seng's digital certificate.
 - 4) Click each of the three tabbed panels called General, Details and Certification Path and briefly note what information is contained within each panel.
 - 5) Which certification authority (CA) issued Hang Seng's certificate? When does Hang Seng's certificate expire?

CAs are contributing to promoting trust online by allowing websites with digital certificates to display a branded seal (see Figure 3.4 below). This seal allows them to proclaim their authenticity in a more prominent manner to site visitors. By clicking on the seal, visitors can view the information and status of the website's digital certificate in real-time on the CA's website.



Figure 3.4: Branded Seals

3.4.3 Accepting payment

So you have decided to take the plunge and accept sales transactions on your e-commerce site. This section describes solutions that you can use to accept and process online payments directly from your website. Customers always welcome having more choices, and the more choices you offer when it comes to payment methods, the more likely it is that you will attract their business.

Activity 3.7



- 1) Visit and record the payment methods accepted at these e-commerce sites. Include both electronic and traditional methods of payment, if both are offered.
 - ◆ <http://www.parknshop.com> (Click on **Customer Service**.)
 - ◆ <http://www.yesasia.com> (Click on **Help > Making Payment**.)
 - a. Which of these payment options have you used before, whether for personal or business purchases?
 - b. Did you have a satisfactory experience at the time?

Not surprisingly, credit cards are the most commonly accepted form of payment on most websites. There has long been a well-established network that allows credit card payments to be accepted by merchants and transmitted to banks for processing, so it was only a matter of time before this network was extended to also include Web-based storefronts.

There are four parties involved in an electronic credit-card payment scheme: 1 a credit-card holder; 2 a merchant; 3 a merchant's bank (also called the acquiring bank or acquirer); 4 a credit-card issuing bank or financial institution. The diagram below shows how the different pieces can be put together.

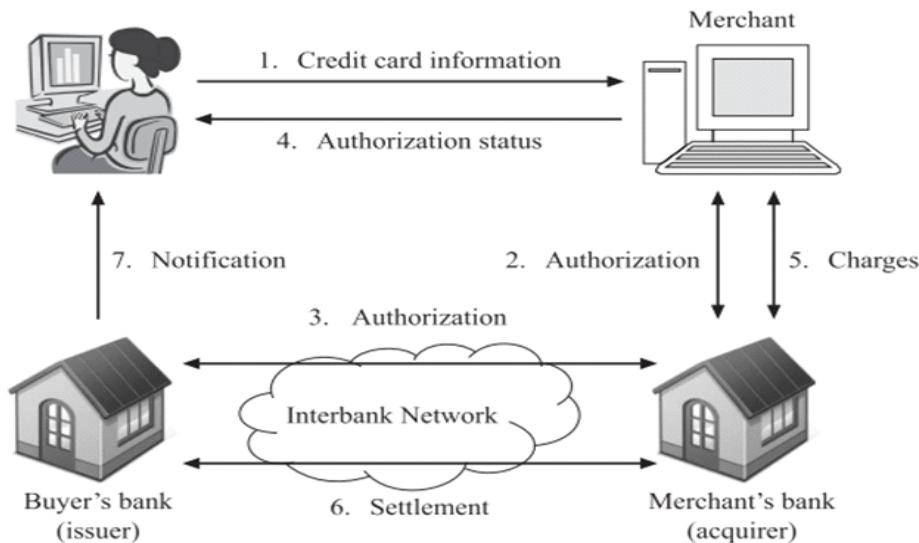


Figure 3.5: Parties Involved in an Electronic Credit-card Payment Scheme

As you can see, your website can be treated as just another point-of-sale (POS) system, similar to the cash register in a retail store or the telephone for a mail-order company. The diagram in the Figure 3.5 illustrates real-time credit card processing, meaning the customer's payment is processed immediately after the order is accepted. This is similar to when you walk up to a cash register in a store and hand in your credit card.

Merchants can also choose to process payments offline. This means they manually enter the payment information into their existing credit card terminal

some time after the order is submitted through the website. They will typically group website orders together and process them in batches, perhaps at the end of the day. This approach may be more labour-intensive, but it is simpler to implement. There is no need for the merchant to set up a communication link between the Web server and the acquiring bank. The disadvantage is that the customer cannot be immediately informed if the charge was accepted or declined by the issuing bank. This set-up may work fine for businesses that do not generate a huge volume of transactions.

There is a final step that takes place after the payment has been authorised, and this is called 'settlement'. The settlement process is where the funds are actually transferred to the merchant's bank account by the acquiring bank. Settlement typically takes place a few days after the payment is authorised.

Merchant account

You need to apply for a merchant account with a financial institution (such as a bank) or a card company (such as American Express) before you can start accepting credit card payments. This account number is used to identify the merchant when the payment authorisation request is sent to the issuing bank (authorisation process) and when the funds are actually transferred to the merchant's bank account (settlement process). You may need to apply for more than one merchant account depending on the payment methods supported.

In order to establish a merchant account with a bank or another organisation, you need to go through an application process. Depending on the institution, you may need to fill out forms, pay an application fee and provide evidence that your business is legitimate and really exists. Your application will probably need to be approved by a committee. You may need to allow six to eight weeks for processing your merchant account application. Most banks may also require you to have a separate merchant account for accepting payments over the Internet, even if you already have an existing merchant account for a physical storefront.

Activity 3.8

Let us see what information is required when applying for a merchant account.



- 1) Visit the American Express Online Merchant Account Application form at https://home3.americanexpress.com/hk/en/merchant/secure/wth_learn/apply.asp.
- 2) What three pieces of information are merchants asked to provide?

Payment processing gateway

After getting a merchant account, you'll need some way to connect your online store to your merchant bank. A payment processing gateway provides you with the software and the network connection needed to do this. The next figure shows how the payment processing gateway, in this case Authorise.Net, fits into the picture.

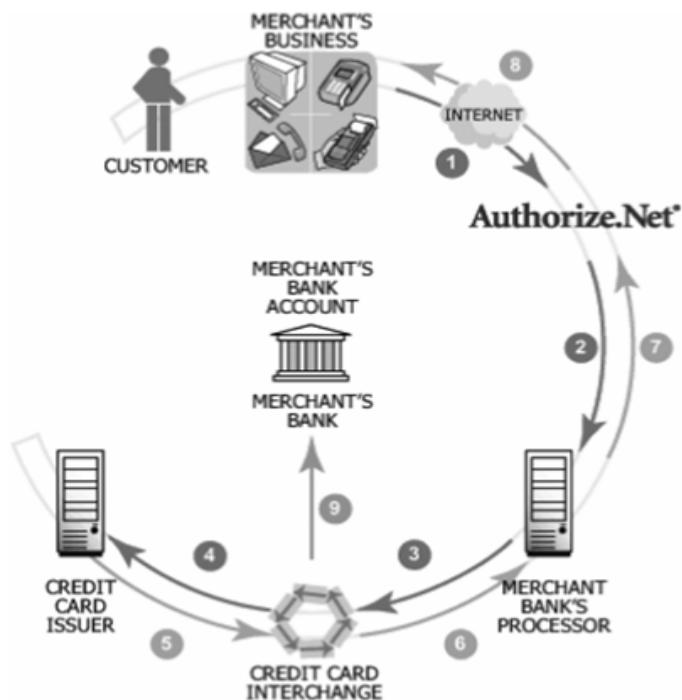


Figure 3.6 A payment processing gateway **Source:** Authorise.Net (<http://www.authorise.net/resources/howitworksdiagram/>)

Anti-fraud controls

Aside from enabling you to authorise, settle, and manage credit card payments, payment processing gateways can also perform other value-added activities such as fraud detection. In the real world, merchants are able to receive the actual credit card, ask the customer to sign the receipt, then compare the signature to the one on the card. Although your payment processor cannot do these things for you in cyberspace, it can perform some checks on the credit card information provided by the customer to minimise fraud.

Here are some of the most popular anti-fraud controls available from major credit card companies, such as, Visa, MasterCard and American Express:

1. Address verification service - the payment gateway software checks that the billing address entered by the user matches the billing address on the credit card account.
 2. Three-digit verification code - online customers are asked to enter the three-digit cardholder identification number that is printed on the back of their cards as proof that the card is physically with them. This three-digit number is sent to the payment gateway along with the credit card details.



Figure 3.7: Credit Card Verification Code Printed on the Back of the Credit Card

3. Password authentication - users are required to enter a personal identification number (PIN) during the checkout process before their credit card payment is accepted. Users must register for the service and merchants will need additional programming on their Web server to accept the PIN number and send it to their credit card processor.

Visa's password authentication scheme is called Verified by Visa, while MasterCard has a similar scheme called SecureCode.

By employing an extra layer of authentication, merchants can protect themselves from chargebacks associated with fraudulent and disputed transactions. You will view an online demonstration of Visa's password protection scheme in the next activity.

Activity 3.9

-  1) Visit the Secure Online Shopping page on Visa's website:
http://www.visa-asia.com/ap/hk/en_US/merchants/productstech/vbv_howdoesitwork.shtml.
- 2) View the 'Verified by Visa registration' demo. This shows how users sign up for the service and associate a Web-based PIN number with their credit card account.
- 3) View the 'Verified by Visa Online Shopping' demo. This shows how users will enter the PIN number, along with their credit card information, when purchasing from an e-commerce merchant that participates in the Verified by Visa programme.
- 4) What do you think are the advantages and disadvantages of implementing such a system, both from the merchant's and the customer's point of view?

Setting up a merchant account and learning how to process your own credit card transactions can be quite complex. As you might expect, there are several companies that specialise in providing merchant accounts and payment processing services to online merchants. Your Web hosting company can also assist you in this matter.

Activity 3.10

-  1) Browse through the services offered by Authorise.net to Web-based merchants at: <http://www.authorise.net/solutions/merchantsolutions/onlinemerchantaccount>

Peer-to-peer payment systems

Once your merchant account is approved and you start accepting credit card payments, you will have to pay a whole slew of fees such as a set-up fee, an annual fee, a monthly fee and transaction fees ranging from 2.5% to 10%. The expense and effort involved puts credit card processing well beyond the reach of many small merchants and individual sellers.

Peer-to-peer (P2P) payment systems, also known as person-to-person payment systems, have sprung up to address this user segment. These systems are so called because they were originally created to let individual users transfer funds among each other. For example, a P2P system could be used to repay money borrowed from a friend, pay for items purchased at an online auction, or send cash gifts to family members.

Nowadays, P2P payment systems can also be used to pay small merchants who are not set up to accept credit card payments. Individual sellers and small merchants on Web-based auctions are major users of peer-to-peer payment systems. PayPal is a leading example of such a system. In fact, PayPal was purchased by eBay in 2002, as an acknowledgement of the popularity of its technology among eBay users. Yahoo! PayDirect is another example of a P2P payment system.

PayPal requires both the buyer and the seller to have PayPal accounts. The process works like this:

1. A buyer establishes a password-protected account with PayPal. The account includes the name and address of the buyer as well as information that can be used to pay another PayPal user. This information could be a credit card number or a checking account number.
2. The buyer purchases something from the PayPal seller. If the seller has a website where the buyer places the order, the website can redirect the buyer to a PayPal page during the checkout process. The buyer logs into her PayPal account with her username and password, and authorises the payment transfer to the merchant.
3. PayPal charges the buyer's credit card (or debits the buyer's checking account) and transfers payment to the seller's PayPal account.
4. A confirmation email is sent to the buyer and the seller, confirming that the payment has been made.

One major benefit of PayPal, from the user's point of view, is that you can use it to pay for online purchases with different merchants without having to reveal your credit card number to each and every one of them. The only place where your credit card number is stored is on PayPal's servers.

There are two major types of accounts available to PayPal sellers - personal and business accounts. Personal accounts are not allowed to accept credit card payments, so if you are planning to use PayPal for your online storefront, you have to go with the second type of account, called a business account.

Activity 3.11

- 1) Visit PayPal at <http://www.paypal.com>.
 - a. Click on the tab labelled Merchant Services.
 - b. Under the section titled 'PayPal as an additional payment option', click the link labelled Demo.
 - c. There are many sections under this demo. Under 'Learn More', view the sections titled How PayPal Works and What Your Customers See.
 - 2) Define the term e-commerce.
 - 3) What do the following models refer to?
 - a. B2C
 - b. B2B
 - c. C2C
 - 4) In what ways is the B2C model used to generate sales revenue for a company?
 - 5) What is a digital certificate and how is it used?

3.5 Summary

E-commerce is a huge unit in itself. We have only tried to cover the basic concepts in this unit, so that you will be equipped with the design sensibilities necessary to create and build effective Web commerce sites.

First, we defined e-commerce within the context as the set of commercial activities and transactions that take place over the Web. This includes e-shopping, e-procurement or e-purchasing, sales and marketing. We saw how



a majority of websites fall within three broad models: B2C, B2B and consumer-to-consumer auctions. We also explored the content, features and functions that are typically available under each model.

Experienced online shoppers normally want to complete their entire transaction online. Security and payment processing, therefore, are important features that should be built into full-service websites. Although a Web hosting company or merchant bank can help you out with these matters, it is important to know the concepts behind them so you can communicate your needs and requirements to them accurately.

Privacy is another major concern for e-commerce sites. Shoppers are willing to browse for product information online but a large majority of them still hesitate to make an online purchase due to data privacy and security concerns. At the very least, you must communicate your information handling practices to your online users clearly through a privacy notice.

References

- Anderson, N. (2006). '*Tim Berners-Lee on Web 2.0: "nobody even knows what it means"*'. <http://arstechnica.com/news.ars/post/20060901-7650.html>.
- 'Credit cards', <http://ecommerce.about.com/cs/paymentprocessing/index.htm>.
- Derfler, F.J. and the editors of PC Magazine (2001). *E-business essentials*. Ziff Davis Media Inc.
- 'E-commerce FAQ', http://ecommerce.about.com/library/weekly/aa021502a.htm?PM=ss11_ecommerce
- E-commerce Times, <http://www.ecommercetimes.com>.
- Einhorn, B. (2007). 'China: Falling hard for Web 2.0', *Businessweek* (Online Edition). 15 January 2007.
- Garfinkel, S. and Spafford, G. (1997). *Web Security and Commerce*. Cambridge, MA: O'Reilly & Associates.
- Hanrahan, M. and Kwok, W.T. (2006). '*Globalizing the Web*'. www.ionglobal.com/documents/globalizing_the_web.pdf
- Hof, R.D. (2005). 'The power of us', *Businessweek* (Asian Edition), 20 June 2005.
- InfoWorld, <http://www.infoworld.com>.
- Kalakota, R. (2001). *e-Business 2.0 Roadmap for Success*. (2nd Edition), Addison Wesley Professional.
- Kelly, K. (2005). '*We are the Web*'. http://www.wired.com/wired/archive/13.08/tech_pr.html, accessed 13 February 2014.
- Moll,C.(2005).'*Mobile Web design: The series*'. <http://www.cameronmoll.com/archives/000398.html>, accessed 13 February 2014.
- Reynolds, J. and Mofazali, R. (2000). *The Complete E-commerce Book: Design, Build and Maintain a Successful Web-based Business*. Gilroy, CA: CMP Books.
- Rosen, A. (2000). *The E-commerce Question and Answer Book*. AMACOM.
- Sendsafe User Manual, <http://www.c-prompt.com/JSOFUserManFrame.htm>, 13 February 2014.
- Turban, E., King, D., Lee, J. and Viehland, D. (2004) *Electronic Commerce 2004: A Managerial Perspective*. Pearson Education.



E-Commerce Concepts

4.0 Introduction

Just like the physical environment within a store or a mall, the website design plays a very important role in making the customer feel comfortable during the shopping process.

Our focus in this unit is on creating and implementing effective Web commerce sites for small to medium-sized businesses. To achieve this goal, we must know the right design and functionality that will make customers feel comfortable and that they will find useful during the online shopping experience.

In addition, online shoppers have concerns that are unique to the medium of the Web. These very valid concerns include: security of their payment information, privacy of their personal details, the assurance that they will get what they paid for and the ability to return any defective or unwanted merchandise.

While the underlying problems are not entirely due to Web design alone, they can be alleviated by applying design principles that are specific to online shopping and purchasing.

4.1 Objectives

By the end of this unit, you should be able to:



- develop an awareness of e-commerce website design issues, such as, data privacy and internationalisation
- recognise the potential for mobile commerce
- introduce the second generation of Web-based services, dubbed 'Web 2.0'
- examine how it enables greater online collaboration and information sharing among users

4.2 E-commerce Design Issues

We will now look at issues that have a significant effect on the design of e-commerce sites. These include privacy, catering for an international customer base, and designing sites for mobile users.

4.2.1 Privacy

Privacy is a growing concern as more and more people go online. Whether users are aware of it or not, data are collected about them as they surf the Web. For example, every time you connect to the Internet, your Internet Service Provider keeps a record of your computer ID and the date and time of your session. Every time you view a webpage on your Web browser, a record of the request is kept in the Web server's log files. This record includes the name and IP address of the computer that made the request, the webpage the user was looking at before he or she clicked into your site, and information about the type of Web browser and operating system used.

Another common practice is the use of cookies to track the users on a website. A cookie is a tiny file stored by a Web server on your computer. The information contained in the file is sent to the server by the Web browser each time you visit this particular website. Cookies are designed to remind the site of information you have provided them with before, such as, your password for the site, your user preferences (that is, preferred background colour), and your session ID, to keep track of the items in your shopping cart.

Cookies are usually harmless. They cannot be used to take information about you or your computer that you have not provided. But it is sometimes difficult to tell what they are used for. They might be used by certain services to create a profile of your interests based on the sites you visit. Then advertisements on participating sites can be customised for you. Some folks may not feel comfortable about having their user profile stored in a database somewhere on the Internet and consider this a violation of their privacy.

Websites can also collect data about users through online registration forms. Customers may be required to give away their names, addresses, phone numbers, email addresses, personal preferences and so on, in order to access certain parts of the website or to place an order. Beware, though. Asking customers for too much information may turn them off from completing their purchases or from returning to your site. Usability expert Jacob Nielsen (<http://www.useit.com>) even recommends that customer registration should be optional.

There is nothing inherently bad about collecting all this data about customers online. Websites and service providers often use this information to improve customer service or to guide their business strategy. However, website owners must always be respectful of data privacy when handling and storing confidential information. They should also inform their users about their data collection and handling practices through a privacy notice posted on their website.

Reading 4.1 http://www.bbbonline.org/privacy/sample_privacy.asp

A well-written privacy notice should always address these major areas of concern:

- ❖ What information is collected from website users?
- ❖ What is this information used for? Aside from the website operator, will the information be shared with anyone else?
- ❖ What safeguards are used to protect the security of the data collected?
- ❖ How can users contact the company in case they have questions or in case they want to access their personal information?

4.2.2 Internationalisation

We all know that physical borders are meaningless when it comes to doing business online. When you market your goods and services on the Web, your potential customers may be anywhere in the world. Web designers must, therefore, ensure that their website is usable, acceptable and understandable by local and international visitors alike.

On the most basic level, the website must be available in a language that can be read and understood by its target audience. On another level, cultural and geographical considerations must be made when presenting information online. Colours, icons and even the phrases used must be chosen so that they are interpreted appropriately by the intended audience. Designers should note that even within the English-speaking population, the same term may have different meanings based on regional affiliation (for example, in British, American, Australian English). An awareness of these issues should be factored into all decisions made regarding the website.

Figure 4.1 shows how two different languages can be displayed on the same webpage using the Unicode character set.

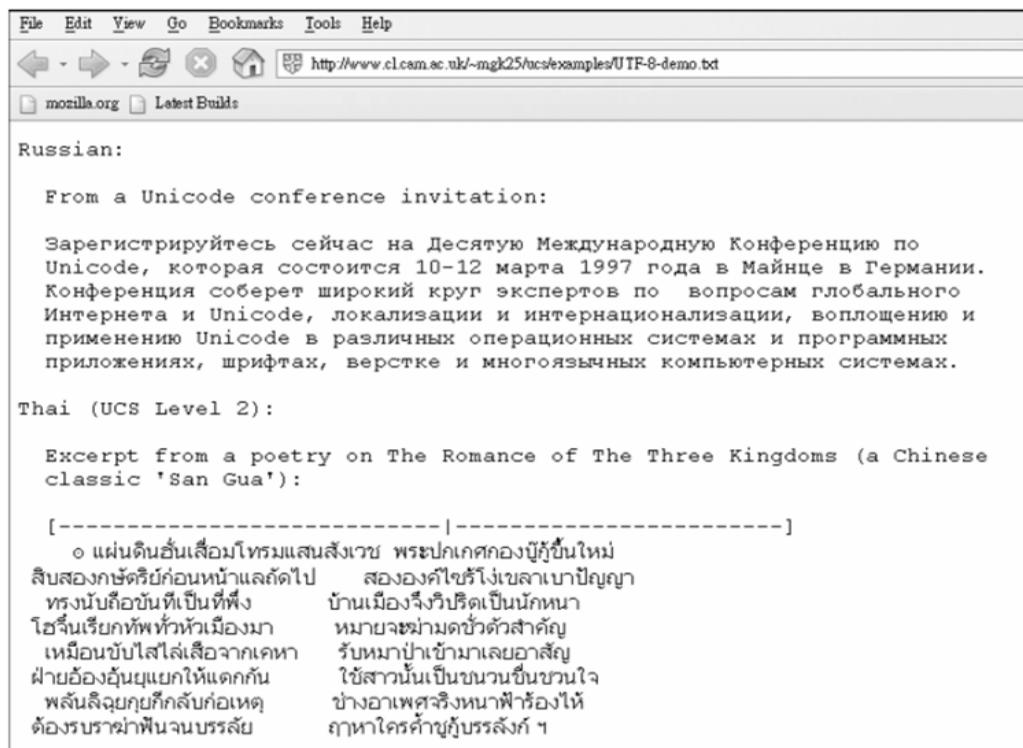


Figure 4.1: Webpage Using the Unicode Character Set

The encoding scheme used by a webpage may be explicitly specified by page designers through a META tag in the HTML page. For example, most Hong Kong websites would specify Traditional Chinese (BIG5) encoding in the META tag, while mainland Chinese websites would specify Simplified Chinese (GB2312).

```
<head>
<title>Welcome to netvigator.com</title>
<meta http-equiv='Content-Type' content='text/html; charset=big5'>
</head>
```

Figure 4.2: Sample META Tag

Web servers can also be configured to serve different language versions of a webpage depending on the language and encoding preferences sent by the Web browser. In Mozilla Firefox, you can view these preferences by selecting Tools > Options from the menu.

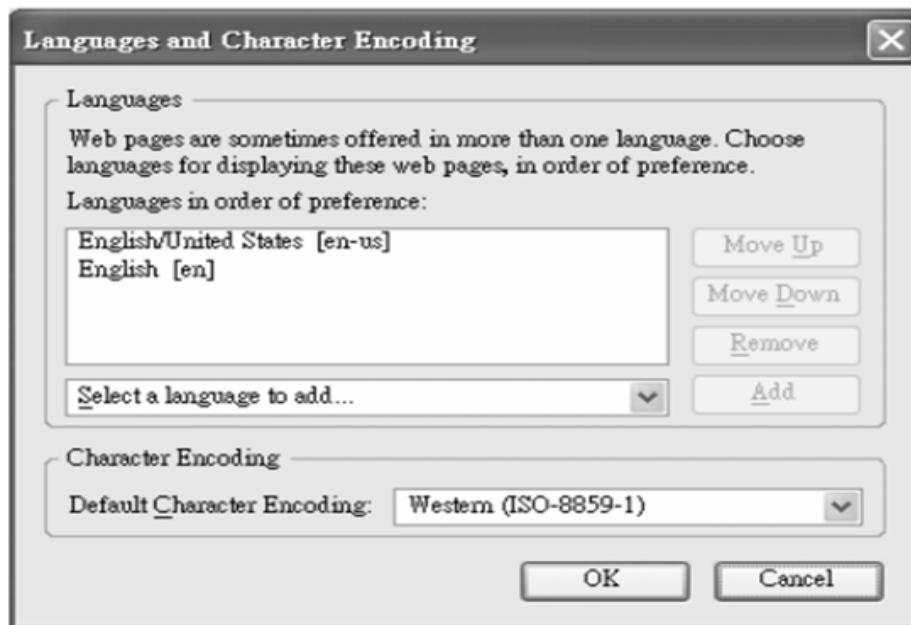


Figure 4.3: Language and Character Encoding

So how do you go about serving different language versions of your site? There are two basic approaches:

- ❖ You can build static versions of the site in each target language; or
 - ❖ You can use software to do the translation in real-time for each page request.

For our case study website, Scenic HK, static translation is adequate due to the small number of pages. The second approach is suitable for large, database-driven websites with frequently updated pages, such as news portals and large-scale e-commerce sites.

There are some automated translation tools available on the Web to help you with your translation needs.

Activity 4.1

In this activity, we will translate an English webpage into different languages. We will also look at the META tag that contains the encoding scheme for the page.



- 1) Go to http://www.google.com/language_tools?hl=en
- 2) View the HTML source of the webpage using View > Source on the menu.
- 3) Look closely at the <META> tags in the <HEAD> section.
- 4) Write down the META tag and attribute that contains the encoding scheme for the page.
- 5) Now translate the same page into Spanish.
- 6) Just as before, view the HTML source of the webpage and write down the META tag and attribute that contains the encoding scheme for this page.

Translating websites to the desired target languages is only the first step in serving an international audience. Next comes localisation. Localisation refers to 'the actual adaptation of those sites to meet the language, cultural, and other requirements of a specific target market' (Holzschlag, 2006). Here are the aspects of localisation that Web designers must watch out for:

- ❖ numeric, date and time formats
- ❖ currencies
- ❖ keyboard usages
- ❖ use of colour
- ❖ sensitivity to cultural perceptions of language, iconography, and imagery

When making use of images and icons, designers must be aware that the same image may be interpreted differently according to the user's culture and nationality. For example, the 'thumbs-up' sign is considered offensive in Iran and the 'A-OK' symbol is regarded as obscene in Brazil.

Colours must also be chosen with care. Many colours, especially black, white and red, may have varying symbolic or religious meanings throughout the world. Websites with a black background may be considered hip and cool in the United States, but the same colour is connected with death and funerals in Chinese culture. It is important to get user feedback right at the design phase in order to avoid displeasing a significant segment of your audience.

Webpage layouts also need to account for the swelling and shrinking caused by different language versions of the same text content. For example, German takes up more horizontal space than English, while Chinese takes up less horizontal space but uses up more vertical space.



Figure 4.4: German Toolbar on Amazon.com



Figure 4.5 Chinese Toolbar on Amazon.com

Translating and localising your website is just the beginning. Once you start accepting orders from international customers, you also have to deal with issues, such as, shipping globally, accepting multiple currencies, and providing customer service in multiple languages.

4.2.3 Designing for mobile commerce

It has long been predicted that more people will eventually access the Web via mobile phones and other handheld devices rather than traditional desktop computers. Right now, 'there are three times as many mobile phones as PCs worldwide, and the gap shows no signs of decreasing' (Moll, 2005). In fact, it is envisioned that a large segment of the online population, especially those from poorer countries with inadequate network infrastructures, will bypass the desktop and go straight to mobile Web browsing.

There are encouraging signs for mobile Web design and development. Many of today's mobile devices already feature Web browsers and the demand for mobile devices continues to grow. The leading search engine, Google, even maintains a separate index called Google Mobile which concentrates only on 'mobile' friendly sites.



Figure 4.6: Google Mobile *Source: <http://www.google.com/mobile>*

Despite these trends, browsing the Web from a mobile device - for example, to find product information, consult timetables, check email, or transfer money - has not become as convenient as expected. Users often find that their favourite websites are not as accessible or easy to use on their mobile phone as on their desktop computer. Content providers still have difficulties building websites that work consistently on all types and configurations of mobile phones offering Web access.

To start with, mobile devices have inherent limitations due to their restricted keyboard and screen size. Users often need to scroll down in order to view the entire page. Inputting data into forms or entering a Web address is difficult to do on a small keypad. To make things even more complicated, there is a wide range of device models and mobile browsers which may not always display content in the way it was intended. The limited storage capacity and slower access speeds of mobile devices also make it difficult to download and display large files. In terms of usability, mobile visitors are paying higher rates for network access and are therefore very focused on a specific goal. They normally want to quickly get the information they want instead of browsing at a leisurely pace for it.

It is clear that a different approach to webpage design is needed for mobile devices. In May 2005, the World Wide Web Consortium launched the Mobile Web Initiative (MWI), with the goal of making 'Web access from a mobile device as simple, easy, and convenient as Web access from a desktop device'

(World Wide Web Consortium). The initiative has published a list of mobile Web design guidelines for developers, as follows:

Table 4.1: Mobile Device Profile for Mobile Browsing

Usable screen width	120 pixels, minimum
Markup language support	XHTML Basic
Character encoding	UTF-8 or 8-bit Unicode Transformation Format
Image format support	JPEG, GIF 89a
Maximum total page size	20 KB (kilobytes)
Colours	256 colours minimum
Style sheet support	CSS 1.0
Scripting	No support for client side scripting (such as, JavaScript)

The list of capabilities shown above may look primitive to us now, but these are the baseline requirements that most mobile devices are capable of at the moment. Designers have a better chance of creating sites that work on most devices by adhering to these guidelines.

WAP (Wireless Application Protocol) is the technology that allows the browser on your cell phone, called a microbrowser, to access a website. In the next activity, we will use a WAP emulator to view a website and compare it to our desktop browsing experience. An emulator is a software application that is designed to act and feel like something else, in this case, a mobile phone.

Activity 4.2



- 1) What is the significance of the following on design of a e-commerce website?
 - a) Privacy
 - b) Internationalisation
- 2)
 - a) What are cookies
 - b) How can cookies be useful on an e-commerce website?
- 3) How can cookies be used in a malicious manner to store and track your activity online?
- 4) What does the term localisation refers to?
- 5) Which aspects of localisation should the Web designers watch out for?

4.3 What is Web 2.0?

'Web 2.0' is a buzzword originally created by O'Reilly Media back in 2004. Like many others, you may find it hard to grasp the meaning of 'Web 2.0'. Is it a technology? A business model? A new software version? Or is it just a buzzword intended to attract naïve investors back into Internet companies? Even Tim Berners-Lee, the founder of the World Wide Web, was quoted as saying that the term Web 2.0 is 'a piece of jargon, nobody even knows what it means' (Andersen 2006).

It is taken a while for the true meaning of Web 2.0 to emerge, but if you have spent time recently on Google, YouTube, Wikipedia or Digg.com, then you are already a part of the Web 2.0 revolution. According to Wikipedia, Web 2.0 refers to 'a perceived or proposed second generation of Internet-based services that emphasise online collaboration and sharing among users'. In other words, Web 2.0 sites act more as portals or points of presence which are driven by consumer-generated content and user communities.

During the first phase of the Web, most users were passive consumers or 'readers' of information. Only a small segment of the online population had the tools, knowledge and resources to publish information. In contrast, much of the content on the Web nowadays is manufactured by users, not corporate interests. One study found that only 40 percent of the Web is commercial. The rest runs on duty or passion.

As recognition of this trend, Time magazine announced that the 2006 Person of the Year was 'You'. 'You' means all of us who have made contributions to the online world in our own small way, whether by publishing videos, voting on our favourite songs, sharing our online bookmarks, writing a product review, or simply offering our comments on the work of others. And that is the true spirit of Web 2.0. It is a revolutionary way of using the World Wide Web as 'a tool for bringing together the small contributions of millions of people and making them matter' (Time 2006).

4.3.1 Examples

Here are a few concrete examples of the Web 2.0 phenomenon:

- ❖ Amazon.com's customers have contributed millions of book reviews over the years. Customers also post recommended reading lists according to subject, for example, 'My Favourite Books on Web Design'. These reviews and book lists, in turn, guide the buying decisions of other customers.
- ❖ The online encyclopaedia Wikipedia has more articles than the Encyclopaedia Britannica has online (Logan, 2006). Any of Wikipedia's users can contribute or edit an article. Inaccurate or misleading content is often quickly repaired once it is brought to the attention of the Wikipedia community.
- ❖ Google analyses the traffic and link patterns generated by 2 billion searches a month and uses these patterns to organise its search results. It treats links to a site as a 'vote' for the site, which means that the more links point to a site, the higher its ranking will be on Google's search results. In effect, Google uses the judgement of its user community to determine the most relevant search results.
- ❖ YouTube, a video-sharing website launched in February 2005, has grown quickly into one of the most popular websites on the Internet with '100 million videos viewed every day and an estimated 72 million individual visitors each month' (BBC Online News 2006).
- ❖ OhmyNews is an online newspaper based in South Korea which uses the motto 'Every citizen is a reporter'. It was founded by a veteran investigative reporter in reaction to the country's entrenched conservative media. Based on its concept of 'participatory journalism', it depends on the efforts of 36 000 'citizen journalists' to write up to 200 stories a day. Its popularity has made it the sixth-most influential media outlet in Korea, overtaking the ranking of one of its three television networks.

- ❖ China has produced several home-grown Web 2.0 companies hoping to become the next YouTube or mySpace. Shanghai-based Tudou and Shenzhen-based Xunlei are both video-sharing sites that have received financial backing from Western investors.

These examples illustrate how the Web is tapping the collective intelligence of nearly 2 billion people online worldwide, leveraging their shared knowledge, social contacts, online reputations, computing power and more. This unprecedented ability of large groups of people to mobilise themselves for a common cause online is both exhilarating and potentially threatening.

Another buzzword that is often associated with Web 2.0 is the Long Tail. This is a theory that has been popularised by Wired magazine editor Chris Anderson. According to Wikipedia, the Long Tail describes business models which concentrate on selling products that are in low demand or have low sales volume. Examples of such products would be obscure book titles or foreign language documentaries. While this strategy may sound strange at first, Anderson argues that this business model is justified because the combined market share of low demand products can rival or exceed the market share of the relatively few current bestsellers and high volume products. Therefore, companies who focus on niche markets are in a better position to survive and prosper.

For example, there are a small number of very popular books which sell millions of copies, and then a long tail of less popular books which may sell a few hundred or even fewer copies. A real-world bookshop can only stock so many titles on its shelves, so naturally, it will only carry those titles that are most likely to sell.

But an online store such as Amazon.com has no limits on its shelf space, so it can offer a far wider range and serve customer markets found within the long tail, by selling out-of-print titles or books by obscure writers.

Google is another classic example of a Web 2.0 company, and its Google AdWords product is a perfect example of the Long Tail theory at work. With Google AdWords, a company can submit its text-based advertisement to Google, along with a list of keywords that are related to its product or service. The whole sign-up process for Google AdWords can be done entirely online, including payment.

Whenever a user enters a search for one of these keywords, the company's advertisement appears alongside or across the top of Google's search results in a section titled 'Sponsored Links'. The company does not pay Google unless a user clicks on its link.

As one marketing writer states, "Never before in the history of advertising has it been possible to spend five bucks, write a couple of ads, and get instant access to over 100 million people in less than 10 minutes" (<http://www.perrymarshall.com/google/>). By concentrating on selling advertising to the vast majority of small companies with micro-advertising budgets instead of going after a few, well-established branded companies with multi-million dollar budgets, Google has established itself as a major player in the online advertising market, capturing a staggering 25% market share in the US (source: eMarketer) after just a few years.

4.3.2 Applications

Now let us turn to more practical matters. For example, what are the tools that can help us create content if we wish to participate in Web 2.0?

For a start, laptops and desktop computers, as with most hardware components, have become more affordable in recent years. Broadband, or high speed Internet access, is becoming more widely available, making it easier and cheaper to distribute multimedia content. Digital cameras, camcorders and camera phones can now be used by anyone to snap photos and capture events on video.

There are also plenty of Web-based applications which allow user-generated content to be edited and distributed over the Internet. Many of these applications target consumers or small businesses who may wish to collaborate or work together online.

Activity 4.3

You probably have many 'favourite' pages bookmarked in your Web browser. As you accumulate bookmarks over the years, it gets more and more difficult to keep track of why you bookmarked them in the first place!

- 1) Would it not be great if you could search your bookmarks using relevant keywords? Would it not even be greater if you could search the bookmarks that others have saved as well? This is the premise behind social bookmarking site del.icio.us.
 - a. Go to <http://del.icio.us> in your Web browser. Enter the term 'Web2.0' in the search box. Please note that there is no space between 'Web' and '2.0'.
 - b. A list of search results will be displayed, with a number next to it which indicates how many people have saved this page in their list of bookmarks. The more times a site has been bookmarked, the more useful people found it to be.
 - c. Compare the quality of the search results on del.icio.us to Yahoo's search directory. Do you notice any difference?
 - 2) You need to create an account on del.icio.us in order to save your bookmarks. After creating an account with a username 'your account name', you can view your bookmarks by pointing to <http://del.icio.us/youraccountname> in your browser.
 - 3) You can also attach tags to each bookmark that you save. These tags will assist other users in their searches. The next Figure 4.7 shows how we saved and tagged the Open Source Web Design site in my online bookmarks.



url	<input type="text" value="http://www.oswd.org/"/>
description	Open Source Web Design - Download and upload free web designs.
notes	<input type="text"/>
tags	<input type="text" value="free webdesign templates design community"/> space separated
<input type="button" value="save"/>	

Figure 4.7: The Open Source Web Design Site in Online Bookmarks

Now let us turn to the question that is probably been at the back of our minds all along: 'How does this generation of websites and services expect to make money?' The next reading will enlighten us on this matter.

You may recall that del.icio.us displays a list of sponsored results along the right-hand side of the page, next to its bookmarked results. Sponsored results are paid for by advertisers, and del.icio.us gets paid every time a user clicks on a sponsored link. Aside from raising money through advertising, del.icio.us was acquired by Yahoo! in December 2005 for an undisclosed amount.

The term 'Web 2.0' has its critics as well. One of the biggest criticisms is that it has failed to generate enough truly important products or even just products that appeal to a wider market. For example, many regular Web users may never have heard of MySpace, del.icio.us or digg. Only time will tell if Web 2.0 will live up to all the hype surrounding it.

Activity 4.4

- 
 1. What do you understand by the term 'Web 2.0'
 2. List any 'Web 2.0' companies that you know and justify why you listed them.

4.4 Summary

In this unit we discussed that if you aim to serve an international audience, you also have to give some thought to issues such as serving a localised version of your website in each target language, along with order fulfilment and customer service across different countries.

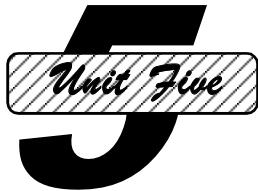
We also looked at the advances in mobile Web browsing, along with the design considerations facing Web designers who intend to serve a mobile audience.

Lastly, we looked at Web 2.0 and the ways in which online user communities use the Web for information sharing and collaboration.

You now have the basic knowledge in Web design and e-commerce that you will build on in the remaining units of this course. In the next unit, Analysis and Planning, you shall lay down the blueprint for your website case studies.

References

- Anderson, N. (2006). *Tim Berners-Lee on Web 2.0: "nobody even knows what it means"*. <http://arstechnica.com/news.ars/post/20060901-7650.html>, 13 February 2014.
- Derfler, F.J. and the editors of PC Magazine (2001). *E-business essentials*, Indianapolis: Ind., Ziff Davis Media Inc.
- Einhorn, B. (2007). 'China: Falling hard for Web 2.0', *Businessweek* (Online Edition), 15 January 2007.
- Garfinkel, S. and Spafford, G. (1997). *Web Security and Commerce*. Cambridge, MA: O'Reilly & Associates.
- Hof, R.D. (2005). 'The power of us', *Businessweek* (Asian Edition), 20 June 2005.
- http://www.c-promptdev.com/JSOFUserMan_AutomatedCCProcessing.htm.
- InfoWorld, <http://www.infoworld.com>, 13 February 2014.
- 'Internationalization', http://whatis.techtarget.com/definition/0,,sid9_gci212303,00.html, 13 February 2014.
- Kalakota, R. (2001). *e-Business 2.0 Roadmap for Success*. (2nd edn.), Addison Wesley Professional.
- Kelly, K. (2005). 'We are the Web'. http://www.wired.com/wired/archive/13.08/tech_pr.html
- Moll, C. (2005). 'Mobile Web design: The series'. <http://www.cameronmoll.com/archives/000398.html>, 10 March 2014
- Nielsen, J. (2005). *International sites: Minimum requirements*. <http://www.useit.com/alertbox/20050808.html>, 13 February 2014.
- Reynolds, J. and Mofazali, R. (2000). *The Complete E-commerce Book: Design, Build and Maintain a Successful Web-based Business*. Gilroy, CA: CMP Books.
- Rosen, A. (2000). *The E-commerce Question and Answer Book*. AMACOM.
- Sendsafe User Manual, <http://www.c-prompt dev.com/JSOFUserManFrame.htm>?
- Steve Schifferes (2006). *Has the dotcom boom returned?* <http://news.bbc.co.uk/2/hi/business/6036337.stm>, 13 February 2014.
- Turban, E., King, D., Lee, J. and Viehland, D. (2004). *Electronic Commerce 2004: A Managerial Perspective*. Pearson Education.



Analysis and Planning

5.0 Introduction

We are now about to begin the first stage of the Web design process: Analysis and Planning.

This stage can be likened to problem-solving. Essentially, your client has identified a problem that can be solved or a business need that can be satisfied by building this website. In this unit, before building the pages for the site, we need to decide, specify, and communicate just what, exactly, needs to be built and why. What problem are we solving? Who needs it? What's this site for, anyway?

Here again is the website design process diagram, highlighting the specific steps within the Analysis and Planning stage.

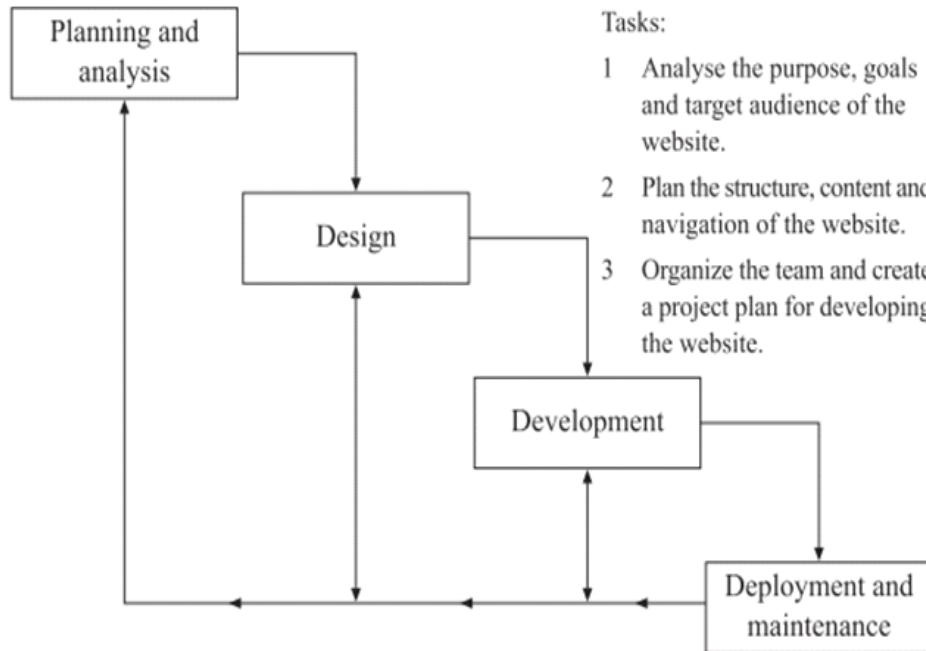


Figure 5.1: The Website Design Process Highlighting the Specific Steps within the Analysis and Planning Stage

5.1 Objectives

By the end of this unit, you should be able to:

- outline the steps for analysing the goals for the website
 - explain the steps for understanding the target audience for the website
 - discuss the steps for gathering the content and functional requirements for the website
 - organise the content and functional requirements for the website

5.2 Analysing the Project

We begin this unit by outlining the procedures that are needed for setting a website's goals, and identifying its target audience.

Most beginners interested in designing websites tend to jump straight to the actual production of the website pages and elements. Page design and construction are certainly important aspects of the process; however, most experienced designers realise that much of the success of a website is based on the overall planning of the site, long before webpage coding ever takes place.

In their book *Web Page Design*, Stubbs, Barksdale and Crispen (2000) introduce a technique called 'reverse-identifying'. Reverse-identifying "involves applying each of the design phases to websites that already exist" (Adobe Web Tech Curriculum). We will try out this process in the next activity, to give you an opportunity to become more aware of the significance and impact that the Analysis and Planning stage can have on the finished website product.

Activity 5.1



Visit these two websites:

- 1) Dummies Online (<http://www.dummies.com>)
 - 2) Encyclopaedia Britannica Online (<http://www.britannica.com>).

Use the tables below to reverse-identify their purpose and target audience. Did the reverse-identifying process help in determining the strengths and weaknesses in the websites you reviewed?

Table 5.1: Analysis of Website Purpose

	Dummies Online	Encyclopaedia Britannica
What do you believe is the purpose of the site you visited?		
Is the purpose of the site clearly stated?		
Approximately how long did it take you to identify the intended purpose of the site?		
If the purpose is not clearly stated, what information provides you with a clue regarding the intended purpose?		

Table 5.2: Analysis of Website Audience

	Dummies Online	Encyclopaedia Britannica
Who is the intended audience of the site you visited?		
Does the website make clear who its intended audience is?		
If not, what information presented provided you with clues about the intended audience?		
Approximately how long did it take you to identify the intended audience?		

5.2.1 Setting site goals

We all know that the general purpose of any website is to facilitate the communication of information. To establish the specific goals of a website project, you need to ask yourself, 'What is the important information that this site wants to collect or distribute? What are the commercial, social, legal or political motives behind the communication?'

Goals may be stated in 'hard' or 'soft' terms. 'Soft' goals are a bit harder to define, such as brand building or image design. 'Hard' goals include specific functions, such as: selling products online, giving access to order information, letting users run Web-based applications.

More often, the goals are vague and incompletely stated. Clients who request Web design services may fall in the category of 'let us do something cool' instead of 'let us see how we can best meet our customers' needs.'

One way to make things clearer is to realise that there are two types of needs that must be served by any website: business needs and user needs. By looking at both points of view, a designer can come up with a holistic set of goals that satisfies both parties. This approach is discussed in the next reading, along with some concrete examples of website needs and goals.

Know your client

Most of the time, you would not know enough about the nature of your client's business to proceed with any project analysis work right away. First you need to learn everything you can about your client's products and services, then you have to filter this knowledge through your design expertise in order to communicate the necessary information in the most effective way.

Here are the main aspects you should know about your client:

- ❖ Company/Client/Industry
- ❖ Current website (if available)
- ❖ Competition
- ❖ Target audience profile
- ❖ Products and services
- ❖ Available resources for the project
- ❖ Content requirements
- ❖ Visual requirements
- ❖ Technical requirements.

If you are lucky, your client will provide a lot of this information up front with a Request for Proposal (RFP) document. The RFP is a document which a client may send out to several Web design firms, inviting them to bid for a design project.

Other sources of information would be:

- ❖ your client's existing website, if available
- ❖ newspaper or magazine articles
- ❖ press releases or marketing materials about your client

Your client may also provide samples of their products or services to help you get familiar with them.

Interviewing

Another way to get a complete and clear picture of the full range of website goals is to interview all the project stakeholders and get them to tell you what the site must achieve in order for them to consider it a success.

Project stakeholders include 'all the people or groups who have some significant interest in the project's success' (Your Site's Goals). Examples of stakeholders are:

- ❖ the client who's paying the money and has a commercial interest in the site's success
- ❖ the salesperson who will be following up the leads and inquiries coming from the site
- ❖ the person in customer support whose job will be made easier
- ❖ the technical person who will be updating and maintaining the site

Interviewing is probably the most widely used technique for gathering information from your client. It also requires the most skill and sensitivity. Here are some guidelines on how to conduct effective interviews (adapted from Bennett et al., 1999).

Before the interview	Make appointments for interviews in advance. Have a clear set of objectives for the interview. Plan your questions and write them down. Do some background reading on the industry that your client belongs to as part of your preparation.
At the start of the interview	Introduce yourself and the purpose of the interview. Take out your pen and paper for taking notes, or a tape recorder if the interviewee agrees to be taped.
During the interview	Control the direction of the interview by making sure the interviewee sticks to the subject matter at hand. Make a note to return to any important issues that are brought up during the interview but which were not part of the original agenda. Ask different kinds of questions to get different kinds of information. Questions can be open-ended ('Can you explain how customers return items to the store?') or closed ('How many corporate customers do you expect to register at the site?'). However, it is not acceptable to ask very open-ended questions such as 'What do you want the website to do?' Be a good listener. Encourage your client to expand on any key points. Take the opportunity to collect examples of documents that may be useful when designing the site, such as brochures, style guides, and blank forms.
After the interview	Make an appointment for a further interview if it is necessary. Offer them a copy of the notes you have taken to check that you have an accurate record of what they have told you. Update your notes to reflect any comments or feedback while the interview is still fresh in your mind.

Figure 5.2: Guidelines on How to Conduct Effective Interviews
(Adapted from Bennett et al., 1999).

Here are some interview questions you might ask:

1. Are you ready to put your entire product database online? Do you have the personnel and budget necessary to maintain a database-driven website?
2. Are you ready to put your order database online? This is necessary if customers are allowed to query their order status.
3. You currently have customers who are used to sending orders to you by phone or fax. They use the order form that comes with your paper-based catalogue, where they simply fill in the item number and quantity for each product they order. Would you consider putting the same form online as well? This lets your regular customers do things in a way that is already familiar to most of them.
4. Would you consider allowing customers to download your price lists, perhaps in Adobe Acrobat (PDF) format? This is an effective and immediate way to introduce your product catalogue to new customers who may not want to wait several days to receive a paper-based catalogue in the mail. This feature is also available in other online office supplies stores.

We all know how easy it is to lose focus when confronted by all the things you could be doing with the website. With a clear set of goals written down before you start construction, you have a yardstick for measuring the potential success of each function, piece of content or design element that will be included on the website. Does it take you further towards your goals or does it add something your users will find useful? If it does not, then it is not necessary.

One last word of advice: Do not get frustrated if the requirements keep changing as you go through the analysis stage, or if they sound over-ambitious given the resources at hand. This is all quite normal! Your client may not necessarily know how a website can best serve their needs, and part of your job is to help them figure this out.

5.2.2 Understanding the target audience

If you are creating a website for a business, a group or an organisation, your target audience will most likely be the people who buy or use the company's products or services. Even if your site is purely informational, you are still targeting a certain audience, such as prospective customers, university students, business travellers or first-time home buyers.

To understand your website's target audience, you need to ask these questions: Who's coming to your site? Why are they coming? And what do they hope to achieve once they get there?

Whoever they might be, it is important to identify and understand the characteristics of your target audience during the website Analysis and Planning stage. This knowledge will greatly affect how you choose, present and organise the content and features on your website.

Now let us move on to the methods you will use to identify and understand the characteristics of your target audience. Based on your client's responses and on your analysis of their website goals, you should already have an idea of the main user groups of the site.

For example, a university website may use the following line of reasoning to identify its target audience: 'The main goal of our site is to recruit new students. Currently, our students have entrance test scores of 925-1025. We want to attract students whose entrance test scores are 1000 and above. Our target audience is students who meet those criteria' (adapted from Web Project Management Guide).

Here are more examples of major user groups for a website:

- ❖ Prospective customer, whose goal is to understand how our products compare to the competitor's
- ❖ End-user, whose goal is to find timely help in using our product
- ❖ Young homebuyer, whose goal is to find attractive properties to visit, with the ultimate goal of finding a flat that suits his or her lifestyle

Once you have established the target audience for a site, you need to do more research on their needs, their online habits and their preferences.

After you have identified all the major user groups that your website will cater to, it is time for you to put yourself in their shoes and think like a user, not like a designer. You will literally create a mental picture of individual members of your audience and then walk through how they will actually use the website.

User profiles and scenarios

The demographics and marketing research you have done so far tell only part of the story. You will now use your research findings to create detailed profiles of targeted users. By creating a collection of such profiles, you can begin to assign 'human' faces to the demographic data and craft personalised stories.

You may also combine your user profiles with actual situations or scenarios that a typical user might go through as he or she attempts to achieve different goals on the site.

Target platforms

It is important for you not only to understand the functions that will be performed by the users at your site, but also to understand how they will experience the website. This experience depends to a large extent on their browsing environment and viewing platform. By this, we mean hardware (that is, computer speed, memory, disk space, video and audio capabilities), software (that is, operating system, browser, plug-ins), Internet connection (that is, dial-up, broadband), and monitor (that is, screen size and resolution).

Web designers must accept that the same webpage will look and perform differently depending on the viewing platform. Remember the saying that goes, 'You cannot please everyone.' This is definitely the case on the Web! You will just have to select the target platforms that the majority of your audience is more likely to use, and then design your website to look, feel, and maybe even sound, as great as possible on that platform.

If you are building a website for a client with an existing online presence, their website log file can tell you a lot about the browsing environment used by their target audience. A log file contains a record for every file that is requested from the Web server. There are many software tools which are capable of crunching through these log files and extracting useful information that you need to know about your target audience's platforms.

Activity 5.2



- 1) What is a Request for Proposal (RFP) document?
- 2) One way of getting the goals for a website is to?
- 3) Outline the Web Design Process.
- 4) What do you understand by the Reverse Identifying Technique?
- 5) When setting goals for your client website, what issues do you need to consider?

5.3 Summary

The earlier the website goals are defined and recorded, the easier it is to stay focused; and the more easily potential problems are identified and solved, the better the result is for everyone in the end.

In this unit, you walked through the necessary tasks in order to set a firm foundation for your website projects. We hope you have gained a greater appreciation of the discipline and structure that is provided by the Web design process and documentation that guided you through the Analysis and Planning stage.

It is not absolutely essential that you go into as much detail for small or simple websites. You may find yourself skipping or consolidating some of the steps. You may not include all the sections mentioned in the Site Specification document. There is no need to feel guilty about this! Keep in mind that the Web design process is meant to be adaptable and flexible. There is no 'one-size-fits-all' solution when it comes to deciding which steps to follow and documents to produce. You should judge for yourself how much analysis and planning is needed to come up with the most effective website product possible.

References

- Bennett, S., McRobb, S. and Farmer, R. (2006). *Object-Oriented Systems Analysis and Design Using UML*. (3rd Edition), McGraw-Hill.
- Krug, S. (2005). *Don't Make Me Think: A Common Sense Approach to Web Usability*. (2nd Edition), New Riders Publishing.
- 'Macromedia Website production management techniques', <http://www.adobe.com/resources/techniques/discover/>, accessed on 14 February 2014.
- Powell, T.A. (2002). *Web Design: The Complete Reference*. Osborne: McGraw-Hill.
- Pruitt, J. and Grudin, J. (2003). Personas: Practice and theory. <http://research.microsoft.com/research/coet/Grudin/Personas/Pruitt-Grudin.pdf>, 13 February 2014.
- Sisson, D.(2000). *Requirements and specifications*. <http://www.philosophe.com/design/requirements.html>, accessed on 13 February 2014.
- Sklar, J. (2011). *Principles of Web Design*. (5th Edition), Course Technology.
- 'Web project management guide', <http://www.publicaffairs.uiuc.edu/web-projectmanage/index.html>. Accessed on 10 March 2014.
- Willard, W. (2001). *Web Design: A Beginner's Guide*. Osborne: McGraw-Hill.
- 'Your site's goals'. <http://www.webdesignfromscratch.com/site-goals.cfm>, 14 February 2014.
- Zeldman, J. and Evan, M. (2003). *Design process, clients and Web standards: An interview with Jeffrey Zeldman*. Retrieved from <http://www.peachpit.com/articles/article.aspx?p=102019>, Accessed on 14 February 2014.



Design and Planning

6.0 Introduction

You will spend a lot of time in the initial stage learning as much as you can about your client, its industry, competitors, target audience and its objectives in developing this site. At the end, you will deliver a website design proposal that is tailored to the client's needs, including some needs of which the client may be unaware in the beginning. The design proposal is very similar to the blueprint that an architect produces before construction starts on a building.

Analysis and Planning is the stage where structural decisions regarding the website are made. If you do a good job of understanding the goals, purposes and target audience of the website, your site will have a much better chance of meeting client requirements and visitor expectations, and finishing within the given project constraints.

6.1 Objectives

By the end of this unit, you should be able to:



- plan the structure and navigation methods for the site
- describe the different types of roles within the Web design process
- prepare a project work plan and a project schedule
- recognise the importance of maintaining proper documentation throughout the stages of the Web development process

6.2 Information Design

Information design is concerned with identifying, organising and labelling the content and functions on a website so that they can be easily browsed, searched and navigated. This aspect of design is also known as 'information architecture'.

At this point, we have already analysed the purpose of the site and the characteristics of its intended audience. This gives us the proper background to choose and organise the content that will be included on the site. The major questions we need to answer at this stage are:

1. What are all the pieces of content the site needs: To
 - a) fulfil its objectives?
 - b) accommodate all its stakeholders?
 - c) stand up to its competitors?
2. What types of functionality are required (for example, shopping cart, request catalogue)?
3. How should the various pieces of content be organised or grouped?

Once again, you will be working closely with your client at this stage. You will also start building a content inventory of all the information that your client has provided you with to put up on the site. Here is a typical content inventory list:

- ❖ Website text: Who will write or provide the text if not already available? Basic text content might include: who you are, what you do, how to contact you, list of services or products.
- ❖ Photographs, posters, illustrations
- ❖ Company logo
- ❖ Databases for customers, products, orders, and price lists

- ❖ Content to encourage repeat visitors, for example, press releases, newsletters, discussion boards, expert advice
- ❖ Sample forms (order forms).

Content may be given to you in digital form (for example, CD-ROMs, disks, email attachments) or in hard copy. When content comes in, you should record the date when the item was received. Verify the digital media as they come in. Sometimes the files may be damaged, corrupted or they may be in the wrong format. Contact your client and get a working copy as soon as you can if any of this happens.

6.2.1 Organising content

Now that you have got the top-level sections of your site, it is time to assign the content that will go under each of them. You should have an informal list of all the content that the site should contain by now. This list was constructed based on the inputs received during the Analysis and Planning stage.

6.2.2 Site diagrams

You have already seen what a site diagram looks like. It looks like an upside-down tree with the roots sticking out at the top. The site diagram is meant to serve as a visual representation of your website structure. Now that you have identified the main sections of the site and organised the content under each of these sections, you have got the basis for your site diagram.

Directory structure

You will now decide on the filenames for your website. The most important page on your site will be the homepage or the initial page that users see when they request your URL, such as <http://www.mysite.com>.

If your website is hosted on UNIX, the default main page will most likely be called index.html. Windows NT uses the name default.htm. If you are not sure what the default page is on your Web server, check with your system administrator.

Naming files

Here are some things to consider when naming the files on your website:

1. Use brief and meaningful names. Although UNIX and Windows NT both allow up to 255 characters, u234proj1.html is a better name than myWebdesignproject1.html, do not you think?
2. The filename should be made up of any combination of letters, numbers, and the underscore (_) character. Avoid any blank spaces in your file names. The Windows operating system allows this, but UNIX does not. Any filenames with blank spaces embedded within may need to be changed if you move your site to a UNIX server.
3. Use lowercase letters for all filenames. This avoids any inconsistencies in case your website is hosted on a UNIX server, which treats filenames as case-sensitive. This means that the file picture.gif is not the same as the file Picture.GIF on a UNIX server. This is a good convention to adopt even if your site is not hosted on UNIX right now.
4. Use the correct file extensions to identify your files. Here are some commonly used file extensions.

Table 6.1: Some Commonly Used File Extensions

Item	File extensions
HTML document	.html or .htm
Graphics Interchange Format (GIF)	.gif
Joint Photographic Experts Group (JPEG)	.jpeg or .jpg
Portable Network Graphic (PNG)	.png
Adobe Acrobat	.pdf
Quicktime Movie	.mov
Common File Compression Format	.zip
Macromedia Flash	.swf

5. Consider using consistent naming schemes. For example, filenames for press releases could include dates. 'pr_2006_10_15.html' and 'pr_2006_12_1.html' would refer to press releases issued on October 15, 2006 and December 1, 2006, respectively.

Organising files into directories

The default main page of your website is located at the very top of your directory structure. This folder is known as the root directory. There is nothing to stop you from putting all your website files in here. This approach might be adequate for most small websites. But if you get beyond eight to ten HTML pages, along with all the images for the site, it gets difficult to locate the files that you want to edit or work on.

You can consider creating a directory below the root directory for each of the main categories in your site diagram. You can also create directories to hold commonly used elements. Table 6.2 shows common directory names and their usual contents.

Table 6.2: Common Directory Names and Contents

Directory Name	Contents
/cgi-bin	server-side executable programs, particularly CGI
/scripts	JavaScripts, Active Server pages or CGI scripts
/styles or /css	any linked style sheets
/images	all site images, such as GIFs, JPEGs and PNG files
/audio	audio assets
/video	video assets

Activity 6.1

-  1) Visit <http://www.netflarehosting.com/node/479>
 - a. Outline the 7 step design analysis process
 - 2) What is involved in the following stages:
 - a. Website planning
 - b. Website analysis
 - c. Website design and development
 - d. Website testing
 - e. Website implementation and maintenance

6.3 Navigation Design

You have now designed how the content will be structured and organised on your website. Next, you will map how your users will navigate through the various sections of the site.

Good navigation design allows your visitors to get the information they want in the shortest amount of time. Unlike software, websites do not come with user manuals. Your navigation system needs to double up as your default help system as well. It should provide enough information to answer the following questions from users:

- ❖ Where am I?
- ❖ Where can I go?
- ❖ How do I get there?
- ❖ How do I get back to where I started?

Common sense tells us that we should create 'clear, simple and consistent' navigation, but how do we go about this? First, let us look at the process that most people go through when they enter a website.

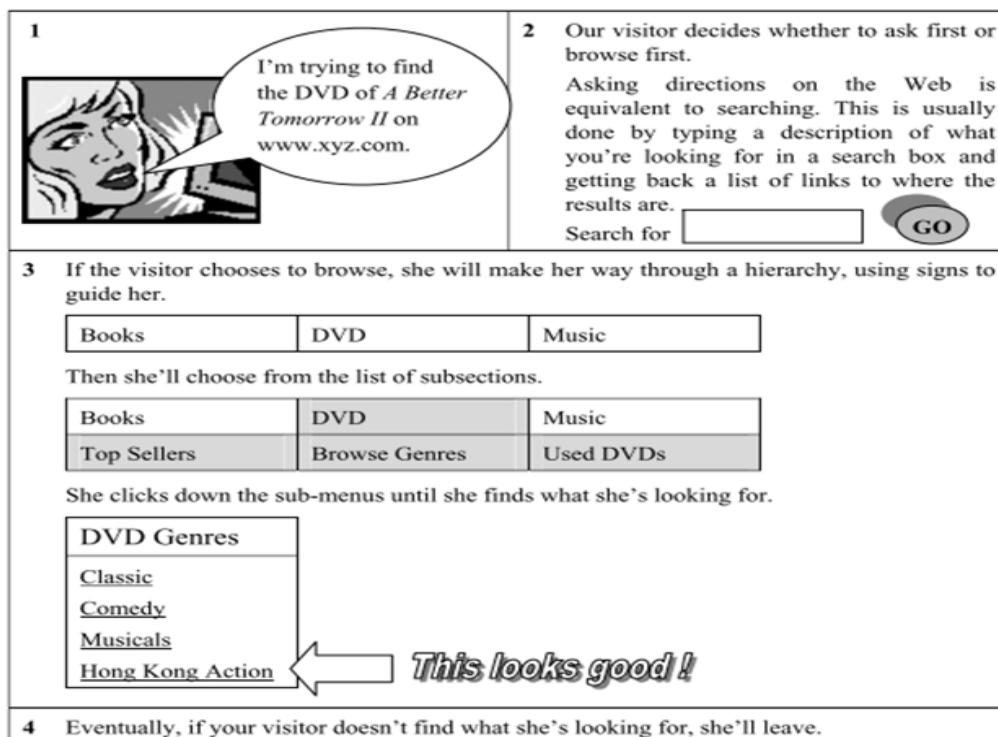


Figure 6.1: How to Create Clear, Simple and Consistent Navigation

We personally find ourselves looking for the 'Search' box automatically whenever we visit a new site. Steve Krug, in his book *Don't Make Me Think*, describes folks like us as 'search-dominant' people. Does this mean every website should have a search function? It ultimately depends on the purpose and the size of the site. The important thing is to give users access to the information they want in the shortest amount of time (and with the least amount of frustration) possible!

6.3.1 Developing navigation

The first step in developing navigation is to identify how visitors will move through the website. The diagram used to capture this is called a storyboard, because it essentially describes a sequence of interactions that take place between the user and the website, much like a story. According to Newman and Landay (2000), storyboards 'reflect limited detail about the contents of each page in the sequence and only the navigation links required to accomplish the task are presented'.

You can see more samples of how a storyboard may be presented at www.eecs.berkeley.edu/Pubs/TechRpts/1999/CSD-99-1062.pdf?

6.3.2 Common navigation models

It is recommended that you follow commonly used navigation models in your own navigation design. This helps ensure that they look familiar to the majority of your users. Placing navigation systems in a standard place lets users locate them quickly and easily. Standardising their appearance makes it easy to distinguish them from everything else on the webpage. Think how frustrating it is when one of these familiar conventions is broken (when a hyperlinked text label is not underlined, for example).

Activity 6.2



Visit the following website:

1. <http://journeymanpm.com/checklists/24-essential-website-project-analysis-questions/>
 - a) Summarise the project analysis questions.
 2. Draw a sketch of a story board that you would use in the design and analysis of a Website.

6.4 Managing the Project

I once read this quote on a webpage: 'Half of planning your website is project management, which is all about making life easier for yourself.'

The analysis and planning that we have done so far is all about making the right structural decisions for the pages that we will eventually design and build. Like any other project, we will need time, money and manpower to produce the actual website. With project management, we will identify, acquire and manage the right amounts of these resources so that we can accomplish what we have set out to do.

6.4.1 Organising the team

Each project requires different sets of skills and expertise. Go over your client's website requirements and think about the team roles needed to fulfil them. Some questions you could ask are: Will it be a dynamic or a static site? Will it contain a significant amount of animation and multimedia? Will it require original illustrations and graphics? Will it require technical expertise in programming and database integration? The answers to these questions will help you figure out which team members are needed on your website project.

6.4.2 Project scheduling

Project scheduling is one of the most crucial steps of project management. This is where you will provide an estimate of the time needed to complete the project and the amount of resources required. Making an accurate estimate is important because it will have a significant impact on the pricing of the project. Meeting the important milestones within the project schedule is also an important indicator of the project's success.

A detailed project schedule contains the following:

- ❖ specific activities and tasks, organised into phases;
- ❖ specific resources necessary for completion of tasks (people, equipment, facilities);
- ❖ timelines (start and end date);
- ❖ important milestones (for example, end of Analysis stage, end of Design stage, and so on).

It requires a lot of experience to come up with accurate estimates for the amount of time to complete a task. Remember to include time for holidays, travelling, meetings, documentation work and the unexpected (for example, equipment breakdowns, corrupted files, new requirements that were not included in the initial scheduling estimate).

Another important item you need to submit to the client is the project budget. The final budget may include the following items:

1. Personnel: website management, design, development and maintenance staff.
2. Hardware: machines (for example, servers, work-stations) and devices (for example, printers, scanners, workstations) needed to develop and test the site.
3. Software: Web authoring tools, database software, scripting, programming tools and shopping cart software (for e-commerce sites).
4. Hosting: Web server, domain name, hosting, and Internet Service Provider (ISP).
5. Others: Search engine registration and optimisation, fees for originally produced or copyrighted text and graphic content.

If you find that you exceed the available project resources after creating the budget, you will either have to go back to your client and ask for more resources, or you might have to cut a few requirements.

6.5 Preparing Your Site Specification

You have been producing mini-documents as you have gone through the various steps within the Analysis and Planning stage. Now it is time to bring everything together in one general document, called the Site Specification document. This document is also called by other names, such as Project Requirements or Functional Specification.

The main purpose of this document is to record the project requirements (that is, What are the goals of this website?) and the project plan (that is, How should we design and build the website in order to achieve these goals?). Your client should be given a copy of the Site Specification and they should be asked to approve each item within it by affixing their signature to each section.

No one ever said that creating and maintaining proper documentation is easy. However, as pointed out in the previous reading, the benefits far outweigh the costs. Documentation often prevents any serious misunderstanding between designers and clients with regards to the project scope, budget and responsibilities. Asking clients to sign off on project requirements, budgets and prototypes also offers designers a certain level of protection if things go wrong later.

Signing off does not mean that you will no longer allow the client to change their minds at a later point. It just means that if your client requests any revisions after they have signed off on a certain stage of the project, they also agree to provide the additional resources (that is, time, staff, money) needed to accommodate these revisions. ?

Here is the outline of the Site Specification document.

Website Goals
<ul style="list-style-type: none">• List the business needs, user needs and goals of the site• Competitive Analysis Summary — summarise the owners' comments and your own research about other competitor sites here.
User Experience
<ul style="list-style-type: none">• Major User Groups• User Profiles for each user group
Site Content
<ul style="list-style-type: none">• Content Grouping and Labelling• Functional Requirements Site
Structure
<ul style="list-style-type: none">• Site Diagram• Navigation Systems
Implementation Plan
<ul style="list-style-type: none">• Team Members• Project Schedule and Budget
Recommendations
<ul style="list-style-type: none">• This is where you can include any requirements that can be added in the next version of the website.

Figure 6.2: The Outline of the Site Specification Document

This document will form the basis of the detailed Web design and development work that follows in the next stages of the project. Here are the benefits of having a formal document that records the outputs of the Analysis and Planning stage (adapted from the Web Design Process):

- ❖ 'It helps you make the thousands of design decisions between now and a finished product.'
- ❖ 'It helps you communicate with your client and maintain their confidence throughout the process.'
- ❖ 'It helps to show that you have done what you set out to do.'

Activity 6.3



- 1) What do you understand by the concept
 - a. Information Design
 - b. Content inventory
- 2) Draw an example site diagram
- 3) What is involved in project management for a website
- 4) Outline the site specification document template

6.6 Summary

Here again are the steps that make up the Analysis and Planning stage (adapted from Willard, pp. 96-97). Remember to document all your outputs along the way.

- ❖ Learn as much as you can about the website client, their organization and the project at hand. If the client has provided you with a Request for Proposal (RFP) document, this would be a perfect place to start. You may also conduct interviews and do your own research.
- ❖ Formulate the website goals and purposes. Start thinking of the amount of time and the resources needed to do the work.
- ❖ Identify and evaluate your target audience. You should document the content and functions they will want to see on the site, as well as their viewing platforms (for example, browser, screen area, operating system).

- ❖ List all the content that will be placed on the site. Evaluate each piece of content to make sure it meets the goals and objectives for the site and the target audience.
- ❖ Organise the site content into a clear structure and plan the flow of information between content areas.
- ❖ Develop the navigation methods for the site.
- ❖ Create a project schedule and budget. Determine the skills and roles needed on the project team.
- ❖ Present all your findings to the client representative for sign-off and approval.

References

- Bennett, S., McRobb, S. and Farmer, R. (2006). *Object-Oriented Systems Analysis and Design Using UML*, (3rd Edition), McGraw-Hill.
- Krug, S. (2005). *Don't Make Me Think: A Common Sense Approach to Web Usability*. (2nd Edition), New Riders Publishing.
- 'Macromedia Website production management techniques', <http://www.adobe.com/resources/techniques/discover/>, 14 February 2014.
- Mark W. Newman and James A. Landay. *Sitemaps, Storyboards, and Specifications: A Sketch of Web Site Design Practice as Manifested Through Artifacts*. Group for User Interface Research, Computer Science Division University of California, Berkeley, CA 94720-1776 USA.
- Powell, T.A. (2002). *Web Design: The Complete Reference*. Osborne: McGraw-Hill.
- Pruitt, J. and Grudin, J. (2003). *Personas: Practice and theory*. <http://research.microsoft.com/research/coet/Grudin/Personas/Pruitt-Grudin.pdf>, 13 February 2014.
- Sisson, D. (2000). *Requirements and specifications*. <http://www.philosophe.com/design/requirements.html>, 13 February 2014.
- Sklar, J. (2011). *Principles of Web Design*. (5th Edition), Course Technology.



Interface Design

7.0 Introduction

In this unit, we proceed to the next stage of our process - design. You will now put your creative skills to use by mapping the information design, navigation design and website structure for your projects into the visual interface that your users will see.

The interface is everything that the user can see and interact with on a webpage. This includes the detailed visual characteristics of the site, such as colours, images, page layouts, page backgrounds, and typography. The interface also includes the concepts, messages and icons your users will be presented with while interacting with the site's navigation systems, forms, animations and multimedia.

7.1 Objectives

By the end of this unit, you should be able to:



- maintain an awareness of human computer interaction while designing page layouts and user interfaces
- maintain an awareness of usability issues while designing page layouts and user interfaces
- recognise the issues involved in designing for a specific page size
- apply an appropriate visual style to a webpage - including colours, backgrounds, fonts and images

7.2 Preparing for Interface Design

There is one thing we have realised after several years of teaching webpage development to adult learners. Although most of us instinctively know what a well-designed user interface looks and feels like, it still is not immediately obvious to many of us how we should go about designing such an interface.

All tools, from an abacus to a personal computer, provide an interface to a human user. This interface is supposed to communicate "both the tool's capabilities and how it is intended to be manipulated" (MacDonald, 2003, p. 52).

Now that more and more people are using software applications and Web-based applications in their everyday lives, it is even more important for designers to be aware of the special considerations and challenges that arise when human users interact with computers. This is the topic of this first section of the unit.

7.2.1 Human-computer interface issues

Most physical devices, such as a joystick, hammer, spoon and fork, are designed using a shape and form that reflects their intended function. However, there is nothing 'natural' about using software or websites. Users cannot perceive the function of software packages and web pages based on their physical form alone. Users can only rely on their cognitive abilities to figure out what is useful about a computer application and how they should go about using it.

This means that your users will have certain pre-existing notions of how they should work with websites and computers. For example, many users expect to find a link back to the homepage in the upper left hand corner of a web page. They expect links to internal sections of the site to be located on the left side of the web page. They also expect advertisements to be located either at the centre top or the right side of the page. If your interface design does not match their view of the way things should be, then they will have difficulty achieving their goals on your site.

The study of human computer interaction (HCI) aims to 'improve the interaction between users and computers by making computers more usable and receptive to the user's needs' (Wikipedia). As a Web designer, this means that you should design and produce Web interfaces which closely approximate your users' experiences on other websites. If you produce something that is too unusual and unfamiliar, your users may not be able to use your site as effectively as possible, or worse, they may simply leave.

Use of metaphors

Most users have an existing mental model of how a task should be done on their computer. This model arises from a combination of real-world experiences, experience with other software, and with computers in general. Take the task of filing letters. We normally organise them into folders, and we throw the ones we don't want into a rubbish bin. These metaphors are reflected in the user interface of most email applications.



Figure 7.1: Online Metaphors Used in a Web-based E-mail System

Metaphors are the building blocks in the user's mental model of a task. Since metaphors instantly convey their purpose to the user, they can be used to represent the concepts and features of your website in an obvious way.

The metaphors you use should be simple, familiar, and logical. When dealing with an international audience, you should also keep in mind that some metaphors may not be universally understood. For example, some cultures

may not recognise a mailbox graphic as an indication for email, so it is better to use an envelope graphic instead.

Activity 7.1



- 1) What do you understand by the following terms as far as web design is concerned?
 - a. Look and feel
 - b. Human Computer Interaction
- 2) The following website uses metaphors to present navigation choices on their homepage to the user. Evaluate how well these metaphors work within their given context.
 - a. Yahoo : <https://www.yahoo.com/>

Simplicity and consistency

Your users will already have some experience using other websites before they arrive at your site. Thus, they will be familiar with the general navigation and layout conventions found in the majority of these sites. You can make life much easier for them by complying with these familiar conventions and practices. Avoid highly unusual interfaces which may confuse and distract your audience.

Aside from observing common design conventions, your pages should also share the same basic layout grids and graphic themes. For example, a website should use a consistent approach to the layout of titles, subtitles, page footers, navigation links and navigation graphics. It can display the same header menu graphic in the same location on all pages to reinforce its corporate identity. By presenting a consistent and predictable user interface, your users will get the sense that the pages of your site belong together, just like the pages of a book. Your users will also feel more comfortable exploring your site if they know what to expect.

Activity 7.2

- 1) The following websites make use of unfamiliar and unconventional navigation and page layouts. Evaluate what the possible effect might be on their visitors.

 - a. Brown University Graduate School (archived version): http://web.archive.org/web/20040607092635/www.brown.edu/Divisions/Graduate_School/home/index.php
 - b. Longscycle.com - online seller of cycling apparel, jerseys, shorts: <http://www.longscycle.com/>

Independent, freestanding web pages

Web pages differ from printed materials in the sense that we control the sequence of the pages that we view. Most of our interactions with web pages involve navigating hypertext links between documents. This gives us a lot of freedom to explore, but it doesn't give us a sense of our current location within the website's structure. It is hard to tell how deep or how much content is available on the site. Some of us may even bypass the homepage and go straight to a subsection page if we discover a site through a search engine.

For these reasons, web pages need to be more independent and freestanding than printed pages. They need to fully identify themselves and provide a way for the user to navigate back to the rest of the site. You can achieve this by including these elements consistently on all your pages:

- ❖ an informative page title (which also becomes the text of any bookmark to the page)
 - ❖ the creator's identity (author or institution)
 - ❖ a creation or revision date
 - ❖ at least one link to a local section's homepage or to the main 'home' page.

Activity 7.3

- 1) Visit your favourite online newspaper or magazine website.
 - a. Evaluate how well this site satisfies the guidelines for independent, freestanding web pages.

Direct access to information

According to webstyleguide.com, 'Studies have shown that users prefer menus that present at least five to seven links and that they prefer a few very dense screens of choices to many layers of simplified menus'.

Users want to get information in the fewest possible steps. This means that you must design an efficient hierarchy of information so that real content is only a click or two away from the main menu pages of your site.

Activity 7.4



- 1) Identify the strategy used by these websites to provide information in as few clicks as possible.
 - a. Staples.com: <http://www.staples.com>
 - b. Bigboxx.com: <http://www.bigboxx.com>

Feedback and visibility of system status

Keep your users informed about what is happening as they interact with your site. For example, when a user initiates an action by clicking a button, you can display a message saying that the input has been received and that their command is being carried out.

A good example of this can be found on Kayak, www.kayak.com, a travel meta-search engine. This site lets you search for airfares from multiple airline websites using a single search form. Since it takes them a while to display the results from all airlines, they use a progress bar and a 'Now Adding Results From ...' section on the left-hand side to keep users informed.

On the other hand, if a command cannot be executed, display a message telling your users why it cannot be done, and provide them with an alternative action. Make sure your message is accurate and easy to understand.

I recently had a frustrating experience trying to get an online account on my insurance company's website. The site kept rejecting the password I had chosen, with a message stating that the password had to be at least 8 characters long and made up of letters and numbers. The problem was, my password was already 8 characters long and made up of letters and numbers. What

they forgot to mention was that the letters had to be a combination of uppercase and lowercase, which I found out on my own after several rounds of trial and error.

You can also prevent errors in the first place by providing samples of correct inputs. An excellent example from Google's Gmail online registration dialogue is shown in the next figure.

The screenshot shows a registration form titled 'Get started with Gmail'. It has three input fields: 'First name' (xyz), 'Last name' (xyz), and 'Desired Login Name' (xyz). To the right of the login name field is the '@gmail.com' suffix. Below the login name field, there is a note: 'Examples: JSmith, John.Smith'. At the bottom, a message states: 'Sorry, your username must be between 6 and 30 characters long.' A 'check availability' button is at the bottom right.

Figure 7.2: An Example of Error Feedback

Feedback also means being prepared to respond to your users' enquiries and comments. Well-designed websites provide direct links to the website editor or Webmaster responsible for running the site. You can include these email address links in a predictable location, such as, a 'Contact Us' page or on the footer of every page.

We have just finished going through the user interface principles that can increase the usability of your page designs. Hopefully, the examples you have seen here will help you avoid making the same mistakes.

7.2.2 Common web design styles

Just like clothes, music and hairstyles, Web design fashions have evolved and changed with the times. Websites that were considered state-of-the-art in 1998 will most likely be regarded as outdated and old-fashioned today.

Identify five Web design styles that are currently in fashion nowadays. Explain the possible reasons behind each of these styles.

In fact, there is a site called 'Web pages that suck' whose tagline is 'Learn good Web design by looking at bad Web design'. You can visit it at <http://www.webpagesthatsuck.com> to see all sorts of examples of bad Web design, along with running commentaries. Aside from usability problems, many of these sites look like their designs have not been updated since 1996.

Activity 7.5



- 1) Visit the Internet Archive's Way Back Machine at <http://web.archive.org>.
 - a. Enter the following Web addresses in the WayBack Machine's search box to view their archived versions:
 - i. <http://www.apple.com> - view the April 4, 1997 snapshot of the site.
 - ii. <http://www.toysrus.com> - view the Jan. 18, 1997 snapshot of the site.
 - 2) Identify three differences between the past and current versions of these sites.
 - 3) Identify five Web design styles that are currently in fashion nowadays.
 - 4) Explain the possible reasons behind each of these styles.

7.3 Page Layout Techniques

In the analysis and planning stage, you designed the structure for the entire website. Now that we are in the design stage, you will design the structure for the individual web pages of the site. Specifically we look at techniques such as using page size and organising page content, using wireframes, table-based page layouts, and CSS-based layouts.

7.3.1 *What is 'page layout'?*

Page layout refers to how the navigation and content are organised on a webpage. It is similar to putting together the pieces of a puzzle. When you are developing the structure of a page, you must first know all the pieces of content to be included on the page. Fortunately, you have already identified all the content and assigned each piece to a designated page during the Analysis and Planning stage.

Now you need to prioritise each piece of content by marking it as 'High', 'Medium' or 'Low'. This will guide you later on when you start sketching the page layouts and positioning the contents on the layout. Here is how I prioritised the content on Speedy Office's homepage.

Table 7.1

Page element	Priority (High, Medium, Low)
Logo/name of organisation	High
Tag line (short phrase with mission statement)	Medium
Navigation to main content areas	High
Weekly specials, along with photos and text	High
Latest company news	Medium
Copyright notice	Low
Contact information	Medium

Your client will also provide you with inputs during the page layout design. For example, he or she might say, 'I want to have a logo at the top of the page, a navigation that links to these other pages, a section for an online store, and a place where I can insert the latest store promotions.' Based on that discussion, the designer begins planning the layout of the site, and makes sketches of sample pages that fulfil the client's requirements.

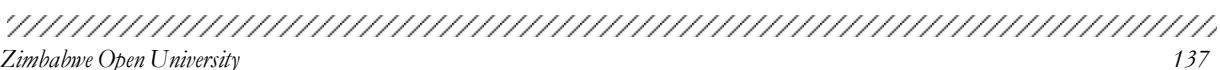
7.3.2 Page size

Similar to printed materials such as posters, newspapers and textbooks, web pages also come in different sizes. You cannot begin detailed design work if you do not know how much real estate is available for you to work with on a page. The amount of space is determined by the dimensions, or the width and height, of a page.

Unlike the print world, the Web has no equivalent for 8.5 × 11-inch or A4 letter size. There are no standard rules to follow. However, the following are some key things that must be considered.

Platforms used by your target audience

You must consider the screen monitor, resolution, operating system and browser software of your target user groups.



The amount of content on the page

A common mistake in Web design is spreading the width of page graphics beyond the area most viewers can see on their 17- or 19-inch display screens. The page size must be suited to the content length. If you have too little content, you may be left with excessive white space. If there is too much content, it may not all fit within the browser screen area, forcing your users to scroll either horizontally or vertically.

If users will be printing the pages from your site, you must choose your page width so that it will look good on the printed page. We sometimes print out articles from online magazines and newspapers on A4 letter size paper, only to find out that the words along the right margin have been cut off! A common option is to provide a separate version of a web page for printing purposes.

Screen resolution refers to the total number of pixels used to render the content on a display monitor. This is specified by the number of pixels going horizontally and vertically along the screen. A higher screen resolution means there are more pixels available, which in turn means that a larger page size can be used. A higher screen resolution also means that users can see more of your webpage at a time.

Figure 7.4 shows the most common screen resolutions available and their share of total users. It also includes the recommended page sizes after taking away the space needed for the browser's menu bars and scroll bars (source: Web Page Design for Designers).

Table 7.2: Most Common Screen Resolutions Available and Their Share of Total Users

Screen Resolutions (width × height)	Percentage of Users	Recommended Page Design Size (width × height)
1024 × 768 (and above)	80%	955 × 600
800 × 600	14%	760 × 420
640 × 480	n/a	600 × 300

Although you cannot count on your users all viewing your website with the same screen size or resolution, you are advised to make your site look as good as possible on 1024 × 768 screen resolution, which is used by the majority of website visitors.

7.3.3 Organising page content

Now that you know how much space is available within your browser window, you can start laying out the structure and organisation of the individual web pages.

It is common practice to copy or adapt layouts that you have seen or admired on other websites. As you have seen from the section on Human Computer Interface Issues, this is because you want to offer a familiar and comfortable experience for your users. Do not be tempted to use an unusual layout just because you want to be different. You can make your design stand out from the crowd by using creative and eye-catching graphics instead.

Below is an example of a common layout that works well for many sites.

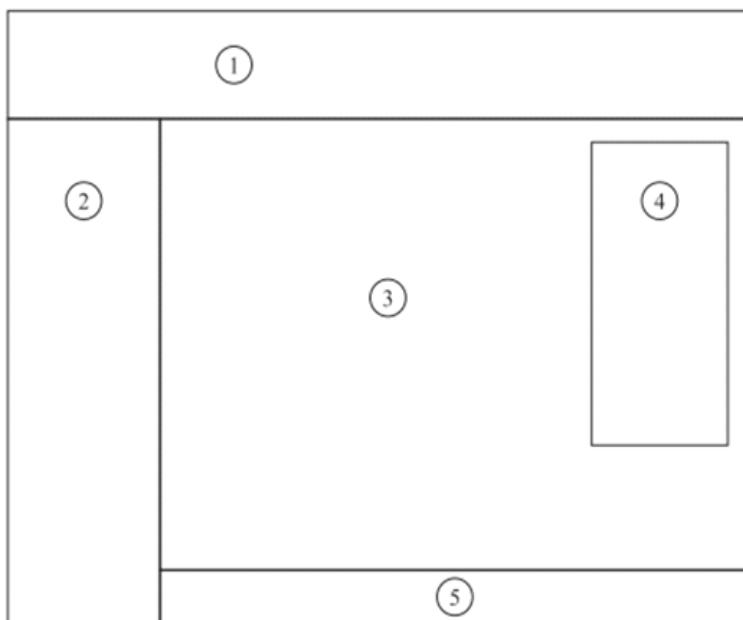


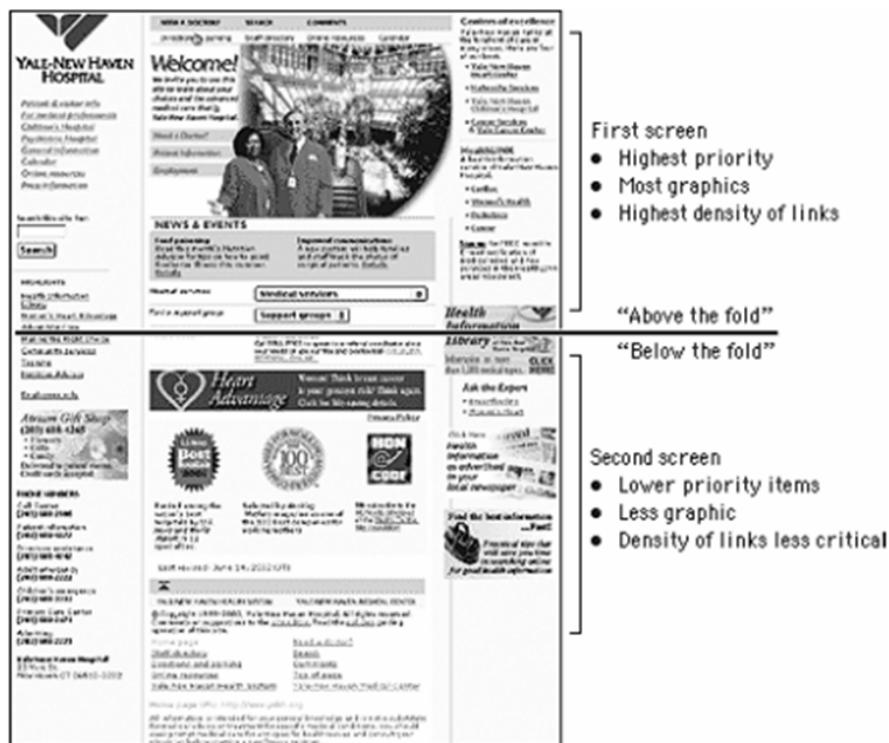
Figure 7.3: The Elements of a Common Web Page Layout

1. *Site identifier* - This can include your website's identifying features, such as a logo, tagline or banner. Pay attention to the height of this area; if it is too tall, your content will be too low on the screen.
 2. *Navigation* - The navigation bar exists to help visitors find content, so your navigation structure should be determined roughly by the information hierarchy laid out in your site diagram. The choice is basically between top and side navigation bars. Larger sites may need to use both the top and the side for navigation.

Table 7.3: Comparative Advantages of Top and Side Navigation Bars

Advantages of a top navigation bar:	Advantages of a side navigation bar:
<ul style="list-style-type: none"> • Can be easily seen • Leaves the full screen width for content • Can tie in with the site identifier 	<ul style="list-style-type: none"> • Supports as many navigation items as needed • Allows for longer item descriptions • Can integrate several layers of navigation as visitors delve deeper into the site

3. *The main content area* - This contains the page title, headings, text, and images. It is what your visitors actually come to see. When prioritising content on a page, make sure the most important information is shown above the page fold so that it can be seen right away. Notice the vertical structure of the homepage reproduced below. The top screen of information is much denser with links because it is the only area that is sure to be visible to all users.

**Figure 7.4: Designing Above and Below the Page Fold (Source: webstyleguide.com)**

4. *Secondary content* - On commercial sites, a secondary content area is often used for advertising. School sites often use an area like this for announcements, news, or related links. If your site is dense with information, you can designate this area of your layout space for news and advertising content. If your site does not need it, however, leave the space for your main content.
5. *Footer* - This section contains information about the page content, such as copyright, last updated date, security/privacy links, and the person who is responsible for maintaining the page. While necessary, this will not be the most crucial information for your visitors to see. A small footer is usually the best place for it. Use a smaller font size to set it apart from the body text.

7.3.4 Wireframes

You have already prioritised your page content and explored potential page layouts for your pages. Next, you need to lay out the various sections of the page by sketching the entire page on a sheet of paper.

Wireframes are 'non-design-oriented sketches of individual screens or pages in the site - showing rough navigation, text and graphic placement, header elements and footer text that might appear on a screen' (Macromedia Web Site Production and Management Techniques). They contain placeholders for the elements that will eventually go on your page, such as the page header, navigation bars, text, graphics, multimedia, and page footer. Since wireframes only focus on showing the position and relationship of page elements to each other, they do not include any visual design characteristics, such as colours, graphics or fonts.

Wireframes serve as a valuable communication tool between the project team members and the client. They are usually completed for the homepage, as well as sub-pages that contain similar content, placement and layout. They will provide the basis for the HTML page templates that will be produced later on.

7.3.5 Table-based page layouts

After your wireframes have been approved by the client, the next step is to build the page layouts in HTML format. These HTML-based layouts can be used as the building blocks for the page templates used to generate your web pages later on.

We will use HTML tables to create our page layouts in this section. Tables are mainly used to present tabular data, or data made up of rows and columns of repeating elements, such as a bus schedule or a price list. However, Web designers were quick to discover that they can also be used to create page layouts, since the rows and columns of a table can effectively act as container boxes for page content.



Figure 7.5: Table-based Page Layout

7.3.6 CSS-based Page Layouts

Back in Unit 1, you experimented with the use of CSS for formatting and changing the appearance of text on a page. Now we will examine the use of CSS for positioning the elements on a page.

Let us say you want to position a logo graphic exactly 20 pixels below the top margin and 20 pixels from the left margin of your page. By using only table rows and columns, it is impossible to specify the exact position of elements in this manner. However, this can be achieved using CSS-based page layouts.

A CSS-based page layout uses block elements instead of table rows and columns to lay out your pages. These block elements are enclosed using `<div>` tags instead of `<table>` tags. After you have positioned the CSS layout blocks on a page, you may assign properties to them, such as borders, margins, background colours, and so on. You may also assign their exact position relative to the top and left of the browser window.

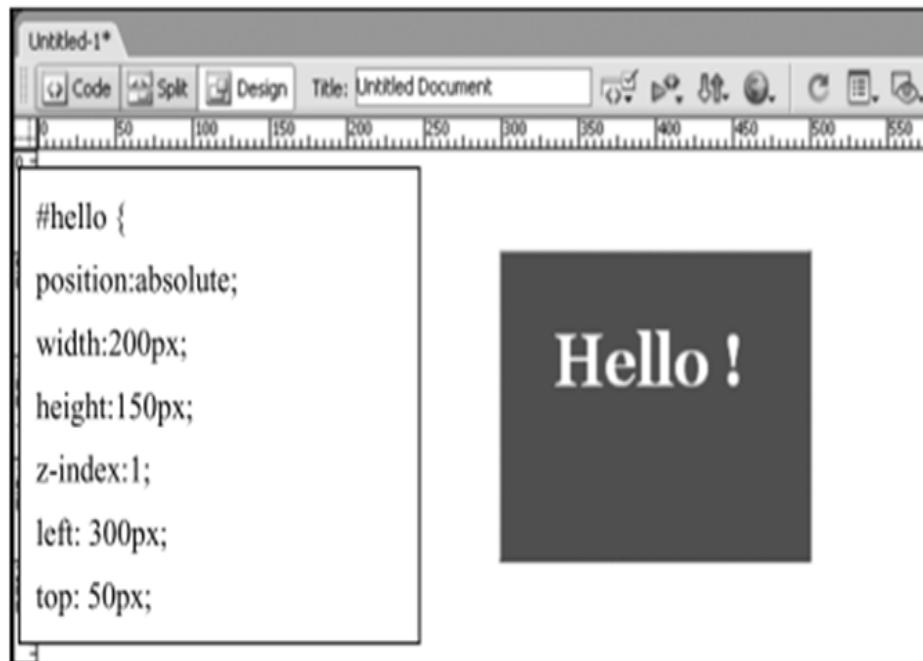
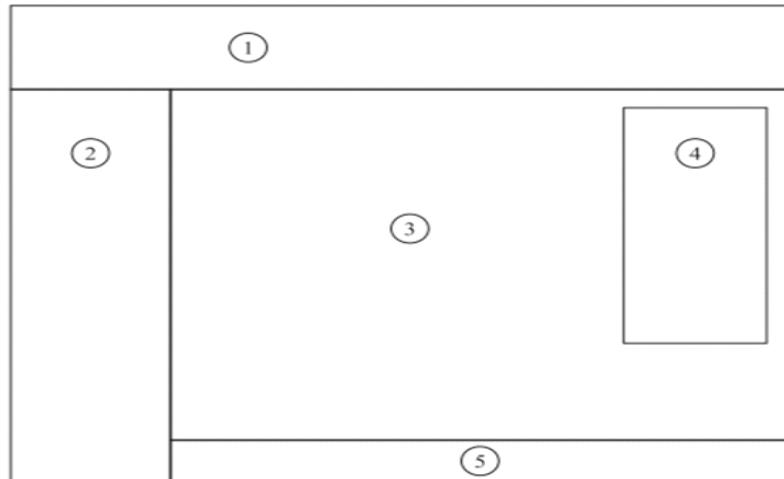


Figure 7.6: A CSS Layout Block which is Located 300 Pixels from the Left Margin and 50 Pixels from the Top Margin of the Webpage

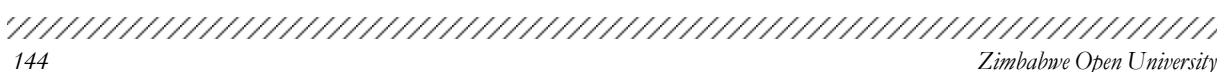
Dreamweaver uses the term 'layers' to refer to block elements that are positioned on a webpage using CSS. A Dreamweaver layer is simply a container that you can draw on a page, and then position anywhere by dragging it to the desired location. Dreamweaver will generate the <div> tag for each layer, along with the position attributes of each tag. You will place elements, such as graphics and text, into these layers later on.

Activity 7.6

- 1) In the layout below that what information do you think is best placed in each section



- 2) What do you understand by the term Resolution?
 - 3) How would it affect the design of a website?
 - 4) What is a wireframe?
 - 5) What does CSS stand for and how would you use them to implement a layout for a website design?
 - 6) Let us say you want to position a logo graphic exactly 20 pixels below the top margin and 20 pixels from the left margin of your page. Write the CSS code to achieve this.



7.4 Summary

Here is a summary of the steps we followed in this unit:

- ❖ Prioritise the page elements to be included on the homepage and on two major section pages.
 - ❖ Assign priorities and make sure each of them is tied to a website goal.
 - ❖ Create sketches with blocks for each of the major page elements, grouping items as needed. These sketches are known as 'wireframes'.
 - ❖ Determine page size to be used within the browser window.
 - ❖ Redraw the most promising sketches on pages that include the browser chrome (printed screen captures of a browser window) to help get the appropriate proportions.

References

- 'Adobe Web Tech curriculum', <http://www.adobe.com/education/webtech/toc.html>.
- 'Accommodating users from different cultures: guidelines for web developers',
<http://www.hcii.com/hcisite2/journal/Accommodating%20users%20of%20different%20cultures.htm>.
- 'A list apart', <http://www.alistapart.com>.
- 'Branding and visual identity', Monash University Web Style Guide, <http://www.monash.edu.au/staff/web/branding/index.html>.
- Concepcion, A-M. (2001). *Professional Web Site Design: From Start to Finish*. HOW Design Books.
- 'Consistent colors for your site - all you need to know about web safe colors',
http://www.webdevelopersjournal.com/articles/websafe1/websafe_colors.html.
- 'Current web style', <http://www.webdesignfromscratch.com/current-style.cfm>.
- Gailey, J. 'Building a web site from a prototype image file in Frontpage 2003',
<http://office.microsoft.com/en-us/frontpage/HA011957351033.aspx>.
- 'Introduction to Apple human interface guidelines', <http://developer.apple.com/documentation/UserExperience/Conceptual/>.
- MacDonald, N. (2003). *What is Web Design?*. RotoVision SA.
http://www.pebbleroad.com/article/creating_maintaining_a_web_style_guide/
- 'Page layout grids', http://www.adobe.com/education/instruction/webtech/CS2/unit_planning2/pd_page_layout_id.htm
- 'Piecing together the Web page puzzle: layout best practices', <http://office.microsoft.com/en-us/frontpage/HA010429391033.aspx?pid=CH063546291033>.
- Priester, G.W. (2000). 'Consistent colors for your site - all you need to know about web safe colors'. http://www.webdevelopersjournal.com/articles/websafe1/websafe_colors.html.
- 'Screen resolution and page layout', http://www.useit.com/alertbox/screen_resolution.html.
- 'Ten usability heuristics', http://www.useit.com/papers/heuristic/heuristic_list.html.
- 'The visual design of Web 2.0', http://f6design.com/journal/2006/10/21/the_visual-design-of-web-20.
- 'Web design from scratch', <http://www.webdesignfromscratch.com>.

- 'Web design', <http://webdesign.about.com>.
- 'Web page layouts shouldn't use tables', <http://webdesign.about.com/od/layout/a/aa111102a.htm>
- 'Where is the search? Re-examining user expectations of web objects',
<http://psychology.wichita.edu/surl/usabilitynews/81/webobjects.htm>.
- Will-Harris, D. 'Web type 101: a primer', http://www.efuse.com/Design/web_fonts_basics.html.
- Will-Harris, T. 'Background basics', <http://www.efuse.com/Design/backgroundbasics.html#miles>.
- Willard, W. (2001). Web Design: *A Beginner's Guide*. Osborne: McGraw-Hill.

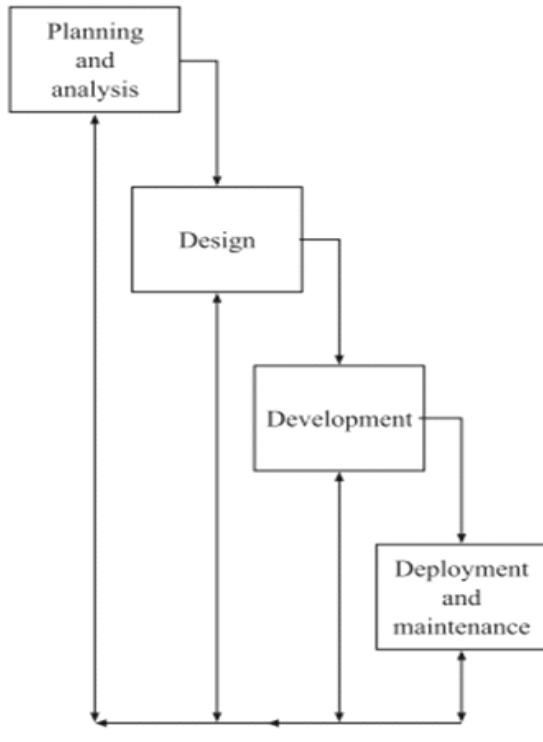


Page Layout Design

8.0 Introduction

Your outputs for this stage will include wireframes, webpage prototypes, HTML templates and the style guide which ties together all your visual design specifications in a single package. These outputs will then form the basis for the web pages that will be produced during the next stage - development.

Here again is the website design process diagram, highlighting the specific steps covered in this unit.



Tasks:

- 1 Prioritize the content of the site's homepage.
 - 2 Develop wireframe sketches of your homepage and major internal pages.
 - 3 Submit wireframes to client for feedback and approval.
 - 4 Develop HTML page layouts based on your wireframes.
 - 5 Design the visual interface of your pages — such as colour, graphics, typography and page backgrounds.
 - 6 Develop webpage prototypes of the homepage and major internal pages.
 - 7 Submit prototypes to client for feedback and approval.
 - 8 Document your outputs and design decisions in a style guide.

Figure 8.1: The Design Stage

8.1 Objectives

By the end of this unit, you should be able to:



- organise the different elements on the webpage effectively
 - combine the different elements on the webpage effectively
 - present the outputs of the page design process via mock-ups and page templates
 - differentiate between the use of tables and layers for positioning elements on a webpage

8.2 Page Layout Design

'Look and feel' refers to the overall visual style of a website. The Web is primarily a visual medium, and the user experience is strongly influenced by how a website 'looks' and 'feels' as the user interacts with it. Your initial sketches and wireframes only show the layout and placement of the content and navigation on the webpage. Once you are comfortable with this, it is time to dress up your layouts by adding the visual interface and design elements.

This section discusses the major elements that make up a website's look and feel: colour, images, backgrounds and typography. Developing the look and feel of a website is often referred to as 'art direction'.

8.2.1 Articulating a 'look and feel'

How do you best articulate a particular 'look and feel'? The following questions could help your clients articulate the look and feel they want for their site during the art direction process:

- ❖ Do you have existing design standards or style guides, such as logos and colours?
- ❖ What are some websites that you like?
- ❖ What do you like about them?
- ❖ Is this site going to be part of a larger group of sites with similar design standards?
- ❖ Do you have existing brochures, posters or other printed marketing material that can be used as a reference?

Keep in mind that the website should tie into the company's existing corporate identity. Most organisations already have a visual identity that is consistent throughout their publications, products, packaging and advertisements. Think of Microsoft, Apple, HSBC, Coca-Cola and Nike, just to name a few. Web designers should design the website's look and feel so that it helps build a coherent and recognisable corporate image or brand for their client.

Activity 8.1



- 1) Examine and describe the visual design theme used on the following websites.
 - a. Tate Museum (<http://www.tate.org.uk>)
 - b. Hewlett-Packard (<http://www.hp.com>)
- 2) How well does the visual design enhance the site content and presentation, and emphasise each organisation's corporate identity?

8.2.2 Using colours

Colours play an important role in setting the mood or theme for the whole website, in the same way they can influence the atmosphere within the interior of a house or building. For example, hospitals use soothing and neutral colours, while kindergartens use bright, warm colours. In the same way, you should choose colours that enhance the site design in a pleasant way.

Designers must find a good colour scheme - a set of colours which will produce the best impression on visitors. Most of the time, your client will already have a colour scheme as part of their design standards, and you simply need to work with what they give you. For example, ParknShop uses blue and white; Welcome uses red and yellow. IBM even named their chess-playing (and world-championbeating) computer 'Deep Blue' after their official colour.

You can also observe and learn how other websites make effective use of colour. Consider the qualities that are often associated with certain colours (Table 8.1). Choose the ones that evoke the appropriate emotion and mood from your site visitors. Also, do not forget the cultural sensibilities of your website visitors when making colour choices.

Table 8.1: Common Colours and Their Associated Emotions

Warm colours	
Red	passion, fire, love, energy, war, violence, aggression
Yellow	hope, light, energy, weakness, illness, cowardice
Orange	confidence, friendliness, cheerfulness, inferiority
Cool colours	
Blue	intelligence, reassurance, trust, patience, cooperation, depression
Green	health, growth, wealth, fertility, freshness, envy, greed
Purple	spirituality, mystery, creativity, royalty
Neutral colours	
Black	elegance, sophistication, evil, sadness, death (Western culture)
White	cleanliness, purity, spirituality, death (Eastern culture)
Grey	security, maturity, reliability, gloominess, sadness

Students often make the mistake of using too many colours on their site, sometimes even on a single page. Too many colours make it harder for users to locate the information they want. It is also more tiring on the eyes.

It is recommended that you use a primary colour, a secondary colour and a highlight or accent colour consistently throughout the entire site.

Activity 8.2



Choose your answers from the following colour schemes - analogue, complementary, split complementary, triad and monotone:

- 1) Which set of colours can be used to contrast and stand out from each other? When should you use contrasting colours?
 - 2) Which set of colours feel harmonious and blend well together?
 - 3) Which set of colours give you a balanced variety of colours?
 - 4) Why is it advisable to use warm colours for menu systems and cold colours for backgrounds?

Colours can be expressed as a set of RGB values, with each value ranging from 0 to 255. For example, the RGB code for white is R(ed): 255, G(reen): 255, B(lue):255. The RGB code for black is R(ed): 0, G(reen): 0, B(lue): 0.

We cannot use RGB values to identify colours on webpages, though. As you have already seen in the previous activity, we use hexadecimal code values. Hexadecimal colour codes contain three groups of hexadecimal (base 16) numbers. The first number stands for the amount of red, the second for the amount of green, and the third for the amount of blue.

Table 8.2: The Speedy Office Colour Scheme

#FF5200	#525759	#FFFFCC
R: 255	R: 82	R: 255
G: 82	G: 87	G: 255
B: 0	B: 89	B: 204

If you are developing your site using a software package, such as Macromedia Dreamweaver or Adobe GoLive, you can choose the colour you want from the palette and the software takes care of filling in the corresponding hexadecimal or base-16 value in the HTML. You can view the numeric equivalent of the colour you choose by viewing the HTML source or by positioning your mouse pointer over the colour selection box in your webpage design tool. The following figure shows the colour picker in Macromedia Fireworks.

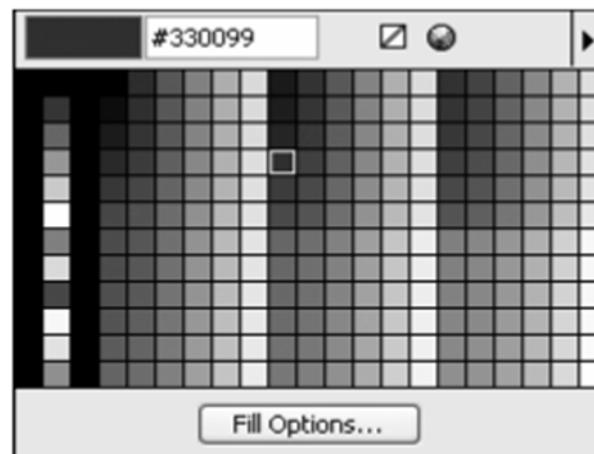


Figure 8.2: Colour Picker with Hexadecimal Colour Code

8.2.3 Web-safe palette

'Palette' is a term that you will encounter over and over again in Web design. A palette is just a set of colours. The colour picker (shown in Figure 8.3) that comes with Dreamweaver contains a ready-made palette of colours for you to choose from. In case you did not notice, the palette only contains 210+ colours. Why is this so?

Well, ten or more years ago, most computer monitors only used 8 bits to store colour information. The major reason for this was the high cost of video RAM (random access memory) needed to store this information. As a result, older monitors were only able to display a total of 256 or 28 different colours. Out of this set of 256 colours, only 216 colours were guaranteed to look the same on both the Windows and Macintosh operating systems, since these two platforms used 40 different 'reserved' fixed system colours (about 20 each).

This gave rise to the Web-safe colour palette, consisting of 216 colours that could be reliably displayed on any monitor and operating system combination. Designers had to stick to using the colours in this palette if they wanted their sites to look consistent under all viewing conditions.

If a colour outside of the Web-safe palette is viewed on an 8-bit monitor, the computer will try to render the unavailable colour using a technique called dithering. Using whatever available colours it has, the computer generates geometric patterns, like the ones shown here, to give the appearance of more colours.

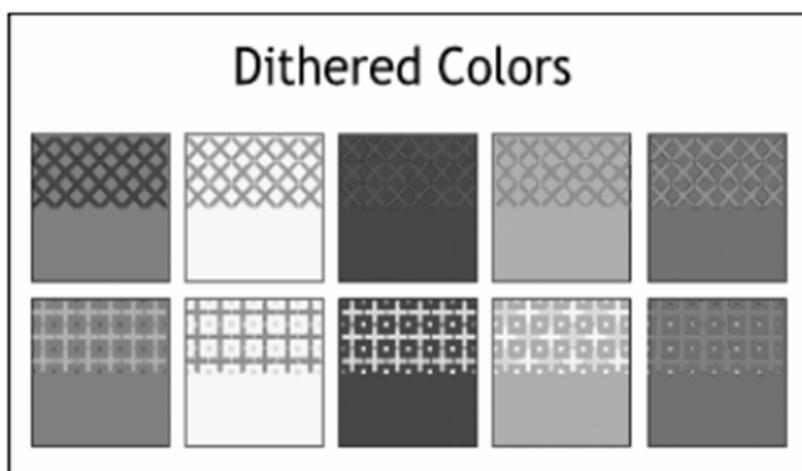


Figure 8.5: Dithered Colours (Source: Priester, 2000)

Some critics argue that the Web-safe palette is no longer relevant in today's world. This palette was defined in the mid-1990s when there were still significant numbers of 8-bit computer monitors in use. Nowadays, there are more and more users on 24-bit or 32-bit colour monitors, which are capable of displaying millions of colours.

Activity 8.3



- 1) Outline the stages involved in the web design process.
- 2) Explain what is involved at every stage of the development process.
- 3) How do you best articulate a particular 'look and feel'? What kind of questions could help your clients articulate the look and feel they want for their site during the art direction process?
- 4) What is dithering>

8.2.4 Graphic formats and styles

You will also be including images into your webpage prototypes as part of your visual design. Part of visual interface design involves choosing image styles which reinforce your client's brand and identity.

As an example, here are the image styles used on Monash University's website (from 'Branding and visual identity', Monash University Web Style Guide):

- ❖ 'Strong, single images should be used, not a collage.'
- ❖ 'A feeling of natural light and space should be present in the images.'
- ❖ 'Images should be fresh, high-quality and incorporate people wherever possible - do not use clip art or clip art-like illustrations.'
- ❖ 'Images should create a sense of confidence and optimism - avoid negative imagery.'
- ❖ 'Clean and natural images are preferred - avoid using coloured lighting or graphic design effects such as contouring and coloured backgrounds.'
- ❖ 'Images should convey some or all of the university's key brand attributes - international, influential, innovative, engaged, substantial, dynamic, broad, accessible and full of integrity.'

Image formats

Aside from deciding on and implementing a consistent image style in your Web interface, you should also be aware of the graphic file formats that can be used. The most common image formats used on the Web are GIF and JPEG, with PNG gaining in popularity.

- ❖ GIF (Graphic Interchange Format) is particularly effective for computer-generated images that have large, flat areas of a single colour. Logos, graphical text, computer illustrations and banner ads are well-suited to this format. GIFs are limited to just 256 colours. Using an animation editor, GIF files can be put together to form an animated image.
- ❖ JPEG (Joint Photographers' Exchange Group) is a better format for photographs and complex images that have many different kinds of colours. Unlike a GIF, a JPEG can support 16 million colours. It uses a 'lossy' compression technique that is meant to discard information that the human eye cannot see, resulting in a smaller image that has a lower resolution and, therefore, lower quality. Usually, the compression ratio is around 10 to 15, depending on the complexity of the image. This technique is fine for photographs, but not for simple graphics, which are better left as GIFs.
- ❖ PNG (Portable Network Graphics), pronounced 'ping', shares many of the characteristics of GIFs. PNG graphics were designed specifically for use on web pages, and were envisioned as a replacement for GIFs. While the use of the GIF format may require software vendors to pay a licence fee, the PNG format is patent-free. Although recent versions of popular browsers such as Internet Explorer and Mozilla Firefox have complete or partial implementation of the PNG format, GIF is still more widely used than PNG. PNG currently does not support animation, which GIF does.

You will most likely use either GIFs or JPEGs for your images. If you do your work in Macromedia Fireworks, you will see that it stores images in PNG format by default. You will export the PNG images to either GIF or JPEG to make sure they can be viewed on all browsers.

Now let us look for possible sources of graphics for your projects. Your client will usually provide you with graphics in either digital or hardcopy format. You may need a scanner to digitise printed materials or take photos with a digital camera. You could also acquire images from online graphic and stock photography websites. These sites allow you to search their image libraries for free. You pay only for the images that you wish to download.

Activity 8.4



- 1) Try locating and downloading some images you can use for your website projects from some of these websites:
 - a. Microsoft Office Gallery (<http://office.microsoft.com/>)
 - b. Stock.xchng (<http://www.sxc.hu/index.phtml>)
 - c. iStockPhoto (<http://www.istockphoto.com>)
 - d. DreamsTime (<http://www.dreamstime.com>)

When acquiring images for use in a commercial project, expect to pay fees. These fees vary according to the quality of the work and the type of licence granted.

Do include an acknowledgements page in your site structure that contains the URLs of any online sources for images, graphics or multimedia used in your project. For each URL, include a list of the items acquired and a brief description of each. This will allow your tutor to distinguish between the original content and adapted content included on your project websites.

8.2.5 Page background

Page backgrounds can also help set the mood for the whole website. Web pages generally feature three types of background: a solid colour, a textured colour or an image.

Activity 8.5



- 1) Create an index page for a site in your Web server.
- 2) Download an image of interest from the web to use as background image for the site.
- 3) View this image in your graphics editor, such as MS Paint, Fireworks or Photoshop. Note the width and height of this image.
- 4) Name the image and place it in the same folder as the index page you created.
- 5) Now modify the BODY tag of the index page as follows: <body background="myimage.gif"> where "myimage.gif" is the name of the background image.
- 6) Save your changes and view the resulting page in your Web browser. How is the background image displayed?

You may have noticed that a background image begins at the top of the page and repeats itself all the way until it covers the entire width and height of the Web browser window. This effect is called tiling. You can take advantage of tiling and cut down your background image size as much as possible to avoid a long download time. You should also make sure your background image is wide enough and tall enough so that the entire picture appears seamlessly, without any unwanted tiling (refer to the left thumbnail in the figure below).

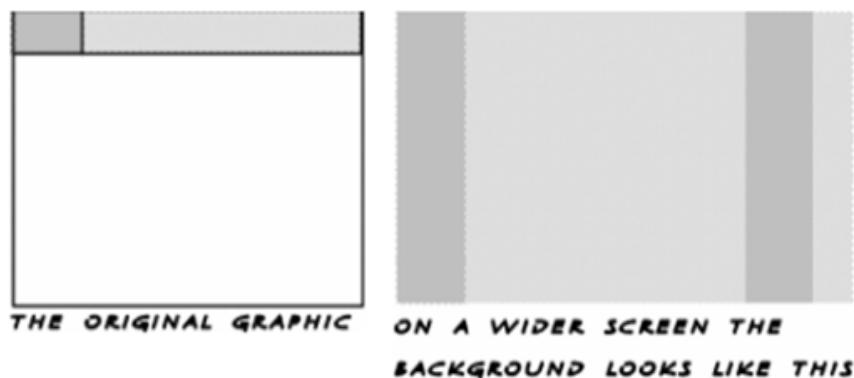


Figure 8.4: Effects of Background Tiling (Source: *Background Basics*)

Another issue to consider is the amount of contrast between your webpage background and foreground. Remember the ideas you have learned from the previous readings on colour theory. Avoid high-contrast backgrounds because they make it extremely difficult to read any text placed on top of them. It is always good to use a cold or neutral background colour since you don't want the background to be the most noticeable thing on a page. A light background colour with a darker text colour in the foreground is always a good combination.

Activity 8.6

- 1) Look at the contrast between the foreground and background colour on each row. Which row number has the most contrast? Which has the least?

	Foreground	Background
Our Menu for Today	#009900	#006600
Spring Roll	#0099FF	#000066
Fried Chicken	FFFF00	#FF6600
Mango Pudding	CCCCCC	#333333

Figure 8.5

- 2) Verify the results of your visual check by using the 'Colour Contrast Analyzer' tool from Juicy Studios.
<http://juicystudio.com/services/colourcontrast.php>
Enter the foreground (text colour) and background (cell colour) hexadecimal colour value of each row into the online form. The tool will evaluate whether the contrast is sufficient according to a formula suggested by the World Wide Web Consortium.
According to the online tool, which row number has the most contrast?
Which row number has the least contrast?

3) Download the file to your local drive. Improve the readability of the page by increasing the contrast or the difference between the background and foreground colours on each row. You may use solid background colours or background textures.

4) Choose the page background for your website projects using the concepts you have learned. Here is a suggested source of background images:

 - ◆ Background Image generator: <http://bg.siteorigin.com/>
 - ◆ Website background images: <http://all-free-download.com/free-vector/website-background-images.html>

8.2.6 Typography

The presentation and appearance of text on a webpage can significantly affect the overall user experience. When we read text on a page, our eye actually 'reads' the shape of words and phrases, rather than recognising individual characters. The shapes, designs, letter spacing, word spacing and line length of on-screen text all affect readability.

The following screen shots were taken from CSS Zen Garden (<http://www.csszengarden.com>). Notice how the typography blends in with the design theme and evokes different moods even though the text content remains the same.



Figure 8.6: From Top to Bottom, the 'Fall', 'Cinema' and 'Manhattan Edition' Design Styles from CSS Zen Garden (<http://www.csszengarden.com>)

Defining fonts

Now we will go through some terms that are commonly encountered when reading about typography. We will follow this up with recommendations on styling the text for your web pages.

A font refers to the face, style, size and colour of the type used on a computer. A font file refers to electronic files that contain typefaces. A single typeface is made up of the upper- and lowercase letters of the alphabet, the numbers zero through nine, punctuation marks, and special characters - all in a particular

style, such as Times New Roman or Arial (both standard fonts that come with Windows).



Figure 8.7: The Contents of a Font File

Typefaces belong to either one of two camps: **serif** and **sans serif**. A serif is the small crossbar or finishing stroke that ends the main stroke of letters. Sans-serif typefaces do not have this finishing stroke. In fact, the word 'sans' means 'without' in French.

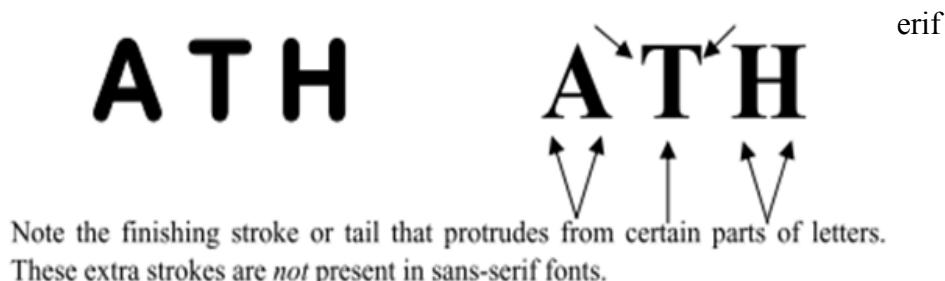


Figure 8.8: Sans-serif versus Serif Fonts

While you may never consciously notice the typefaces used on a webpage, they subconsciously affect the way you feel about the page. They can set the mood for the entire website as formal or casual, modern or traditional, serious or friendly, masculine or feminine.

A T H A T H Note the finishing stroke or tail that protrudes from certain parts of letters.

An online survey conducted by a US university confirms that users assign certain personality traits to onscreen fonts based on their design (Perception of Fonts, 2006). The participants in the study were asked to rate 20 font samples using 15 personality adjective pairs. The 20 fonts used in the survey were classified as serif, sans-serif, scripted/fun fonts, mono-spaced fonts and modern display fonts.

Here is a summary of the personality traits that users associated with fonts belonging to the same group.

Table 8.3: Personality Traits Associated with Various Fonts

Font groups	Sample fonts	Associated personality traits
Sans-serif	Arial, Verdana, Century Gothic	All-purpose: Did not score extremely high or low on any personality traits
Serif	Georgia, Times New Roman	Traditional: Stable, practical, mature, formal
Script/Funny	Comic Sans, Monotype Corsiva	Happy creative: Youthful, happy, creative, rebellious, feminine, casual, cuddly
Modern	Impact, Rockwell, Agency FB	Assertive bold: Masculine, assertive, rude, sad, and coarse
Monospaced	Courier New	Plain: Dull, plain, unimaginative, and conforming

The study also found that over 60% of users preferred sans-serif fonts and serif fonts for website text. You can mix up sans-serif and serif fonts in your pages in order to provide a contrast. In general, sans-serif is recommended for headings and other larger-sized text, and serif is recommended for body text.

The fonts mentioned in the previous reading are all used in graphical image files and rendered in either GIF or JPEG format. Browsers will faithfully reproduce any fonts that are embedded in an image file in this manner. However, it is a different matter for the fonts that are used to display the text within your web pages.

Just as there are 'web-safe' colours, there are also 'web-safe' fonts. These refer to the fonts that are installed and available on most of your users' systems, regardless of their operating system or browser. Table 8.4 describes the 'web-safe' fonts installed on most systems, along with their associated characteristics.

Table 8.4: Web-safe Fonts

Times New Roman or Times	This looks like something you'd see in a newspaper or magazine. It's specially hinted so it's easier to read on-screen.
Arial	This has a streamlined, more modern look, but isn't necessarily easy to read on screen because it's on the narrow side and can look very light in smaller sizes.
Verdana	An extremely easy-to-read sans-serif face that's included with Internet Explorer.
Comic Sans	This face is informal and friendly, but it may not be professional enough for some sites.
Georgia	This serif face is much easier to read on screen than Times New Roman because it was designed for the screen, whereas Times was designed for paper (in the 1920s!). Georgia has excellent italics that are easy to read and attractive.
Trebuchet	This is another screen-friendly sans serif face from Microsoft. It has more character than Verdana, but isn't quite as easy to read in smaller sizes.

Adapted from: Will-Harris, D 'Web Type 101, a primer',
http://www.efuse.com/Design/web_fonts_basics.html

As is the case for colours, Web design beginners sometimes end up using too many fonts on a single site. The general rule of thumb is to pick one or two fonts and use them consistently on all pages. Use bigger text sizes and styles for headings compared to body text. You may also use a different font and/or style for your navigation bar, to make the menu choices stand out more.

Page Title	Trebuchet 24-pt Bold
Subtitle1	Trebuchet 18-pt Bold
Body Text	Trebuchet 14-pt
Menu	Trebuchet 14-pt Bold

Figure 8.9: Using a Different Font and/or Style for Navigation Bar

The fonts and text styles used on your pages can be specified using HTML or Cascading Style Sheets.

Anti-aliasing

When you create text in a graphics editor, such as Macromedia Fireworks, Adobe Photoshop or Paint Shop Pro, you should be aware of when to use anti-aliasing and when not to. Anti-aliasing is a process used to smooth the edges of graphical text by adding additional pixels of colour around its edges. This will also result in a slightly larger file size.

The next figure shows the aliased and anti-aliased versions of the word 'Office'. Note the jagged and stair-stepped appearance of the edges of the aliased version (that is, the top one).



Figure 8.10: Aliased (top) and Anti-aliased (bottom) Text

Text created for the printed page is almost always anti-aliased for better readability. However, on-screen text is easier to read when it is aliased. Take a look at the text used in your operating system interface. Notice how the curved parts of the letters appear a bit jagged. Also note how small-sized text looks blurry when it is anti-aliased.

All text rendered by a Web browser is aliased by default and never has the smooth edges created by anti-aliasing. If you want to have anti-aliased text, your only option is to render it as a graphic.

8.2.7 Prototypes

You have already selected the most crucial visual design elements: colour scheme, typography, images and page backgrounds. Now it is time to submit your design approaches to your client for their feedback and approval.

Good Web design often involves several rounds of design presentations and modifications. Because of the amount of time, work and effort involved to produce web pages in HTML, it usually is not a good return on investment to present your work in this format so early in the Web design process.

Webpage prototypes are an efficient way to show your clients what the finished web pages might look like, without actually having to build them first. Prototypes are typically high-resolution image files which serve as pixel-by-pixel models of the pages as your users will see it. They are built by adding visual design elements to your wireframes, using graphics editing software such as Adobe Photoshop or Macromedia Fireworks. You may choose to skip this step for small projects. But for larger and more complex projects, building a computer-based prototype is often a time-saving step in building the site. Users will be able to give you more reliable feedback when they can see the web page rendered on a computer screen, closely approximating the final product.

Keep the following goals in mind when creating a prototype image:

- ❖ Prototype images should accurately reflect what end users will see. For example, use alias type settings for all browser-based text on your images and anti-aliased type settings for graphic-based text.
- ❖ The size of the prototype image should take into account the intended user's screen resolution. I set the height and width of my Speedy Office homepage prototype image at 955×600 pixels. The resolution should be 72 dots per inch.
- ❖ Make a note of the hexadecimal values for the colours used; also note the font families, sizes, and styles of text.

Most graphic editors let you add elements to a prototype image file in separate layers. This is a good practice when building your webpage prototype images. Keeping your page components in separate layers in the image file lets you adjust and modify each component independently of each other. When the design is complete, the layers can be collapsed into a flat file (usually JPEG format).

8.2.8 Templates

Once your users have signed off on the page prototypes, you are ready to move into actual production of the web pages and the elements that will go on the site. Before you start creating the pages, though, think about any elements that are used over and over again throughout the site, often showing up in the same location on every page.

A template is essentially a webpage that contains the pattern to be used by your final web pages. The page layouts that you created from your wireframes earlier in this unit can serve as the basis for your webpage templates.

You can now add the fixed or non-changeable portions elements to your page layout, such as navigation bars, footers, header and background images. You can leave blank, placeholder or dummy content in the changeable areas. The following figure shows a sample page template for the Speedy Office homepage. The changeable areas have been labelled with numbers.

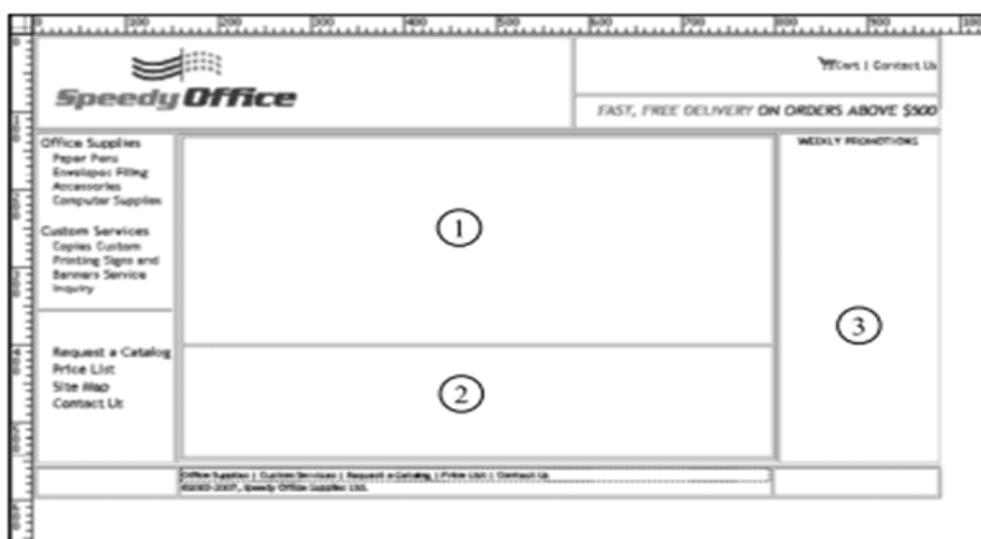


Figure 8.11: Sample Page Template with Fixed and Editable Regions

Templates offer a lot of benefits. They allow pages to be produced more efficiently because they serve as a starting point for creating new pages. Generating your pages from a template also ensures consistency in their appearance. If you are working with other team members on a project, templates allow for the separation of content, design and layout on a page, so that different members of the team are restricted to editing only those portions of the page that they are responsible for.

Dreamweaver allows you to create 'editable' regions within the template. When users build a webpage based on a template, they can only edit content within the 'editable' regions. This enables the template author to control which page elements template users - such as writers, graphic artists, or other Web developers - can edit.

One of the most powerful uses of Dreamweaver templates is the ability to update multiple pages at once. A document that is created from a template remains connected to that template (unless you detach the document later). Any modifications you make to a template will immediately be shown in all documents based on it.

8.2.9 Style guide

We are almost at the end of the design process. There is just one thing left to do - we need to gather all the outputs we have created so far and put them all into a single document called a style guide. A style guide gathers all the interface design outputs and decisions made so far. This includes the colour scheme, typography, site diagrams, navigation designs and any wireframes, page layouts and webpage templates.

To summarise, here is a checklist which can guide you in compiling your own style guides (adapted from Nichani, 2006):

- ❖ Information architecture guidelines (for example, wireframes and site diagram)
- ❖ Proper use of the company logo
- ❖ Colour palette
- ❖ Typography
- ❖ Image styles and formats
- ❖ Web accessibility guidelines
- ❖ Authoring guidelines (or how to write Web content)
- ❖ Page Templates
- ❖ CSS files used

8.3 Summary

I hope you had fun designing your web pages.

Here is a summary of the steps we followed:

- ❖ Decide on the visual design interface of your site. This includes decisions on colour schemes, typefaces, image styles and page backgrounds.
- ❖ Present your changes to the client using prototype images or directly in HTML.
- ❖ Make changes as necessary until you and your client feel the design is acceptable.
- ❖ Get your client to sign-off on the final designs.
- ❖ Create HTML-based page templates based on the approved designs for use in the next stage, development.

References

- 'Adobe Web Tech curriculum', <http://www.adobe.com/education/webtech/toc.html>.
- 'A list apart', <http://www.alistapart.com>.
- 'Accommodating users from different cultures: guidelines for web developers', <http://www.hci.com.au/hcisite2/journal/Accommodating%20users%20of%20different%20cultures.htm>.
- 'Branding and visual identity', Monash University Web Style Guide, <http://www.monash.edu.au/staff/web/branding/index.html>.
- Concepcion, A-M. (2001). *Professional Web Site Design: From Start to Finish*. HOW Design Books.
- 'Consistent colors for your site - all you need to know about web safe colors', http://www.webdevelopersjournal.com/articles/websafe1/websafe_colors.html.
- Gailey, J. 'Building a web site from a prototype image file in Frontpage 2003', Retrieved from <http://office.microsoft.com/en-us/frontpage/HA011957351033.aspx>. Accessed 14 March 2014.
- 'Introduction to Apple human interface guidelines', http://developer.apple.com/documentation/UserExperience/Conceptual/OSXHIGuidelines/XHIGIntro/chapter_1_section_1.html.
- MacDonald, N (2003). *What is Web Design?*. RotoVision SA.
- 'Macromedia website production management techniques', <http://www.adobe.com/resources/techniques/>.
- Nichani, M. (2006). 'Creating and maintaining a web style guide', http://www.pebbleroad.com/article/creating_maintaining_a_web_style_guide/. Accessed 13 March 2014.
- 'Piecing together the Web page puzzle: layout best practices', <http://office.microsoft.com/en-us/frontpage/HA010429391033.aspx?pid=CH063546291033>. Accessed 13 March 2014.
- Priester, G.W. (2000). 'Consistent colors for your site - all you need to know about web safe colors', Retrieved from http://www.htmlgoodies.com/tutorials/web_graphics/consistent-colors-for-your-site-all-you-need-to-know-about-web-safe-colors.html.
- 'Ten usability heuristics', <http://www.nngroup.com/articles/ten-usability->

- heuristics/. Accessed 13 March 2014.
- 'Web design'. <http://webdesign.about.com>. Accessed 13 March 2014.
- 'Web design from scratch'. <http://www.webdesignfromscratch.com>. Accessed 13 March 2014.
- 'Where is the search? Re-examining user expectations of web objects', <http://psychology.wichita.edu/surl/usabilitynews/81/webobjects.htm>. Accessed 13 March 2014.
- Will-Harris, D. '*Web type 101: a primer*'. http://maryfo.com/web_design.html. Accessed 13 March 2014.
- Willard, W (2001). *Web Design: A Beginner's Guide*. Osborne: McGraw-Hill.
- 'Dithering', <http://www.webstyleguide.com/wsg3/11-graphics/5-web-graphics-formats.html>. Accessed 13 March 2014.
- 'Web site style guide'. <http://www.fatpurple.com/2010/02/25/web-style-guide/>. Accessed 13 March 2014.