Web Usability Testing Guidelines – Incorporate Usability Testing Application

By

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Certification of FYP Dissertation Submission

Herewith I, Mohd. Amifarez B. Hamidun, 1822 certify that I am responsible for the work submitted in this project, and I have done all the modifications according to my supervisor's advice.

Thank you.

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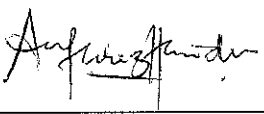
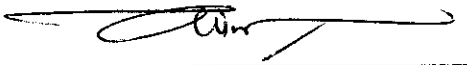
Signature		
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ABSTRACT

The prototype of web usability testing application is an application that will be used by the developer and evaluator to check and verify the usability of the corporate web pages or sites. The application will consist of usability test that will incorporate three main elements of web site; web design, web navigation and web functions. The first project objective is to help the web developer to ensure the usability of their web site by using the developed prototype. The next objective is to gather technical data or recommendations from the user to be incorporated in the prototype application. The technical data will represent the elements that most of users need in the web site.

The scope of this project is about identifying the usability components under the three major elements of web site which is web design, web navigation and web function. The compilation of the components will be the guideline incorporated in the prototype application. The prototype will be developed and used to test the usability of the web site. For the success of the project, the basic System Development Life Cycle methodology that is Waterfall Model will be used whereby it has five phases; planning, analysis, design, implementation and support. The product of the project will lead to build a prototype of web usability testing application that can be used throughout the web development process and to check the usability of the web from time to time.

ABBREVIATIONS

WUTA	Web Usability Testing Application
WWW	World Wide Web
W3C	World Wide Web
U3	Useful, usable and used
SDLC	System Development Life Cycle
VB	Visual Basic
B2B	Business to Business
B2C	Business to Customer

CHAPTER 1

1.0 INTRODUCTION

Usability testing is an iterative process to determine the fit of the design for the proposed customer. This type of testing is typically performed in a laboratory where a customer interacts with some form of the product: web site prototype, design mock-up, simulation, or product. Usability testing should be part of a usability process and instead, usability testing should occur throughout the product life cycle. But, nowadays most of the web sites do not follow the usability guidelines and there is a misconception of usability occurred.

On the Web, usability is a necessary condition for survival. If a web site is difficult to use, people will leave. If the web site fails to clearly state what a company offers and what users can do on the site, people will leave. If users get lost on a web site, they will leave. If a web site's information is hard to read or doesn't answer users' key questions, they will leave. There are plenty of other web sites available; leaving is the first line of defense when users encounter a difficulty.

According to Jordan (1998), usability is a quality attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process. Usability has five quality components:

1. Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design.
2. Efficiency: Once users have learned the design, how quickly can they perform tasks
3. Memorability: When users return to the design after a period of not using it, how easily can they reestablish proficiency.
4. Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors.
5. Satisfaction: How pleasant is it to use the design.

1.1 Background of Study

The purpose of this project is to perform a research of usability testing concepts, dimensions and procedures in developing an effective web site. The research will be based on the three web elements; web design, navigation and function. The finding of the research will be compiled in a prototype of web usability testing application (WUTA).

Under the three web elements that will be used as the gist of research, there will some other components. The first one is web design, web navigation and web function. Under the web design element, a study will be done to the content of the web, relevance and usefulness of the specific content and the appropriate language and tone. The consistency of web design and layout also will be discussed along with the selection of fonts, text size, colors and images. A study about web users and goals, site owners and objectives also will be done.

Another web element that will be studied is about the web navigation. Under this element, all matters about internal / external links, information architecture, searching and using search results, understanding labels, links and icons will be discussed in details.

The last element that will be studied is about the web functions along with user option (e.g. printing), user expectation and satisfaction and use of conventions.

1.2 Problem Statement

For the corporate web sites, usability can increase the traffic and conversion rates. In other words, it is a driving force a new business at increasing revenues. It also can be the competitive advantage for the company and improve the productivity. Besides reducing errors, training and support cost, usability can improve the risk management and reduce the development cost of the web site. Basically, there are a lot of web usability guidelines that can be used as a "road map" to ensure that the development of the web meets the goal and satisfies the user. But, the misconception about usability made by most of the

web sites is they are developed without following these guidelines. Besides, the usability guidelines those are available nowadays just a written guidelines and no unique application that can be used to test the web before or after the user get through it. The lack of usability on the web will make the user leave the site and the company will lose the potential customers. Jakob Nielsen (2000) stated as the first law of e-commerce, if users cannot find the product, they cannot buy it either.

1.2.1 Problem Identification

According to Jakob Nielsen (2000), in his web site www.useit.com, most of top companies do not give much concern about usability guideline in developing their web site. From the research, 10 most violated web usability guideline are firstly emphasize what the web site offers that's of value to users and how the services differ from those of key competitors.. Secondly, use a liquid layout that lets users adjust the homepage size. Use color to distinguish visited and unvisited links. Next, it is the usage of graphics to show real content, not just to decorate the homepage. Include a tag line that explicitly summarizes what the site or company does. Make it easy to access anything recently featured on the web site. Include a short site description in the window title. Next, do not use a heading to label the search area; instead use a "Search" button to the right of the box. No other useful options to the user on the web page and lastly do not include an active link to the web site on the page.

1.2.2 Significant of the Project

From my opinion, the usability of a web site should be evaluated at different stages during the development process. Problems should be rectified at the stage they are identified since it is nearly always more expensive and inconvenient to fix them after a site is completed and launched. The usability of an existing site should also be evaluated regularly to ensure that it is still capable of meeting the needs of all users.

The prototype of web usability testing application (WUTA) will be the output of the project and significantly it is the opportunity to the web developer to do the usability testing conveniently. It is suggested that the usability testing is done to their web site after

some percentage of completion during the development process and after the web site has been deployed. Because of the WUTA is incorporated with the usability guidelines for the web site, both of the developer and user can determine the "level" of web usability and make any changes where needed.

1.3 Objective and Scope of Study

1.3.1 The Relevancy of the Project

According to Nielsen and Norman (2000), studies of user behavior on the web find a low tolerance for difficult designs or slow sites. People don't want to wait. And they don't want to learn how to use a home page.

Based on the fact above, it shows a simple consumerism that if the site is difficult to use, people will abandon the site and move to a competitive site that is easier to use, regardless of how many "wiz-bang" functions the site has. Users aren't interested in the site; they're interested in getting their work done! The web site is a means to an end, and if the journey is difficult, users will find another path. By focusing on the usability characteristics, the web developer will ensure that the site meets the end users' requirements, in a satisfactory manner.

1.3.2 Objectives

The first objective of the project is to do a research about the usability testing concepts, dimensions and procedures in developing an effective web site according to the three web elements; web design, web navigation and web function. Next, the objective is to identify the good approach in testing the usability of different web sites especially the corporate web site. The last objective of the project is to develop a prototype of a web usability testing application (WUTA) that can be used throughout the development phase and after the site has been deployed.

1.3.3 Scope of Study

1.3.3.1 Research Elements

The project research will be based on the three web elements that will be the web design, web navigation and web function.

Under the web design elements, the research will be done about the usable web site content. It means, it will cover from the selection of information, language and its tone. Web content is important because it shows the purpose and objective of the web site. From the design and layout, the user can determine the formality of the web and image will be the medium to strengthen the information relevancies.

Besides, web navigation will comprise the information architecture including the internal and external linkage. With proper understanding of labels, links and icons, user will achieve their goal easily. The research also will be done on the accessibility of the web site according to the World Wide Web (W3C) standards.

Under the element of web function, the research will be done on the importance of other options in the web site like printing option, feedback section and search function. The user expectation and satisfaction of using web site also will be researched and identified.

1.3.4 Feasibility of the Project within the Scope and Time Frame

According to the three main scopes of study that this project has to complete, it is strongly believed that the objectives of the project to come out with proper guidelines of web usability testing and the web usability testing application is possible within the time frame. Refer to appendix for the Gantt chart.

CHAPTER 2

2.0 LITERATURE REVIEW

According to Lesley Ammon (Spring 2000), large-scale websites (e.g., online stores, company intranets, informational sites) are frequently confusing, frustrating and difficult to use by the very audiences the sites are intended to serve. Some experts refer to this as the U3 problem because these obstacles can significantly reduce the degree to which a website is "useful, usable and used.

According to Jakob Nielsen's Alertbox, (2003), sites are getting better at using minimalist design, maintaining archives, and offering comprehensive services. However, these advances entail their own usability problems, as several prominent mistakes from 2003 show.

2.1 The Importance of Web Site

According to James Hobart (1990) the World Wide Web (WWW) has become a very popular means for publishing information. A large number of information repositories (Web sites) already exist and new ones are being created at a very rapid rate. Most of the pages on WWW repositories provide elements that allow users (readers) to interact with them. Thus, the people designing pages for the WWW are actually designing user interfaces.

2.2 The Outcomes of Poor Design

The proliferation of pages with poor usability suggests that most of the designers of WWW pages have little knowledge of user interface design and usability engineering. This is a serious problem that needs to be addressed since pages with poor usability can have the following negative effects such as user frustration that caused by not being able to find the information sought, disorganized pages and confusing information, pages

under construction and disconnected links, the lack of navigation support, and other problems. The discourage exploration is the barriers imposed in the poorly designed interface and the user's lack of trust or faith on the site will discourage further exploration of the site. Lacks of good design is a waste of time whereby the disorganized pages, misleading link names, long pages, and long download times results in large amount of wasted time for the users. The increase of internet traffic also affect the use of a particular site and also responsible for a large unnecessary traffic on the Internet.

Web pages with poor usability can also have negative effects for the site owners. It could result in a reduction of visits to the site, negative feedback from frustrated users, and a negative image for the site. Thus, from all points of views, it is very important to develop practical methodologies for designing usable Web pages.

2.2 Characteristics of Web Usability Tests

According to Michael D. Levi and Frederick G. Conrad (1991), web usability testing is a method for assessing the ease with which web sites are learned and used. The underlying model for virtually all usability tests is that real users carry out real work with a web site. The important concept is that in usability testing, users are asked to do something realistic with a web site, and to do enough of it to approximate the experience they would have with the real site in the real world. This is a key difference between web usability testing and other forms of user input.

A second important characteristic of web usability testing is that it generates quantifiable data. For example, usability testing can tell the users how long it takes, on the average, for users to perform typical tasks or reach particular usage goals with the site or page. This measure, called Time on Task, is frequently used as a yardstick for both the intuitiveness of a user interface and the efficiency with which the site is used.

Other types of quantitative measurements capture how users evaluate the web site subjectively, such as how the site made them feel and whether they believed it was simple or complex. A third type of data comes from direct observations of user behavior

made by a trained usability research team during testing. When catalogued, these observations provide data which point to specific features of the user interface that made a task take longer or a web site be perceived as more difficult than others.

A third and very important characteristic of usability testing is that it propels everyone on the web developer team to agree on what is meant by "usability." Without this sort of definitional framework, usability remains an opinion-based, ambiguous concept that is often not defined or measured at all.

2.3 The Importance of Usability Testing

According to Jeffrey Rubin (1994), "Usability" refers to the following kinds of problems such as the difficulties difficult for customers to find the information they need because it takes too many "clicks". Customers are forced to wait too long for the information they need and they become impatient or lose their train of thought. Customers are having a hard time navigating the site; they cannot find what they need. Customers are not able to do what have been designed the site to do.

A recent Internet study reveals why usability is so important and it shows more than 83 percent of Internet users are likely to leave a website if they feel they have to make too many clicks to find what they're looking for. Many usability problems stem from the fact that the global Internet which extends right to the customer's desktop has severe limitations and was not really designed as a commercial-quality medium.

The design of websites must address these real-world issues such as the Internet data speeds are variable. Customer computer speed may be slow; the web pages may form slowly. Screen resolution and contrast are poor. Browser window size is smaller and software is difference in terms of browser incompatibilities. Competitive websites set the standards and limitations in the abilities of the potential customers.

2.4 The Importance of Usability Review

According to the Department of Information and Design, at www.infodesign.com.au (1998), the Usability Review is also known as 'Heuristic Evaluation'. It is a technique for identifying usability issues. A Usability Review is cheaper to conduct than formal usability testing and it can be completed in a very short period. It also can be conducted at any stage of the design.

A Usability Review is particularly appropriate if an application has a large number of serious usability problems, or if an application is not sufficiently matures for usability testing with real users in a hostile environment, a Usability Review is open to the accusation of being only one opinion against the opinion of others. In such circumstances, consider usability testing instead.

To conduct the Usability Review at least two people should independently review the application, to maximize the number of issues identified. In general, avoid being given a walk-through of the application before beginning, as it is best to approach the task with a fresh and un-biased viewpoint. However, the person who conducted the usability test should know the purpose of the application, the characteristics of the intended users and their levels of domain knowledge. The principles of usability review include:

1. Navigation
2. Functionality
3. Control
4. Language
5. Feedback
6. Consistency
7. Error handling
8. Visual clarity.

In order to report the findings, the acknowledgement of the positive aspects of the web under review is ensured and remembers that some developers may be hostile to or upset by the findings. Give careful and reasoned comments. Provide clear recommendations. Decide whether the application can be 'patched', or whether more fundamental changes are required. The first part of the report should summarize the findings. Do not expect all developers to have time to go through the issues in detail. For a sample report, see appendices.

CHAPTER 3

3.0 METHODOLOGY / PROJECT WORK

3.1 Procedure Identification

The methodology being used for developing this project as well as the prototype of Web Usability Testing Application (WUTA) is System Development Life Cycle (SDLC). The word 'cycle' in traditional SDLC refers to the natural tendency for system to cycle through these activities; planning, analysis, design, implementation and support.

The advantages of this methodology are:

a) High structured, deliberate "step by step" development approach comprised of established phases and tasks.

b) Provides systematic and iterative approach that includes milestones and deliverables after each project phase – this ensures that the project does not move to the next phase without completing the first phase.

c) Methodical approach ensures that "the system that was specified in the analysis phase is actually delivered in the implementation phase" – high systems quality.

3.2 The Waterfall Model

For the success of the whole project development, Waterfall Model is being used. It is the earliest method of structured system development. Although it has come under attack in recent years for being too rigid and unrealistic when it comes to quickly meeting customer's needs, the Waterfall Model is still widely used. It is attributed with providing the theoretical basis for other process models, because it most closely resembles a 'generic' model for software development.

3.2.1 The Development Steps

System Conceptualization: It refers to the consideration of all aspects of the targeted project function or objective, with the goals of determining how each of those aspects relates with one another, and which aspects will be incorporated into the prototype application. During this stage, the Author did all the feasibility studies including defining the problem statement.

Systems Analysis: During this step Author did all the gathering of project requirements, with the goal of determining how these requirements will be accommodated in the prototype application. Extensive communication between the prospect user and the Author as a developer is essential.

System Design: Once the requirements have been collected and analyzed, it is necessary for the Author to identify in detail how the prototype application will be constructed to perform necessary tasks. More specifically, this phase is focused on the data requirements or what information will be processed in the system, the software construction or in other words it shows how will the prototype application be constructed, and the interface construction.

Coding: Also known as programming, this step involves Author into the creation of the prototype application software. Requirements and systems specifications from the System Design step are translated into machine readable computer code.

Testing: As the prototype application is created, testing is performed by the Author to ensure that it is working correctly and efficiently. Testing is generally focused on two areas: internal efficiency and external effectiveness. The goal of external effectiveness testing is to verify that the prototype application is functioning according to system design, and that it is performing all necessary functions or sub-functions. The goal of internal testing is to make sure that the computer code is efficient, standardized, and well documented. Testing can be a labor-intensive process, due to its iterative nature.

3.3 Required Tools

3.3.1 Software Requirement

In order to develop this project, the Author will use the Microsoft Visual Basic 6.0 to be the tool to build the prototype application of Web Usability Testing Application (WUTA). All the interfaces and codes will be developed through Visual Basic 6.0 platform. Wise for Windows Installer Installation System ver.4.2 will be used to develop the EXE extension file for the WUTA installation purposes. The Microsoft Internet Explorer 6.0 is a web browser that will be incorporated in the WUTA to view the web site.

3.3.2 Hardware Requirement

The operating system that will be used for the WUTA development is Windows XP Professional Edition. The standard Multimedia Personal Computer with the capabilities of 15 inch (1024 x 768 resolutions) monitor, 384 MB Random Access Memory (RAM), 20GB Hard Disk and Intel Pentium III 866 MHz processor will be used as the workstation for the development.

CHAPTER 4

4.0 Result and Discussion

4.1 Results and Findings

This is the critical and the most important part in the project where all the hypothesis, research works and prototype of the application will be presented. Since the objective of the project is to develop the usability testing application, all the findings about usability issues will be discussed in this section. The discussion will include the web design, web content and web function approach. The sources of collecting data and information including the internet research, reference books, journals, research papers and opinions from the usability experts.

The main focus of the research is at the corporate web site because the usability of a site will drive more potential customers to it. There are four type of user; Personal B2C, Corporate B2B which this is the frequent customer, Corporate B2B which is the permanent customer and Web Guest which is the normal user that seldom visit the web site.

4.1.1 Data Gathering and Analysis

4.1.1.1 Failure of Corporate Websites

On the average, the Web doesn't work: when the potential customer thinks of something to do on the Web, the expected outcome is that it will fail. Some recent data to support this claim: In Jared Spool's study of 15 large commercial sites users could only find information 42% of the time even though they were taken to the correct home page before they were given the test tasks. A study from Zona Research found that 62% of Web shoppers have given up looking for the item they wanted to buy online and 20% had given up more than three times during a two-month period.

Forrester Research audited 20 major sites, finding 51% compliance with simple web usability principles such as whether the site is organized by user goals or not and whether

does search list retrievals in order of relevance or not. In other words, the average site violated half of these simple design principles.

Despite these miserable statistics, users do benefit from the Web since they spend most of their time on the good sites. But the odds are against them when they want to try something new. And the odds are against any company that wants to put up a website. In some estimation 90% of commercial websites has poor usability.

For the report, Forrester interviewed 25 executives in charge of various companies' Internet efforts. Most had very few design goals for the site, though 56% did mention 'fast performance' as a goal. 24% of sites conducted usability testing. This data implies that 3/4 of large sites are managed without any usability data: essentially poking blindly into the design space.

As the impact on the company, Forrester estimates several costs of bad Web design. The two most striking are: loss of approximately 50% of the potential sales from the site as people can't find stuff losing repeat visits from 40% of the users who do not return to a site when their first visit resulted in a negative experience.

4.1.1.1.1 Fixing the Problem

The most dramatic fix suggested in the Forrester report is to close down sites that are so bad that they damage the reputation of the company. In most cases, various improvements are possible, at costs that are estimated from a few thousands dollars for removing link rot to half a million for advanced solutions. Even the high-end solutions are cheap compared to the estimated cost of having a bad site. The report predicts that Web solutions agencies will soon include usability engineering as one of their core offerings. The Author definitely agrees, though the Author also thinks that the client needs to take an active role in auditing the usability of the deliverables.

Clients should insist on usability testing of all Web designs: The quality of the proposed usability process is one of the few ways a client can judge the quality of the end result

while still in the proposal stage. A proposal without usability engineering milestones or with poorly defined or misguided methodology will result in a poor site most of the time.

4.1.1.2 Criteria for Optimal Web Design

The organization of information within websites is vital to its overall usefulness. In fact, a study by Morkes and Nielsen (1997) found that their experimental website scored higher in usability when text was written concisely (58%), easily scan able (47%), written in an objective instead of a promotional style (27%), than web pages in their control condition.

That is, viewers tend to move quickly from page to page. Instead they usually scan for information that is of direct interest to them. Accordingly, it is suggested that text should be very succinct, include only one key idea per paragraph, use highlighted keyword or phrases, and use bulleted lists when possible.

4.1.1.2.1 Web Links

Users have grown accustomed to looking in certain areas on a screen to find specific items (Bernard, 2001). Analyzing users' expectations of where they expect specific web objects to be located revealed that generally:

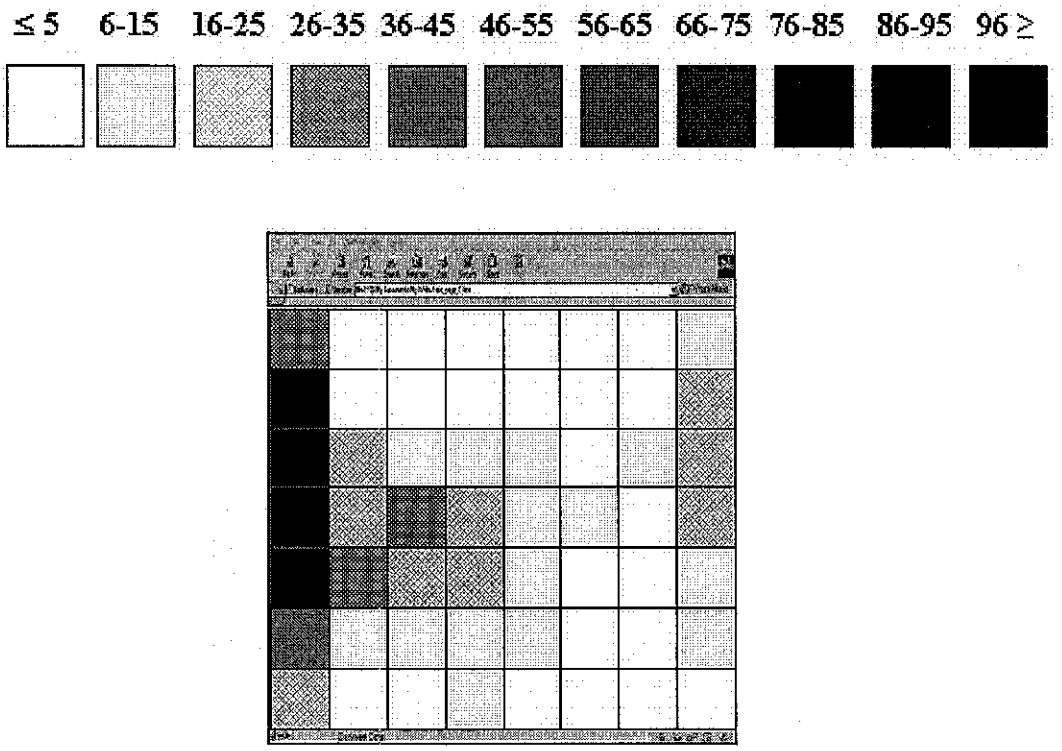

Figure 1. Location for internal web page links

Internal web links were expected to be located on the upper left side of the browser window (Figure 1).

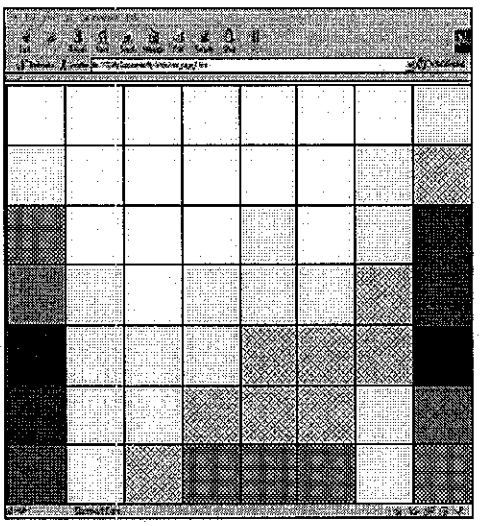

Figure 2. Location for external website links

External web links were expected to be located on the right side or lower left side of the browser window (Figure 2).

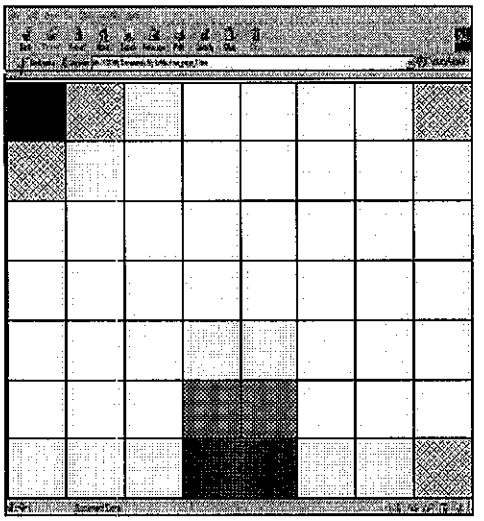

Figure 3. Location for "back to home" link

The "back to home" link was expected to be located at the top-left corner and the bottom-center of the browser window (Figure 3).

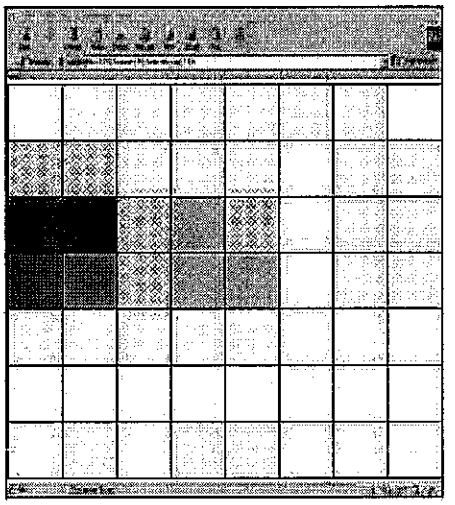

Figure 4. Location for links to merchandise items

Links to specific merchandise items were expected to be located at the left upper-center of a web page (Figure 4)

4.1.1.2.2 Web Buttons and Other Objects

In follow-up study (Bernard, 2002) that analyzed participants who bought at least one item online revealed that:

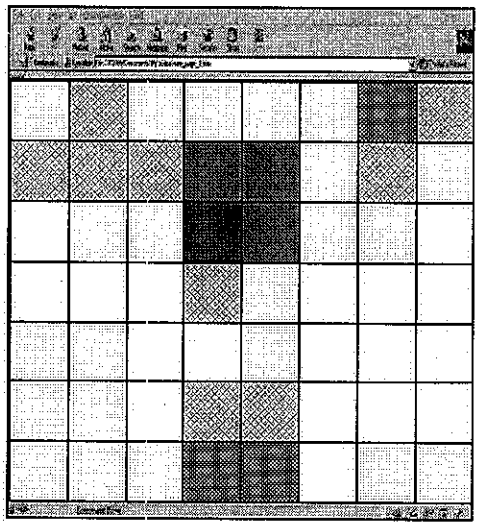

Figure 5. Location for internal search engine

The internal search engine was expected to be located at the top-center of the screen (Figure 5)

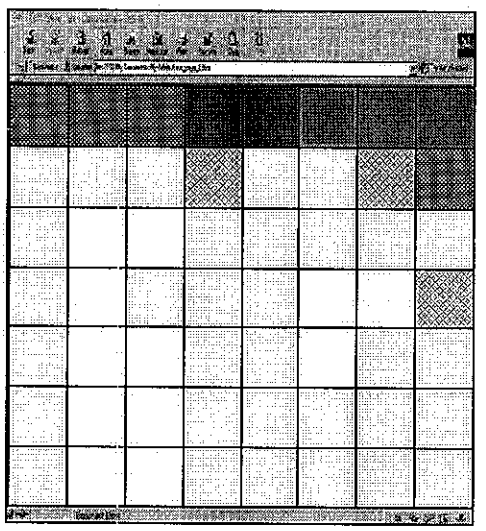

Figure 6. Location for advertisement banners

Advertisement banners were expected to be located at the top of the browser window (Figure 6).

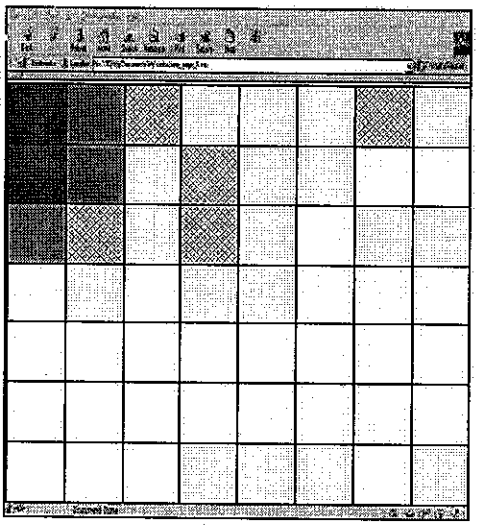

Figure 7. Location for the login/register button

The login/register button was expected to be located at the upper-left corner of a web page (Figure 7).

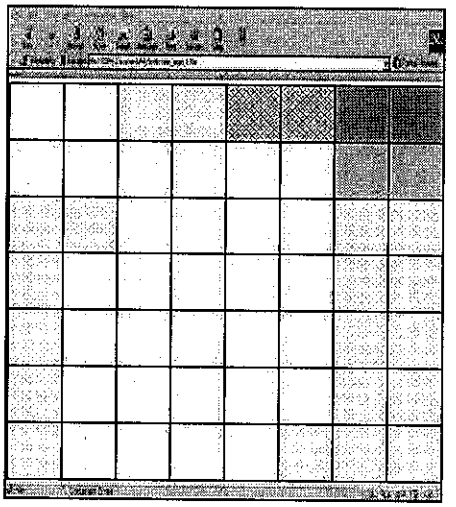

Figure 8. Location for the shopping cart (basket) button

The shopping cart (basket) was expected to be located at the top-right corner of a web page (Figure 8).

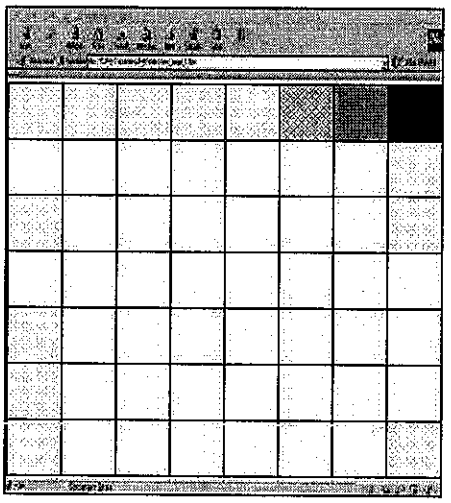

Figure 9. Location for the help Button

The help button was expected to be located at the upper-right side (Figure 9).

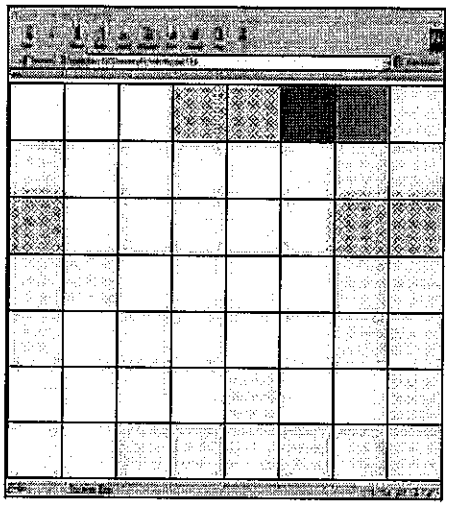

Figure 10. Location for the account/order button

The account/order button was expected to be located at the upper-right of a web page (Figure 10).

4.1.1.2.3 Web Views

Users often miss important pieces of information simply because it is not seen. This often occurs because they forget or are unwilling to scroll in a particular direction especially horizontally, and thus do not see the information that is located outside of the primary viewing area. To reduce this problem, important website information should always fit within the typical horizontal viewing area of the screen. To do this, the rule is still to design for lower resolution settings. According to real-time analysis of Web surfers by MyComputer.com, 800 x 600 currently is the most frequently used computer screen resolution.

The actual usable size to avoid any scrolling at this resolution is 595 x 295 pixels and the safe width for printing at this resolution is 535 pixels. Most users however have their resolution set at 800 x 600 (31%). To avoid scrolling here, the usable size is 750 x 425 pixels. A compromise would be to place the most important information within areas that are visible at lower resolution settings, while placing less important information in areas visible at higher resolution settings.

In addition, when users do scroll, they may not see the information because it is placed in a typically low information-priority area, such as the bottom of a page (Nielsen, 1999) or placed in an area where users typically would not expect it to be placed.

4.1.1.2.4 Fluid Layouts

Fluid layouts are significantly preferred to both centered and left-justified layouts. In a study by Bernard and Larsen (2001) participants indicated they perceived the fluid layout which the margins are not fixed at any particular width as being the best suited for reading and finding information, as well as having a layout that is most appropriate for the screen size neither both small nor large screens. They also indicated that the fluid layout looked the most professional, and consequently preferred it to other layout conditions. Conversely, the consistently least preferred condition was the left-justified layout. A possible reason for the lack of preference for this layout is that users had to

horizontally scroll in order to see all the information on the page. As discussed above, users particularly dislike to horizontally scrolling.

4.1.1.2.5 Link with Summaries

Links with summaries are perceived as the most usable and are preferred to links without summaries. A study by Baker, Bernard, and Riley (2002) found no statistical differences in search time across conditions with links with summary, links only, and full text. However, the summary condition was perceived as being the easiest in finding information, being visually pleasing, promoting comprehension, users' satisfaction with the site, and looking professional. The summary condition was the most preferred, while the full text condition was the least preferred. The full text condition was perceived as being most difficult to find information, not promoting comprehension, not being visually pleasing, and not being satisfying.

Users reported that they preferred the summary condition over the links only condition because the brief summaries accompanying the links often guided them to the information they were searching for. They commented that, in the links only condition, they sometimes felt as if they were "jumping blindly" into the article. Several users also reported that they did not like having to scroll through all of the articles in the full text condition. This study suggests that providing a small amount of information about an article on a page is superior to having long, scrolling pages filled with articles.

In presenting a list of links, it is best if they are bulleted. For instance, as discussed in Usability News, the comparison of the accuracy rates for three link conditions: bulleted links, space between the links, and a no bullet/no space condition. It was found that the accuracy rate was 100% for bullets, 89% for spaces, and 67% for no spaces.

Most users preferred either the bullets or spaces; no one preferred the zero space condition (Spain, 1999). In support of this, Parkinson, Sisson, and Snowberry (1985) found that menus with spacing were searched 25% faster than menus without spacing.

4.1.1.2.6 Web Layout

Much has been said about the design process of websites, such as establishing the proper mood or "feels" to create user interest or even excitement with the site. This is a very important concern, but ultimately users tend to be far more satisfied and stay with websites that are designed for their use in mind Tedeschi, (1999). Considering this, three core principles concerning interface design are presented:

1) Keep the interface simple - To quote Mies van der Rohe, "less is more." Organize the interface by reducing un-needed visual elements as much as possible. That is, remove all unnecessary visual "noise." This will make the important objects that are there stand out even more. Moreover, as Edward Tufte stated, 'it is not how much space there is, but rather how it is used and it is not how much information there is, but rather how effectively it is organized' Tufte, (1990,). The use of open space is generally more effective in organizing and grouping information than using imposed, artificial structures such as visually nested frames or bars. It is also more aesthetically pleasing. In fact, we found empirical support for the notion that the proper use of open space can increase satisfaction with a website Bernard, Chaparro, & Thomasson, (2000).

2) Make action-objects visible - According to Donald Norman, a design should

a) Make it easy to determine what actions are possible at any moment

b) Make things visible, including the conceptual model of the system, the alternative actions, and the results of actions

c) Make it easy to evaluate the current state of the system. On a web interface, one of the chief mechanisms to do this is the proper use of perceived affordances (Norman, 1988).

An affordance refers to the "properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used". Affordance provides us with clues as to the operations of things. More importantly for interfaces, however, are the perceived affordances which provide visual feedback that advertise affordances. For example, a link button may be perceived to afford clicking because of its '3-D' or 'raised' appearance. Consequently, it is often helpful to give link buttons the physical appearance

of a button, or any object that affords clicking, in order for them to be seen as a button to be clicked Norman, (1988). Thus, it is important to make navigation buttons look like they should be clicked as well as follow the convention of underlining links when they are text-based links. Conversely, non-navigation objects should not look like they could be clicked in order not to 'trick' the user into thinking they are links.

Generally, buttons serve as primary object for initiating actions, such as submitting or confirming information. Buttons also can act as the primary link for movement to other web pages, usually within the same website. When this occurs, text-based links often serve as a less important, secondary or supplemental link for the buttons. Normally, however, text-based links are the primary link to other internal web pages.

Moreover, physical appearance of objects such as icons can significantly affect navigational performance. For example, Rogers (1987) found that icons with abstract but simple symbols that represented concrete objects resulted in the fewest number of errors and requests for help. In addition, Byrne (1993) found that large and simple icons outperformed complex ones by a significant margin. Byrne suggests that icons need to be simple, large, and easy to discriminate in order to be effective. Complex icons tend to clutter the screen with unnecessary information. Moreover, Norman (1985) suggests that icons are best used to represent graphic tools and objects. Verbal labels, such as "to save" are best for formal commands.

3) Balance and unify the interface - Balance and unity has always been a key component in good design. Humans on a preconscious level seek structure in the things they see. If there is no intentional structure, we will impose our own. Seeking the appropriate balance among things, as well as unifying those things that are related will generate structures that are not only pleasing to the eye, but will make the interface more understandable Mullet & Sano, (1995, for an excellent discussion on design and visual interfaces). Empirical studies have supported this claim by finding that the position within a plane as well as size and contrast to be one of the most perceptually important variables in visual search tasks Cleveland, (1985).

One of the fundamental concepts of balance is the notion of the Golden Section. The Golden Section is a ratio of a rectangle in which the smaller side to the larger is the same as that of the larger to the sum of both -which is a ratio of approximately 0.618 to 1.000 or a standard 8.5 x 11 page. Examples of the Golden Section are almost ubiquitous in art as well as in nature from the Parthenon to a nautilus shell. A web page that structures its graphical layout according to this ratio will look more appealing and will have a greater impact than other ratios, such as a ratio of 1 to 1.

Also, when placing several objects on a web page, one should take into account the "visual mass" of these objects neither its size nor presence. For example, ideally the placement of objects should be positioned in the same way as balancing solid objects on a fulcrum. That is, a larger object should be placed closer to the center of the screen to offset the smaller object(s). This will create equilibrium between the objects, and will be more appealing Tufte, (1990).

The unity of the interface is important because it has the potential to link concepts and objects together that belong together. For example, Wickens (1986) compatibility of proximity principle states that tasks that necessitate mental integration of information should be in close proximity. However, tasks that require focused attention on specific variables will be harmed by this close proximity. This can be applied to things such as the organization of links. For instance, care should be made to group links that belong together, as well as separate those that do not belong.

Ngo and Byrne, (2001) have taken this notion several steps further by identifying characteristics that define an aesthetically appealing interface. Of the 14 characteristics identified, balance, equilibrium stability, and sequence (shown in Figures 11 - 13) scored high in aesthetic correspondence.

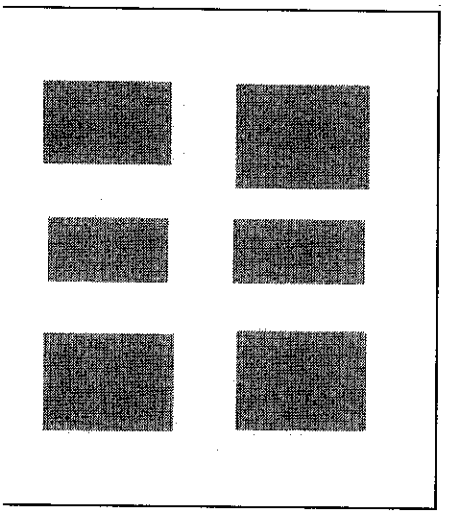

Figure 11a.

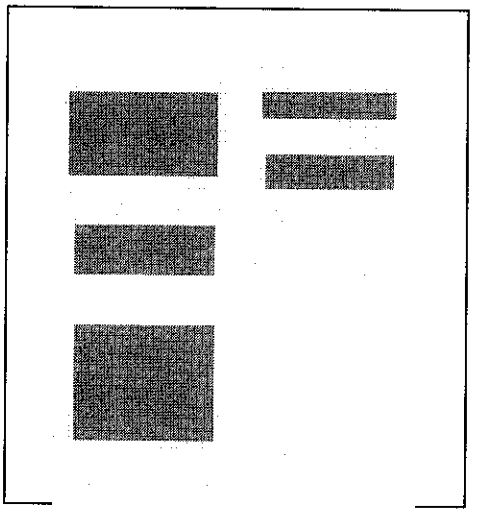

Figure 11b.

Figure 11 is an example of a well balanced (a) and poorly balanced (b) interface.

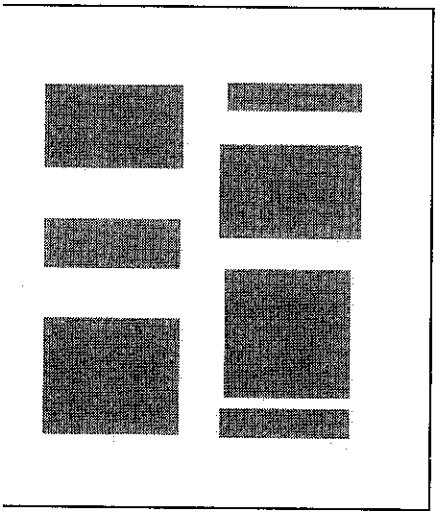

Figure 12a.

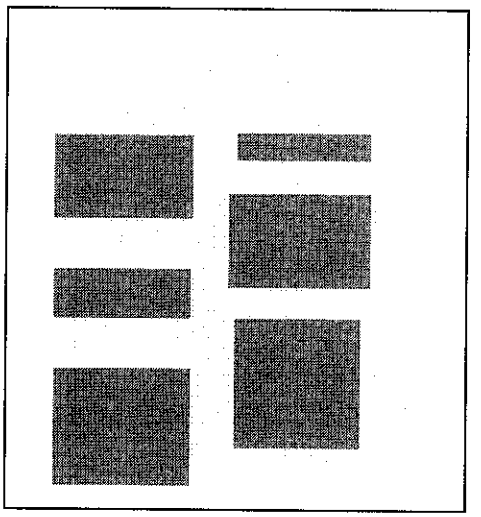

Figure 12b.

Figure 12 is an example of a interface with stable (a) and unstable (b) screen. Equilibrium consists of the general centering of the interface itself to make it a stable arrangement.

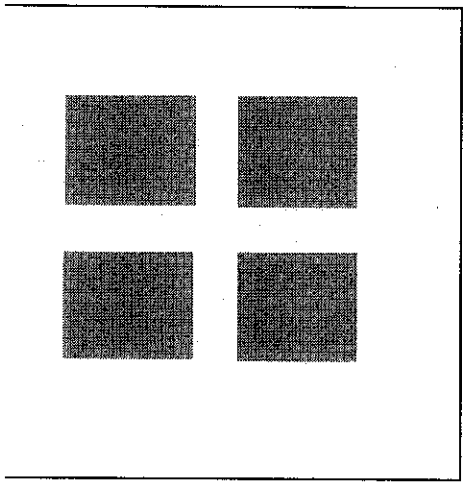

Figure 13a.

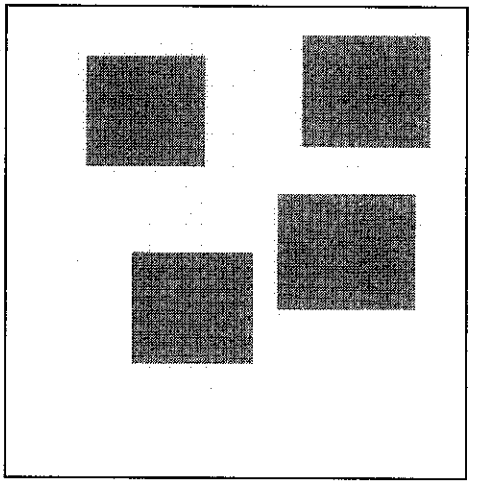

Figure 13b.

Figure 13 is an example of a interface with a sequential (a) and non-sequential (b) screen.

Measuring subjective differences between well and poorly balanced interfaces, Brady and Phillips (2002) found no statistical differences in user satisfaction, suggesting that user satisfaction is related more to successful navigation than aesthetic appearance. However, both Brady and Phillips, and Tractinsky (1997) indicated that participants did perceived aesthetically pleasing sites as having a higher degree of usability.

Be aware of Fitt's Law - Formally, it states that pointing time is a function of the distance and the width of a target (Fitts, 1954). Generally speaking, it states that the smaller and farther away an object is, the longer it will take to reach that object. Several researchers have argued that important buttons should be placed on the right side of the screen because the mouse arrow pointer is usually resting next to the scroll box, and thus it would take less time to click the object. However, what is important here is that knowledge that if there are several different buttons that need to be clicked in succession, the smaller and the farther apart they are; the longer it will take to click them.

4.1.1.3 Web Graphics

Users often may "instinctively" ignore the graphics that are presented on a website. For example, according to the Poynter Institute, users are twice more likely to fixate on text than on the images in their initial visit to a site. In fact, they found that users did not look at the images until the second or third visit to the site. This effect has been found to have the greatest impact on effectiveness of banners. For instance, the Poynter Institute found that only 22% of ads and promotional icons were viewed, 45% of the banner ads presented were viewed, and 64% of photos that were presented were viewed (Poynter.org, 2000).

To determine where users generally expect them to be located on a typical web page, 304 participants were examined. It was found that they expect ads to be located at the top-half of a web page. As seen in Figure 14, the darker shades of blue indicate higher expectations for them to be located in that particular area.

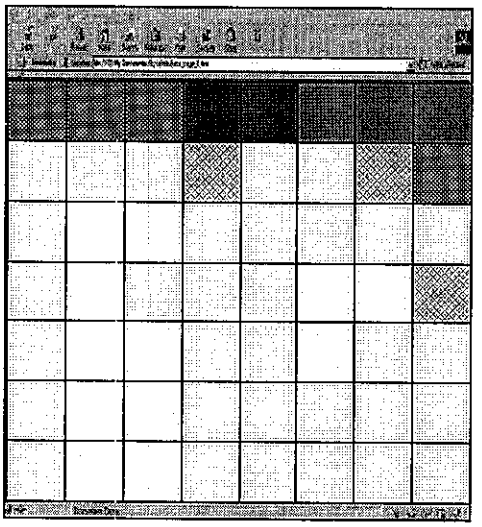

Figure 14. Where people expect ads to be located. The darker the shade of blue, the greater the expectation.

However, an important factor in increasing the effectiveness of banner ads may be to place them where they are generally not expected, since people tend to ignore these areas. That is, it is possible that ads may be more effective if they are placed in an area where they are generally not anticipated. This is because individuals may tend to ignore areas where they believe advertisements are typically placed. Supporting this argument, Benway (1998) found that banners located at the top of a web page tended to be ignored more often than banners located lower down on the page. Another study found a higher click-through rate for advertisements placed 1/3 of the way down the page as opposed to the top of the page (WebReference.com, 1997). Thus, it is generally recommended to place ads lower down on the web page - particularly at the middle-center of the page.

Benway and Lane (1998) also found that participants identified graphical banners only 58% of the time, compared to 94% for the text-based link alternative. It also took more time to find the banners than the text-based links. Interestingly, Benway's (1998) study also showed that extremely colorful and obvious banners tend to be ignored by users. Reasons for this may be that viewers have learned to ignore these types of graphics.

Another consideration is the type of browsing that is taking place. According to a study by Pagendarm and Schaumburg (2001), recall and recognition of banners were higher when viewers were browsing aimlessly than if they were searching for specific information. Thus, it is possible that with aimless or unstructured browsing which is often done with online magazines, viewers are more prone to perceive banners and respond to them.

In addition, banners should be much larger than the surrounding text for viewers to initially notice them. In fact, Faraday (2001) found that if the size of the text and image is approximately equal, then the text will be attended to first and will be more preferred.

It should be noted that graphical images can easily be distracting and may increase load time, which is the greatest complaint of Internet users (GVU, 1998). However, it has been shown that visual information such as graphics is generally more persuasive for simple

messages than textual information, while textual information is more persuasive for more complex messages by King, Dent, & Miles, (1991).

Animating the graphics may not help as well. In a study by Benway and Lane (1998), animated graphics showed no advantage over non-animated graphics. Moreover, there is some evidence that animated graphics may even reduce text retention by serving to distract the user from attending to the textual information around the graphic by Wright, Milroy, & Lickorish, (1999). Studies have also been mixed about whether animated graphics are preferable to only text-based interfaces. It has been suggested that animated graphics should be kept at a minimum in order not to distract the user from the main points of the page, as well as to reduce the download time.

Importantly, graphics that look like banners should normally not serve as important links. This is because users tend to ignore animated graphic because they are generally associated with advertisements. The graphics that are presented should convey a simple message to portray the intended mood of the site or to catch the 'eye' of the user for a brief moment. Any animation that is presented should animate only for several seconds in order not to annoy and distract the user.

Colored images are more easily remembered than black and white images. That is, Gilbert and Schleuder (1990) compared black and white to colored ads and found that the colored ads were more readily recalled and were processed with greater speed.

4.1.1.4 Web Fonts and Text

Evidence suggests that the most commonly used fonts tend to be equally legible at the 10-, 12-, and 14-point size. Comparing four sans serif fonts (Arial, Comic Sans MS, Tahoma, and Verdana) and four serif fonts (Courier New, Georgia, Century Schoolbook, Times New Roman) at a resolution of 1024 x 768 revealed no difference in effective reading (font accuracy/speed of reading) between font types (Bernard, Lida, Riley, Hackler, & Janzen, 2002). This finding is supported by Bernard, Mills, Frank, and McKown (2001), which did not find significant differences as well.

This is not to say there are no objective differences between the fonts. In fact, there is some evidence that suggest that some serif fonts promote better comprehension than some sans serif fonts. For example, a study by Boyarski, Neuwirth, Forlizzi, and Regli (1998) found small but significantly higher levels of comprehension for the Georgia font over the sans serif font Verdana by people reading on a computer screen. However, it is really too early to draw any definitive conclusions from this. Studies need to further examine the effect of different fonts on reading comprehension.

Significant differences in reading time were found in that Times New Roman and Arial were read faster than Courier New, Century Schoolbook, and Georgia. Fonts at the 10-point size were read more slowly than fonts at the 12-point size. The average difference between the fastest and slowest read font was 99.4 seconds.

Ten-point Tahoma was perceived as more legible than 12-point schoolbook. In addition, 12-point Verdana and Courier were significantly perceived as being more legible than 10-point Comic, Schoolbook and Verdana. Also, 12-point Courier was perceived as more legible than 12-point Schoolbook and Tahoma, as well as 14-point Comic. Interestingly, 10-point Georgia had a significantly higher perception of legibility than 12-point Tahoma and Schoolbook. Fourteen-point Arial was perceived as being more legible than14-point Comic, and 10-point Arial was perceived as more legible than 12-point Tahoma. Moreover at the 14-point size, only Arial was significantly perceived as being more legible than fonts at other sizes (10-point Schoolbook and Comic). Overall, Arial and Courier were considered the most legible fonts, whereas Comic was perceived as the most illegible font.

Overall analysis of the participants' font preference revealed that Times was significantly less preferred to all fonts except Schoolbook. Schoolbook was significantly less preferred to Verdana. Overall, Verdana was the most preferred font, while Times was the least preferred font.

For anti-aliased fonts, Arial may be the best font choice. Comparing aliased and anti-aliased Times New Roman and Arial fonts at 10- and 12-point sizes found that the 12-

point anti-aliased Arial font tied for second in preference, as well as being judged as the third to most legible font presented by Bernard & Mills, (2000). The 10-point Times New Roman font was not ranked first or second by any participant.

However, one should use caution in creating anti-aliased text that is based on a graphical image, such as with a JEPG or GIF, because they are "fixed" at a particular font size that may be too small to be read by a certain population of users for example the vision impaired. It is therefore recommended that text which cannot be size-adjusted because it is part of an image and it should be at least 3 mm in height. In addition, all graphics should make use of the alternative text function (alt=" ") so that users who cannot see the text images can have the text image descriptions presented or read to them by a text reader.

Older adults are more accurate with, and prefer larger font sizes. They also prefer sans serif fonts over serif fonts. As discussed by Bernard, Liao, and Mills (2001) reading online documents about 2 pages, older adults significantly preferred the larger, 14-point font size. In this study, serif fonts (Georgia and Times New Roman) were compared to sans serif fonts (Arial and Verdana) at 12- and 14-points. The 14-point fonts were found to be more legible, promote faster reading, and were preferred to the 12-point fonts. Also, at the 14-point size, serif fonts tended to support faster reading. Examining participants' 1st and 2nd preference choice further shows the popularity of the 14-point size.

The sans serif fonts were, however, generally more preferred than the serif fonts. This finding is supported by Sorg (1985), which found that older adults preferred to read Helvetica, which is a sans serif font similar to Arial, compared to Century Schoolbook, which is a serif font.

There is evidence that children prefer sans serif fonts (Arial & Comic) over serif fonts. For instance, Bernard and Mills (2001) found that fourth and fifth graders (mean age of 10) significantly preferred the 14-point Arial and the 12-point Comic Sans MS font over the 12-point Times New Roman and Courier New fonts. Examining participants' 1st and 2nd preference choice further shows the popularity of the Comic font. No difference in

reading speed or accuracy between the font types was found, however. This may be due to the fact that 12-point font sizes and above tend to produce the same level of performance, as long as the font types are designed for legibility.

The optimal text line length is dependent upon several factors. It is commonly recommended that shorter line lengths about 11 words should be used in place of longer, full-screen lengths. This is because longer line lengths require greater lateral eye movements, which make it more likely to loose one's place within the text (Horton, 1989; Mills & Weldon, 1987). It also has been pointed out by Horton (1989) that longer line lengths are more tiring to read. Horton recommends that lines should be limited to lengths of around 40 to 60 characters, which is approximately 11 words per line. A study by Huey (1968) tends to support this in his finding that shorter line lengths or approximately 4" (10 cm) are more accurate on the return sweep than longer line lengths. Moreover, Gregory and Pouton (1970) state that people with poor reading ability performed better when the line length was approximately seven words. This suggests that young readers who have not mastered reading online, as well as readers who have vision deficits, may be most benefited by having shorter line lengths.

As far as reading time, a study by Youngman and Scharff (1999) found that with 0.5 inch margins, the fastest reaction times were for the shorter, 4-inch (10 cm) lengths over the 6- and 8-inch lengths (15 and 20 cm, respectively). The 4-inch lengths were also preferred over the other lengths. However with no margin widths, the 8-inch line lengths had the fastest overall reaction times. A study by Duchnicky and Kolers (1983), found that full screen lengths resulted in 28% faster reading times over lengths of 1/3 of a screen. It was also found that full and 2/3 screen lengths were read significantly faster than the 1/3 screen lengths.

In a recent study by Bernard, Fernandez, and Hull (2002) that compared three links lengths (24.5, 14.5, and 8.5 cm, respectively) for both children and adults supported the finding that shorter line lengths are preferred more than full-screen line lengths. As far as the perception of reading efficiency, the results were mixed. For adults, the full-length condition was perceived as providing the optimal amount of scrolling in comparison to

the two other conditions, presumably because this condition required the least amount of scrolling. The narrow-length condition was perceived as promoting the highest amount of concentration, while the Medium-length condition was considered to be the most optimally presented length for reading.

Overall these results suggest a trade-off between faster reading times of the longer lengths and a more preferred reading arrangement of the shorter lengths. Possibly the best arrangement is somewhere between the two. More research needs to be done, however.

Background textures and colors can affect the readability of text. For example, Hill and Scharff (1999) found that plain backgrounds produce faster search times than medium textured backgrounds. An important determinant, though, is the contrast between the text and the background; the more textured the background, the greater the contrast should be between them.

Moreover, textured backgrounds that are subtle at true-color (24-bit) settings, often become very noticeable at lower-color settings for example, 8-bit, thereby reducing the contrast between the text and the background even further. Thus, if one is to use a textured background, it is recommended to be very careful by testing it in different color settings.

As for color, as long as there is sufficient contrast between the text and the background, many color combinations are possible. However, most studies have shown that dark characters on a light background are superior to light characters on a dark background when the refresh rate is fairly high. For example, Bauer and Cavonius (1980) found that participants were 26% more accurate in reading text when they read it with dark characters on a light background. Moreover, a survey by Scharff, et al. (1996) revealed that the color combination perceived as being most readable is the traditional black text on white background. However, it is common for websites to have an off-white background in order to reduce the flicker and glare associated with white backgrounds.

In the Scharff et al. (1996) study, other color combinations that ranked high were white on dark blue and red on yellow. However, one should be cautious in using colors such as red on yellow that are pure or 'saturated.' Saturated colors create visual fatigue and make it difficult to focus on the text. It is best to de-saturate colors by adding white or combining them with other colors.

The least readable combination was green on yellow, white on fuchsia, red on green, and fuchsia on blue. Also, for all combinations, the lighter backgrounds with darker text were considered to be more readable than darker backgrounds with lighter text.

Approximately 8% of males and a little less than 0.5% of females have a color deficit of some kind. In fact, one study found that around 4% of Internet users are visually impaired in some way (GVU, 1998). Thus, it is important to note that different font sizes and font color combinations can have a dramatic effect on the readability of a site.

For text colors, it is important to have a good contrast difference between colors that need to be distinguished. Some color combinations generally frustrate users and make it virtually unreadable for color deficit or "colorblind" users (Nielsen, 1996). That is, for many color deficit users, red, green, brown, or purple may look the same if these colors have the same contrast. Since color deficit users cannot distinguish between a large spectrum of colors, it is therefore advised to strongly contrast the colors (make sure one color is darker than the other) between the foreground and background, as well as between other colors that need to be distinguished (Wolfmaier, 1999, for a good description of the proper font-color mixture).

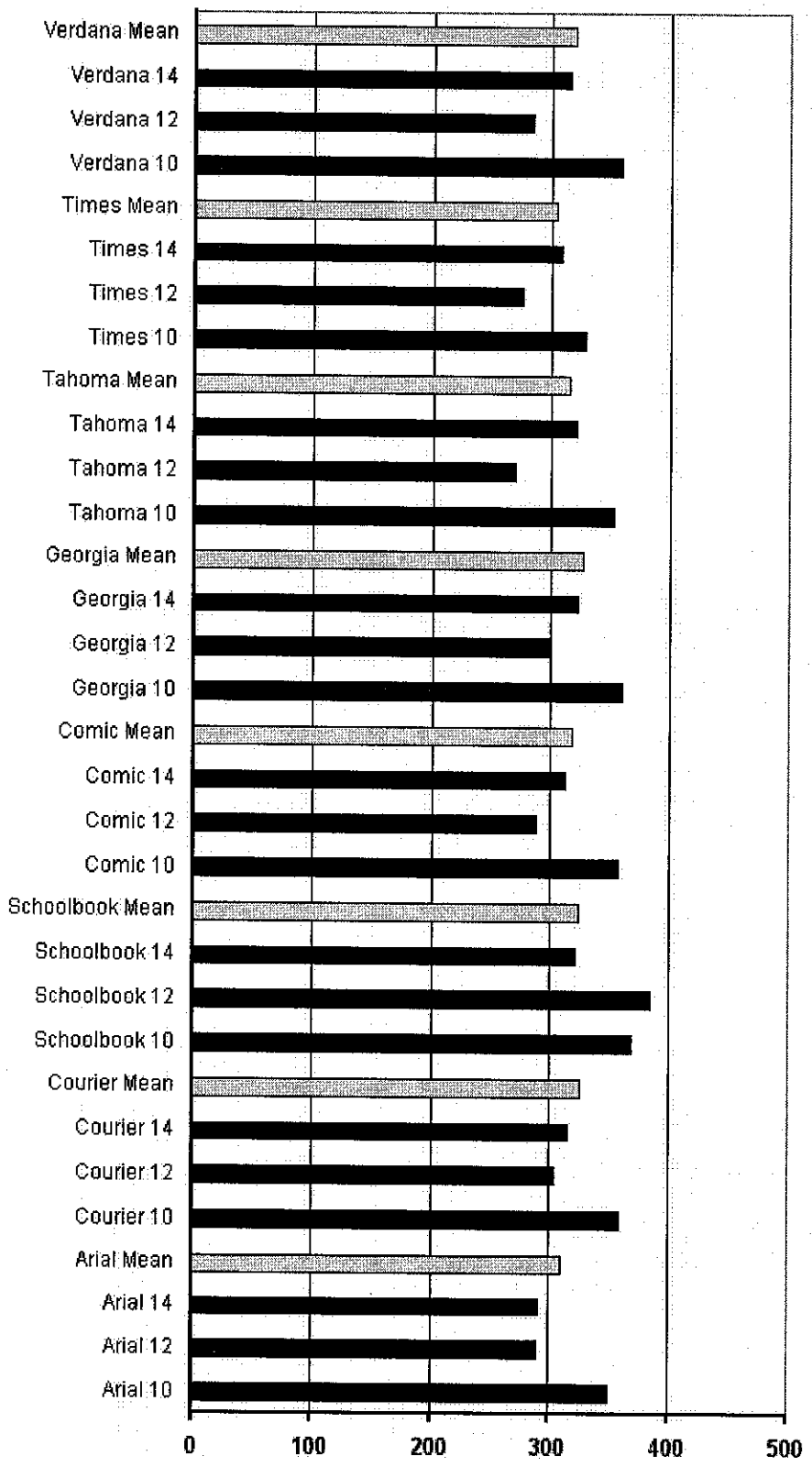

Figure 15. Reading time in seconds (longer bars indicated longer reading times)

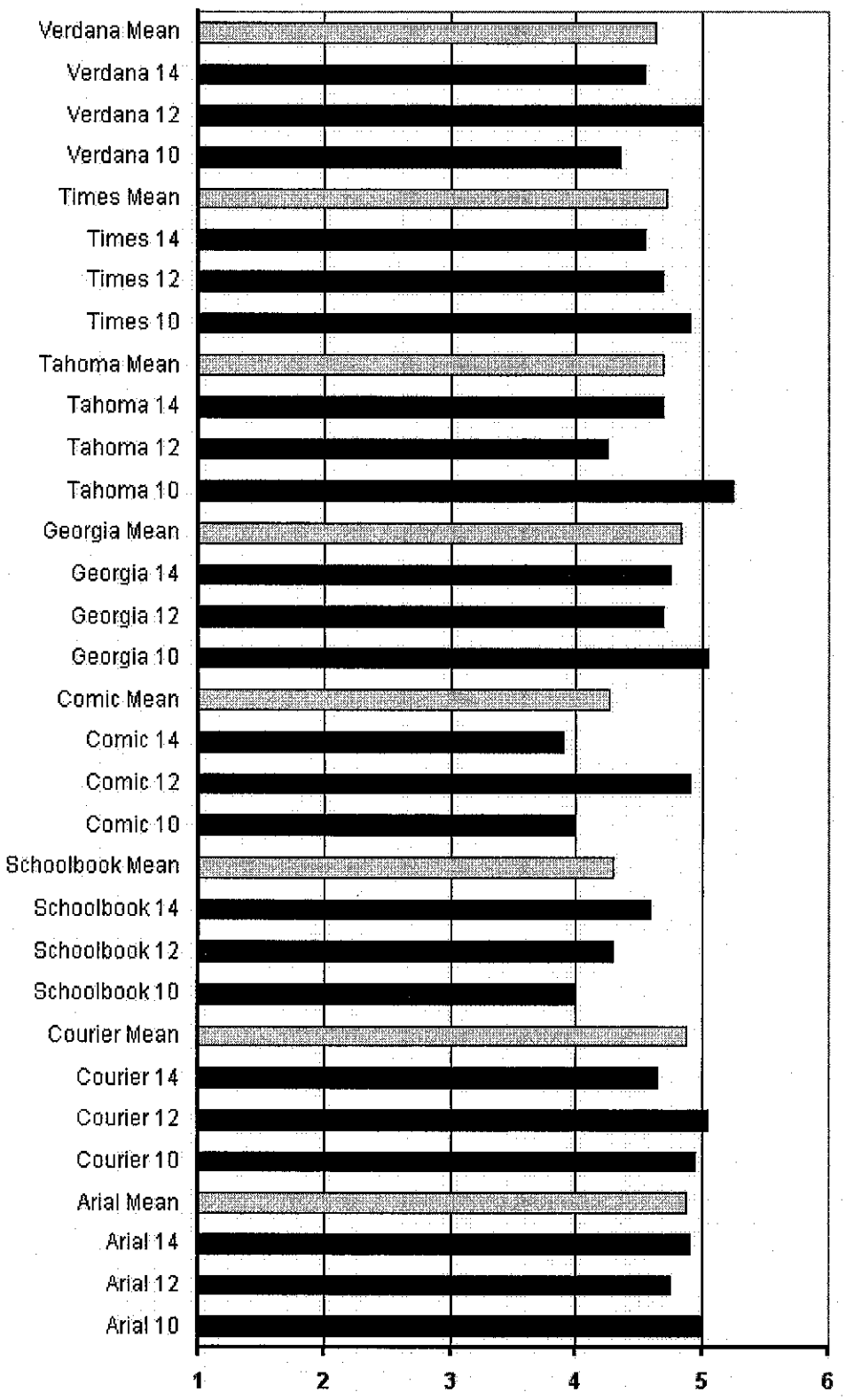

Figure 16. Perceived font legibility (1 = "Not at all" and 6 = "Completely")

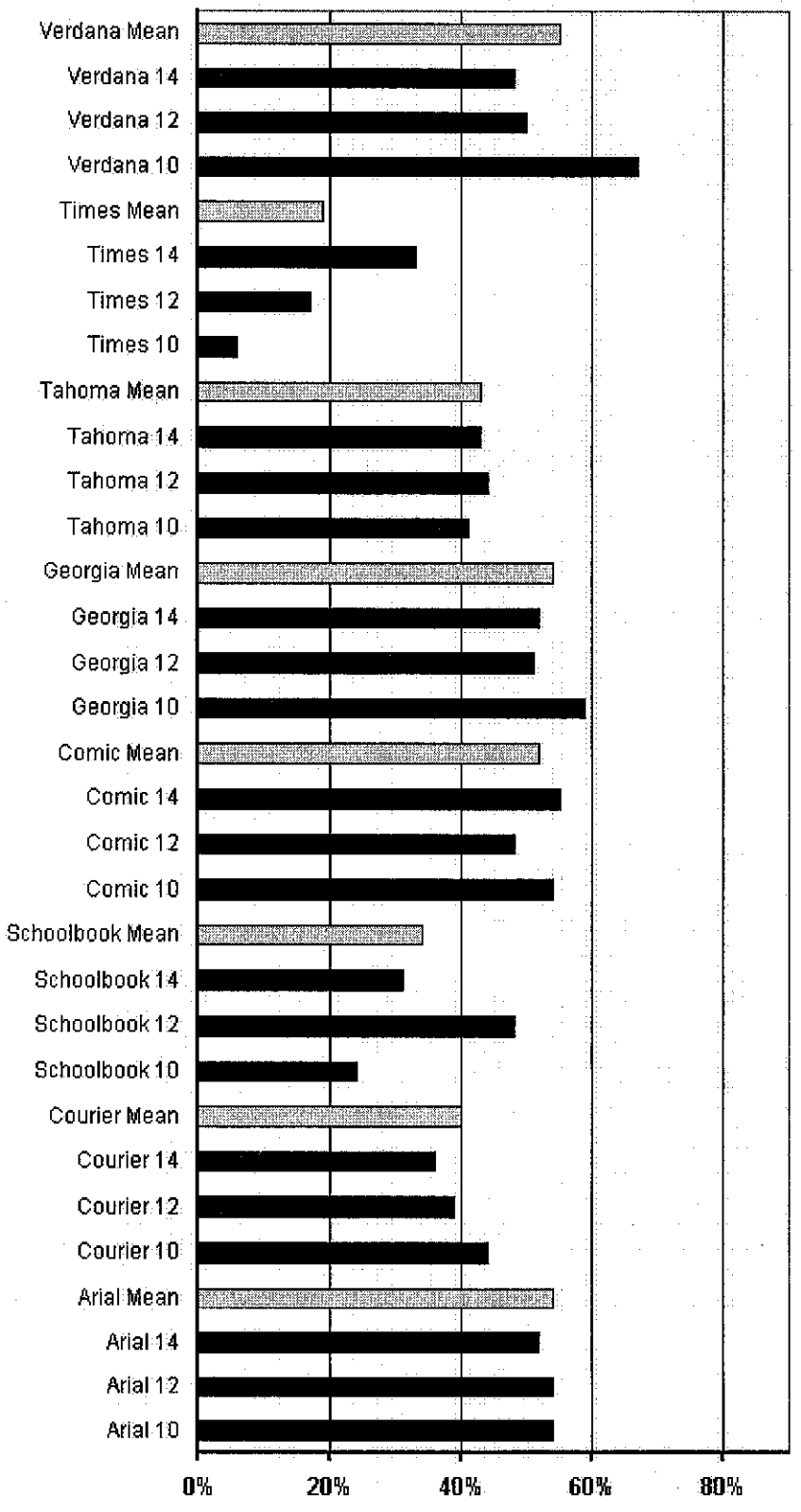

Figure 17. Font preference (longer bars indicates more preferred font choice).

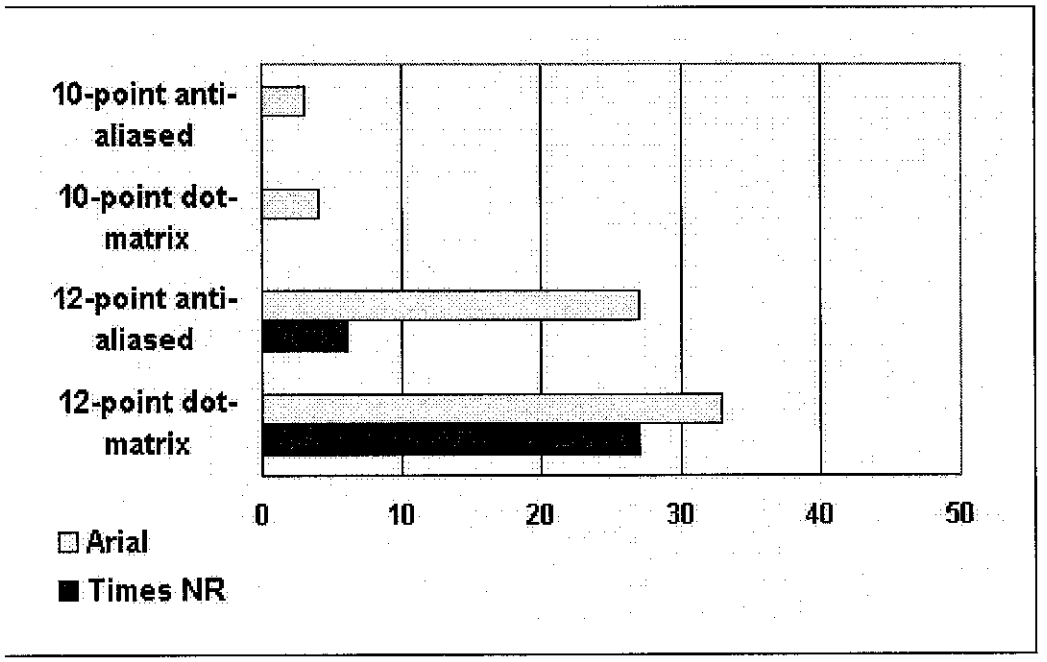

Figure 18. The percentage of times each font was chosen as the 1st or 2nd preference choice

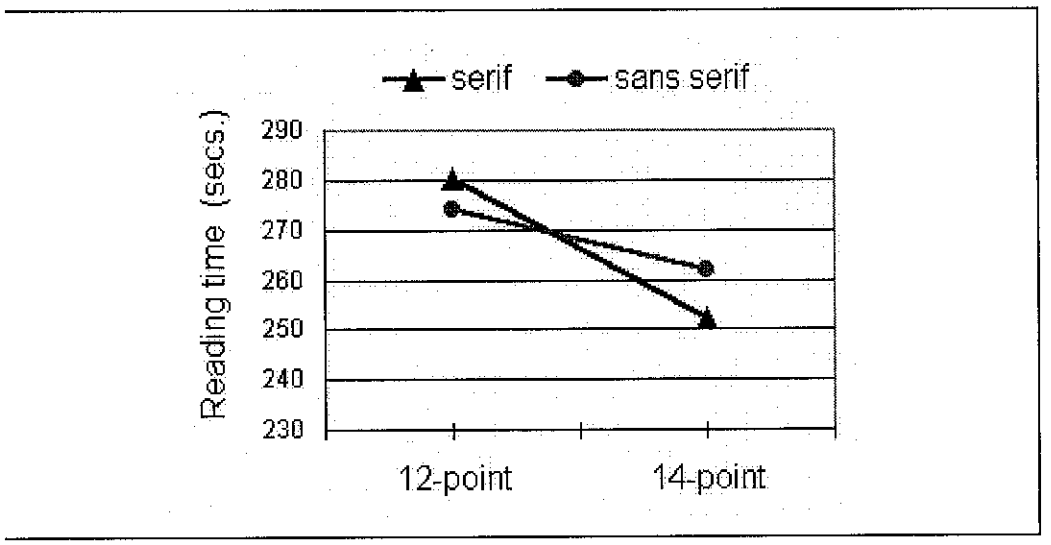

Figure 19. Mean reading time in seconds

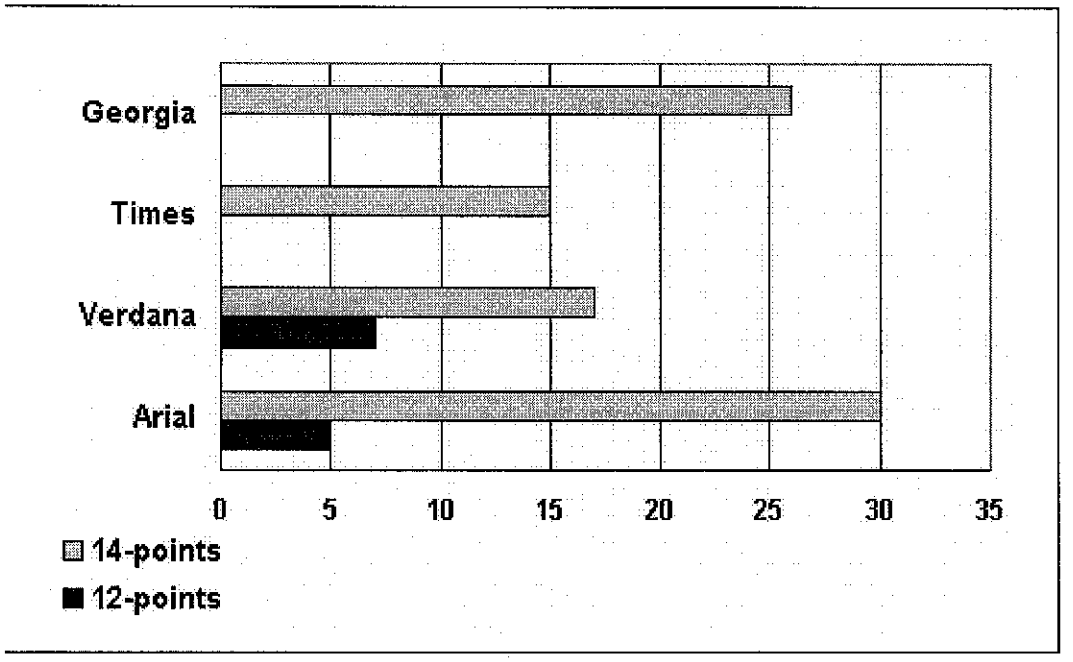

Figure 20. The percentage of times each font was chosen as the 1st or 2nd preference choice. Both 12-point Georgia and Times were not selected as a 1st or 2nd choice.

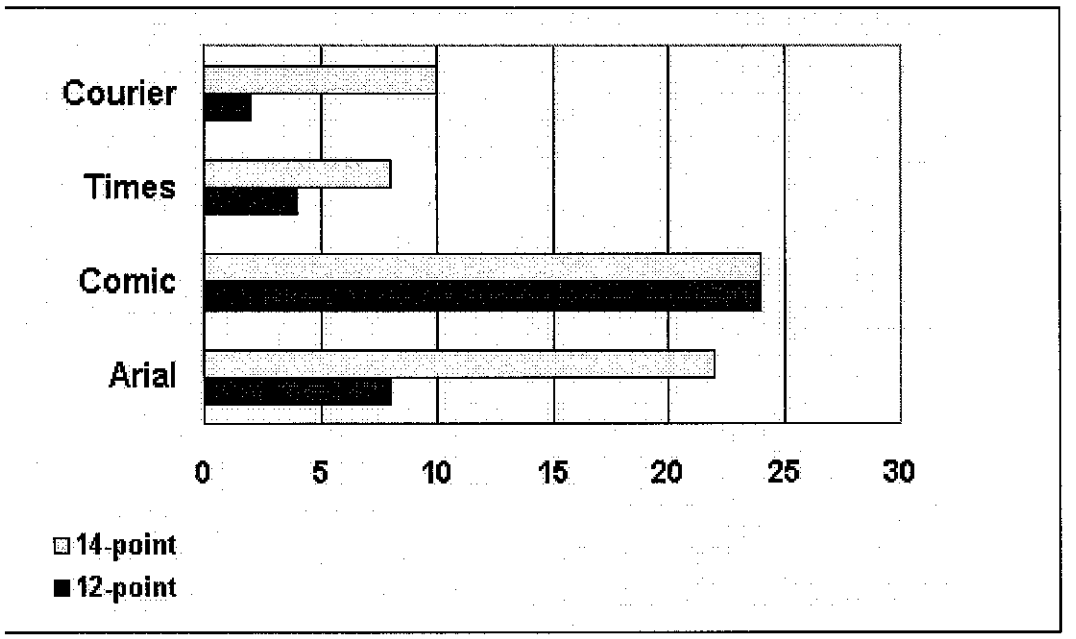

Figure 21. The percentage of times each font was chosen as the 1st or 2nd preference choice.

4.1.1.5 Web Contents Framing

Frames have the potential to confuse users by breaking the user's model of a website. For instance, instead of the concept of a node as being a single unit of information, framed pages may consist of many units that can go in any direction, which may make it difficult to later go back to the original node. Also, viewers cannot bookmark frames, frames are not accessible to many users who employ assisting technology such as screen readers, and some search engines reject the framed pages outright, so what is left is only the main or dominant frame. However, there are some ways around this, see http://searchenginewatch.com/webmasters/frames.html and, of course, users hate poorly designed, framed web pages (Nielsen, 1996).

Proper and parsimonious use of frames may, however, be appropriate for websites if it promotes easier navigation. (Priestley, 1997). One way to use frames is by using a navigational menu frame (also called an inline frame, which is a frame dedicated to displaying the main navigational links within a site). A menu frame can solve the problem of the disappearing menu when users scroll down a non-framed page because the menu frame will always be visible and these are normally placed on the left side or top of the screen. Drawbacks of using menu frames are that the amount of information placed in the menu page must be rather small in order for the entire menu to fit within the frame. That is, forcing the user to scroll to see the entire menu frame defeats the purpose of having one -which is to always have a visible menu.

Frames might also be used to allow users to follow an external link while keeping the original, initial site in view. To do this, typically the top frame shows the initial site as a reminder to return to that site and the lower frame shows the sites that are external to the initial site and hotmail.com is using this technique. However, there should be an option to completely leave the initial site. In addition, links that exit the site should use the TARGET="_top" tag to ensure that users can leave the initial site without being embedded within the frameset of the initial site.

There is a study where the performance and preference of framed versus non-framed pages in which participants were presented with four documents, each with a different link arrangement. For each arrangement they were instructed to search for specific information pertaining to ten questions related to that document. In one condition the links were embedded within a document, as would be found with many online documents. This was accomplished by using an original online article with embedded links. A second condition placed links at the upper-left of the document. Another condition placed links within a horizontal, top frame above the document and a fourth condition placed the links within a vertical frame at the left of the document.

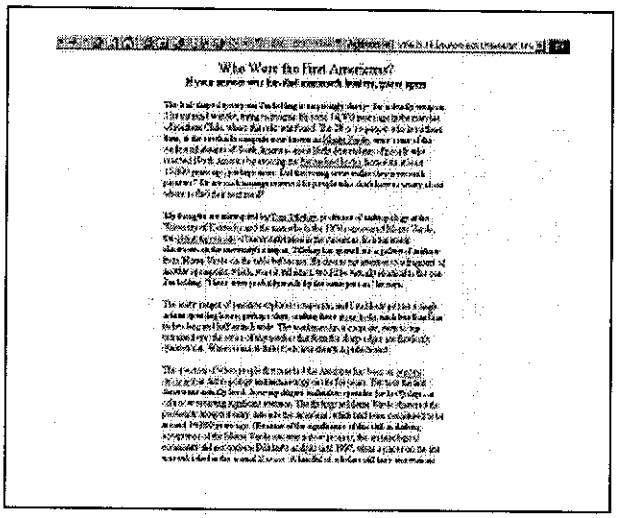

Figure 22. Links embedded in the Document

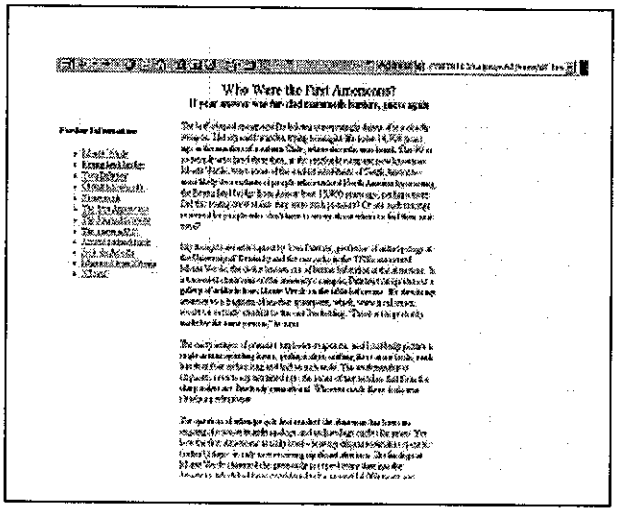

Figure 23. Links at top-left

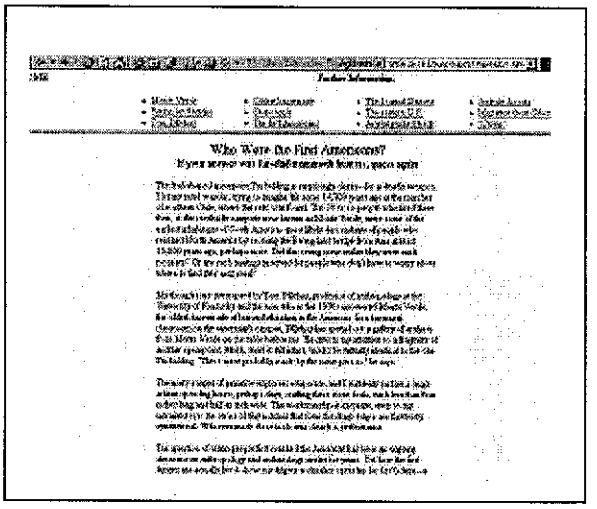

Figure 24. Links within a horizontal frame

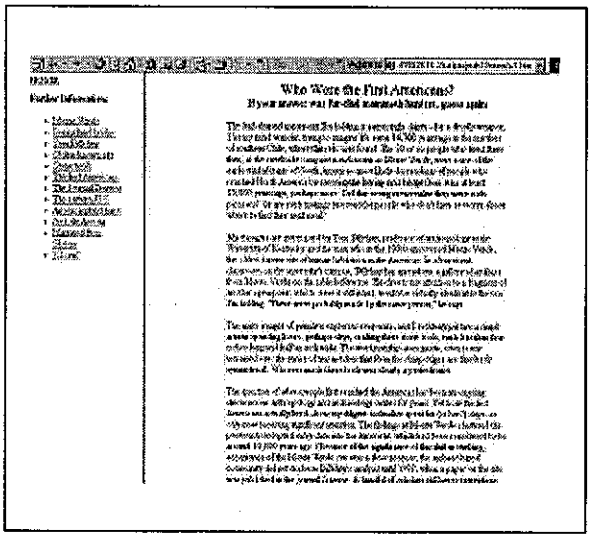

Figure 25. Links within a vertical frame

An analysis of the results revealed no significant differences in search performance such as accuracy, search time, and search efficiency or preference between the four conditions. Interestingly, more users had rather strong preferences towards the top-left and horizontal framed layouts --which, in effect, canceled each other out.

In a follow-up study (Bernard & Hull, 2002) that only compared the top-left with the vertical frame conditions in terms of preference did reveal significant differences that

favored the frame condition [$z = -3.58$, $p < .001$]. Examining the number of participants' ranking either the Frame or Top-Left (no frame) conditions as their first choice further illustrates the preference for the Frame condition.

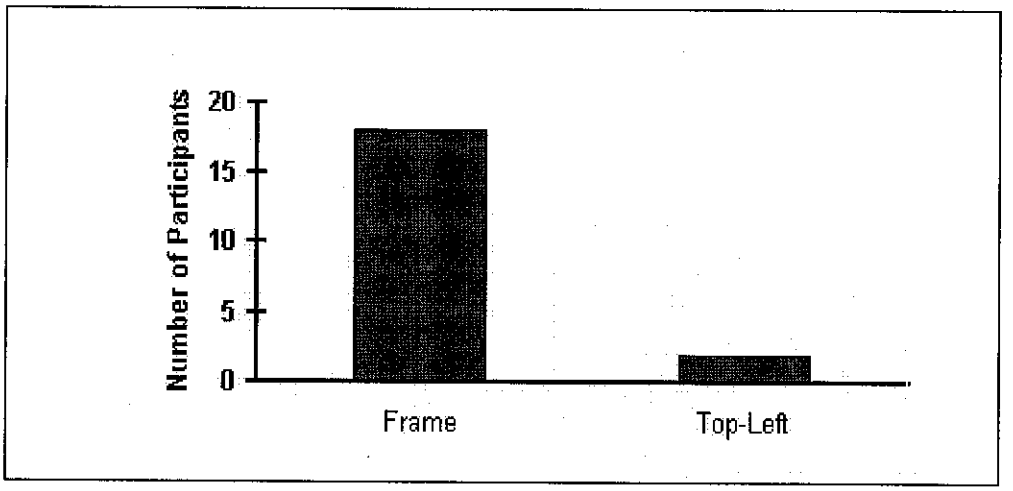

Figure 26 : Preferable frame condition

4.1.1.6 Web Menu

People make fewer mistakes and find information more quickly if the menu structure of the site is broader rather than deeper. Information is found more quickly in Index menus than in cascading menus. In a study by Bernard and Hamblin (2003), three menu layouts were compared for objective and subjective performance, as well as overall preference. The menus structures consisted of an index layout like Yahoo.com, a vertical cascading layout, and a horizontal cascading layout. Significant differences in search time were revealed between the three menu item layouts that favored the index menu layout. In addition, there was a non-reliable trend that favored the subjective opinion that the index layout was less disorientating than the other two layouts. Moreover, participants selected the index layout as their first preference choice more than the other two layouts. The poorest performer, both objectively and subjectively, was the horizontal layout.

The use of the "breadcrumb" menus may help reduce user disorientation within the structure of a site. A breadcrumb menu organizes text links from the sites home page to the page's current location.

Homepage > First level > Second level > presently viewed level

For example, Maldonado and Resnick (2002) found that the use of breadcrumb navigation did reduce user search time, as well as reducing errors and clicks to a marginally significant degree in comparison to expanding hierarchies. However, Lida, Hull, and Pilcher (2002) found in their preliminary study that participants rarely used breadcrumb navigation, and those who did were not any more efficient than users who did not use breadcrumb navigation. Participants in this study used a variety of navigational tool, such as the Back button, left and top navigation bars, and searching to find information instead of or in addition to the breadcrumb tool.

Thus, the benefits of breadcrumb navigation are still inconclusive. Embedding links within a document is preferred to explicitly listing them near the document. A study by Bernard, Hull, and Drake (2001) compared links:

a) Embedded within a document, links positioned at a bottom of the document, at the top-left of a document; and at the same height to which it corresponded with the associative article.

b) No significant differences between the four link arrangements were detected in terms of search accuracy, time, or efficiency, suggesting that link arrangements for non-frame documents do not have a great affect on its actual navigability.

However, there were significant subjective differences between the link arrangements favoring the embedded links. That is, participants indicated that they believed that embedding the links within a document made it easier to navigate, easier to recognize key information, easier to follow the main idea of the passages, and promoted

comprehension. Moreover, participants significantly preferred the embedded link arrangement to the other arrangements.

In a follow-up study, Bernard, Hull, and Chaparro (2002) examined the placement of links in four locations on a web page for user performance and preference. The link placements consisted of links embedded (Embedded) within a document, links embedded within a document and placed adjacent to the left side and at the same height as the corresponding embedded links (Left-Embedded) of the associative document, links placed at the top-left (Top-Left) of a document; and links placed within a vertical frame (Frame) to the left of a document.

In this study, participants using the Left-Embedded condition had significantly faster search times than the Top-Left condition. Participants also perceived the Left-Embedded and Frame conditions as easier navigate and to find information compared to the Top-Left condition. The Left-Embedded condition also was perceived as promoting higher levels of comprehension than the Top-Left condition. Overall, the Left-Embedded condition was most preferred and Top-Left condition was the least preferred

Categorical menus are superior in both search performance and satisfaction to alphabetized sitemaps. As found by Bernard and Chaparro (2002), McDonald, Stone, Liebelt (1983) and others, one of the main reasons for higher performance was that it was more difficult to find information in the Alphabetized sitemap because participants had to guess how this information was worded in the menu. Since index menus are generally based on the alphabetization of the first letter of the hyperlink names in the menus, users may have to guess the wording of the hyperlink name in order to search in the appropriate area, which may have led to lower levels of search performance and satisfaction.

Moreover, as long as the menu items are optimally grouped, the number of items placed on one page can be quite high. In fact, Paap and Roske-Hofstrand (1986) state that as many as 78 items can be placed on a single page without substantially decreasing performance.

Categorical menus arranged in columns are searched faster than menus arranged in rows. In fact, Parkinson, Sisson, and Snowberry (1985) found that search time was reduced by 25% if the categorical menus were arranged by columns. They also found that if the menu links had one additional space between categories groups resulted in even faster search times.

Menu Links accompanied with a summary text tend to be preferred to menus without summary text. That is, a study by Baker, Bernard, and Riley (2002) found that summary menus were perceived more positively in terms of ease of finding information, being visually pleasing, promoting comprehension, participants' satisfaction with the site, and looking professional.

4.1.1.7 Web Conventions

Users overwhelmingly prefer sites which employ common Web conventions (Nielsen, 1997). However, common standards are very rare in web design. Some of the few that exist are:

Follow the standard hyperlink colors: blue for non-visited hyperlinks, purple for visited hyperlinks, and red for active hyperlinks but if there is a site with a blue background -or any dark color- please choose a color that can clearly be contrasted from the background color. That is, if the choice is to either violate the standard or not be visible, choose visibility.

a) Place a navigational link to the homepage at the upper left corner and bottom of each page.

b) Place the site's internal hyperlinks at the bottom of each page (in addition to other places).

c) Images and text space should not cause horizontal scrolling on lower resolution screens.

d) At the bottom of each page, place the date that the page was updated and the URL address.

e) The text should facilitate the scanning of information.

f) Use ALT-Tags for graphics, especially for graphics that serve as hyperlinks.

4.1.1.8 Web Structure and Navigation

People often become lost within the structure. In fact, 58% of users will make two or more navigational errors while searching for information (Forsythe, 1996) and 66.8% of users have stated that one of the greatest problems about the Web is "not being able to find the information that are looked for" (GVU, 1998). Generally there are four major reasons for this occurrence (Foss, 1989):

First difficulty is disorientation or "lost-in-hypertext problems, which arises from an unfamiliarity with the structure or conceptual organization of the site. Here, users have difficulty deciding which node (which is typically one web page) to view next because they are unable to visualize where the information they are looking for could be. The decision concerning which node to view next first involves understanding one's current location within the site, then selecting the proper route. However, users may not even know their current location within a site.

A proper way to reduce this problem is to organize the site according to the typical users' mental model of how a site should be organized. This can be done by having representative users sort cards into several categorical piles in which each card represents the information that would be placed on the actual website. Each pile should indicate the information that would be clustered within each category and subcategory. This would give the designer knowledge on how users mentally organize the structure of a particular site -a technique that uses this method is discussed in Usability News (Bernard, 2000).

In addition, the placement of submenu titles may also help reduce disorientation. For example, Gray (1986) found that of the navigation errors made within a hierarchy, 40%

of them were in the third and fourth levels with submenu titles. Without submenu titles, 59% of the errors were made in the third and fourth levels. Moreover, according to Bransford and Johnson (1972), participants who have read passages with titles recalled approximately twice as many items from the passages and had higher comprehension than participants who did not have passages with titles.

The use of navigational aids such as color coding and consistent logos and banners should also reduce disorientation and the use of the "bread crumb" navigation technique may help in reducing the disorientation problem as well.

The second difficulty is the embedded digression problem. This occurs when users pursue digressive paths within websites and lose their place or forget to return to their original document. This can be lessened by reducing the number of links embedded in text by placing them instead at the end or on the side of the document. However, Knoved and Shneiderman (1986) found that users preferred and were more accurate in answering information using embedded links than an explicit grouping of links outside the text. Yet, they also stated that embedded links could be disruptive in that the user "may be inclined to examine a particular subject or subjects in detail without first getting an appreciation of the overall context".

A recent study by Bernard, Hull, & Drake (2001) examined the effects of embedding associative links with a document, as well as placing them at the bottom, at the top-left, and left, at the same height in which they correspond with the document. No significant differences between the four link arrangements were detected in terms of search accuracy, time, or efficiency. However, there were significant subjective differences between the links arrangements favoring the embedded links. That is, participants indicated that they believed that embedding the links within a document made it easier to navigate, more easily recognize key information, promoted comprehension, and was easier to follow the main idea of the passages while searching for specific information. Moreover, participants significantly preferred the embedded link arrangement to the other arrangements. Conversely, placing links at the bottom of a document was perceived as being the least navigable arrangement, and was consequently least preferred. Thus, while

embedded digression may be a problem for some users, this should be weighed against the subjective perceptions that favor the embedded link arrangement.

The third difficulty is the "art museum" problem. This refers to the lack of memory for the navigational details of a significant part of the site because the viewer is overwhelmed by the sheer amount of information. For instance, as when a patron visiting a museum cannot hope to remember the details of all the art work because of their great number, a large number and variation of navigational information such as the various nodes they have visited may consequently overwhelm the user. This often can have the effect of reducing a person's recall of the pages they have visited.

This can be lessened by reducing the amount of information presented at one time and properly organizing the navigational structure of the site. For example, in a study comparing three types of structures: pure hierarchical or the web pages at one level can only access by a web page directly above or below it, nonlinear which means links could be connected to any number of other web pages on the site, and mixed design that is hierarchical structure with cross referential links, researchers found that participants recalled more information with the mixed design. The pure hierarchical structure was found to be too restrictive, and the nonlinear design presented too much information at one time (McDonald & Stevenson, 1998). Thus, sites should present only the amount of links that are necessary for navigation -superfluous links will increase the probability that the users will be confused and disoriented. Additional support for this conclusion can be derived from the Hick-Hyman law, which generally states that the greater the number of options, the longer it takes to find the appropriate one because of greater uncertainty.

Other aids that are beneficial to navigation are the use of sitemaps. Sitemaps may, if done properly, present the structure of a site in a more cognitively manageable way by showing a site's main structure and the various links to that structure. This is discussed in the previous issues of Usability News (Bernard, 1999).

The fourth difficulty may be the structure itself. That is, it is generally found that people make fewer mistakes if the hierarchical structure of the site is broader rather than deeper.

In fact, research has generally found that ideally all information should be placed within three hierarchical levels from the initial homepage of the site. Specifically, the more levels users have to take in order to get the information they want, the less chance they will find this information. For instance, in placing hyperlinks on a web page, Larson and Czerwinski (1998) point out that a moderate level of breadth is optimal if it is preceded by a well-organized layout. In their study, they reported that a two-level site beginning with 16 sequential links on the first level, then 32 links on the other produced reliably faster searches for information and produced less confusion than a three-level site with eight sequential links in all three levels. The reasoning here is that the deeper the levels, the more a user has to rely on short-term memory. Deeper level sites also have more general and consequently vaguer link descriptions at the top level, which makes it more difficult for users to figure out and remember the correct paths to a target (For a good discussion of the breadth versus depth issue see Larson & Czerwinski, 1998).

However for sites that must have deeper structures by 4 or more levels, Norman and Chin (1998) found in their study of different menu tree structures that users browsing for specific information will find this information faster if the structure is concave (breadth of 8 x 2 x 2 x 8 pages). That is, it should be broad at the top level and at the lowest or 'base' level, while the interior of the web structure should have a narrower level of breadth (see Figure 26 below). They argue that a broad top level gives the user enough specific information to formulate an idea as to the correct path to take, while concentrating much of the information and the choices at the base level will help the user find that specific item. A narrower breadth interior will, in turn, reduce the likelihood of getting lost within the site because the user will have fewer choices, and consequently less chance of being disoriented.

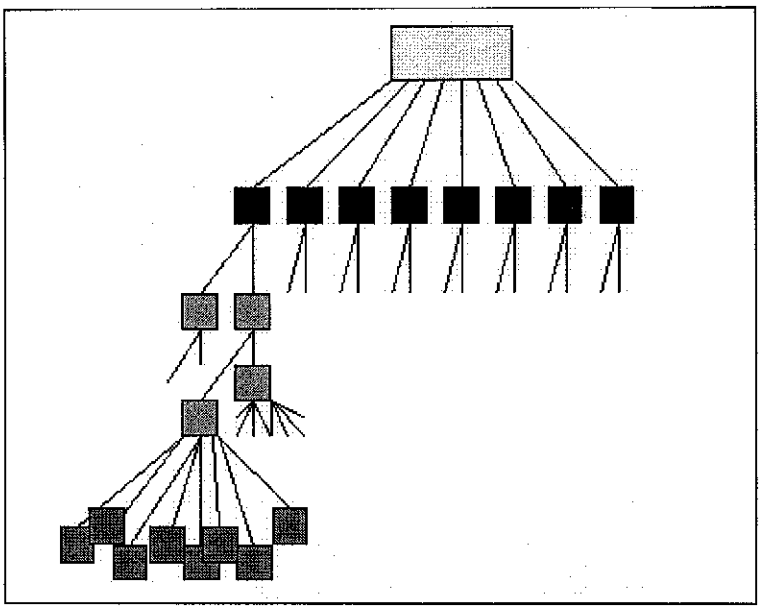

Figure 27. Concave (8 x 2 x 2 x 8) menu tree

As discussed by Bernard (2002), depth alone may not be the sole, or even the greatest determinate in predicting search performance. In fact, as was shown, the shape of a hypertext structure had at least as much to do with search efficiency than its depth. Indeed, a (4 x 4 x 4 x 4) structure was found to be not only less efficient than hypertext shapes of the same depth for example., a (6 x 2 x 2 x 12) structure, but structures that were deeper, such as a (3 x 2 x 2 x 2 x 12) structure. As discussed, much has been said about hypertext depth, in that the greater the depth, the less informational efficient the structure should be for example, (Jacko & Salvendy, 1996; Snowberry, 1983). However, what seems to be occurring is that the search efficiency is at least in part, determined by the properties related to the overall shape of the hypertext structure. These properties, then, act to either help facilitate or impede hypertext efficiency by altering the general complexity of the structure. Accordingly, having an inefficient shape will decrease a hypertext's search efficiency.

Consequently, the goal should always be to reduce the complexity of the site as much as possible. Thus as shown in Figure 27, the ideal structure of a website would have much of the site's information accessible at the first level (shown as the horizontal bar). Structures that have multiple levels should concentrate the information at the first level when possible and at the level closest to the terminal nodes (at the bottom of the pyramid).

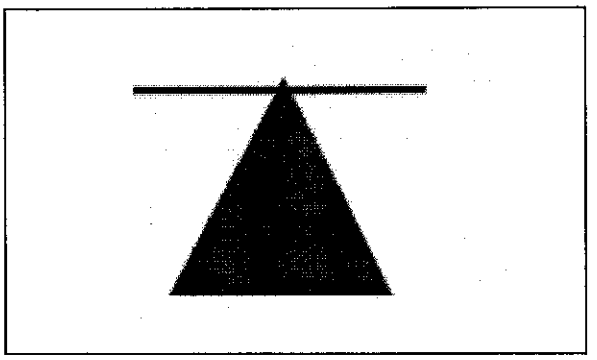

Figure 28. The ideal web structure with multiple levels

The arrangement of links can have a marked effect on search time and satisfaction. For example, it has been found that search time is significantly faster when links are grouped in columns rather than by rows (Nygren, 1996). However, as mentioned above, expandable link columns have been shown to decrease performance in terms of search time, errors, and number of clicks compared to bread crumbs, or simple link-column navigation (Maldonado & Resnick, 2002).

Moreover, as discussed in Usability News (Bernard, 1999), experienced and novice users found specific links faster and were more satisfied with the structure of the site when the information is presented in columns according to their respective categories rather than when the links are presented in columns according to an alphabetical listing of links. This is believed to occur because users have a difficult time trying to guess the appropriate link name in order to know where to initially look within the alphabetized column listing.

In the same study, users preferred to have all the menu links presented on one web page instead of initially showing only the link categories, which would then show the sub-category menus on mouse-over. The Author felt that the latter option of initially placing only the link categories would reduce "link crowding" on the screen to a more manageable number -thus improving accuracy and satisfaction by making it easier to acquire the proper link. However, no significant differences between the former and the latter category options were found. Interestingly, a large portion of users stated that they would prefer the latter option if they were more familiar with the menu structure and the menu terms. Thus, one may want to have a full categorical link organization, but also

have an option to initially show only the link categories, which would show the sub-menus on mouse-over for frequent users of the site (Bernard, 1999).

In the specific placement of links within the website structure, Kim and Yoo (2000) found in a study of Internet shopping mall sites that the combination of neighborhood links (links which move horizontally within the site), top links (links which move the user upward to a predetermined destination, such as the homepage), and index links (links which go to the lowest level regardless of the current position, such as information on a specific product) significantly produce the greatest perception of navigation ease as well as general satisfaction. They also found that links which only moves up one level from its current position and down one level in a site causes a significantly lower perception of ease of navigation, as well as generally lowering the level of satisfaction with the site.

4.2 Product Result and Discussion

4.2.1 Objective and Purpose

The final product for the project is a prototype of a Web Usability Testing Application (WUTA) that focuses on usability evaluation. The objective of the prototype application is to assist the developer and the user in determining the usability level of the web site. Further more, the WUTA prototype could be used in two different situations; during the web development stage and after the web site has been deployed. In both situations, the evaluator or reviewer of the web site could aware with the usability issues that need to be highlighted in developing a web site such as the links, fonts, navigation, text selection, jargon, error control, functionality and visual clarity

4.2.2 Prototype functions

This prototype application will have two functions, Web Design Evaluation and Web Tasks Evaluation. Web Design Evaluation is used to gather web evaluation from the potential user and Web Tasks Evaluation is used by the potential user that will be given a specific task to be done on the web and WUTA can determine the 'time on task' for achieving the goal.

The Web Design Evaluation and Web Tasks Evaluation will incorporate questionnaires that relevant and applies the guidelines found in research studies. In the Web Design Evaluation, user also will be given a chance to put their reviews about the specific design matters such as the web content, web linking or the web fonts. The focus of Web Design Evaluation is to rate the web site and from the rating and user reviews, the developer could make a decision on how user perceive the usability of the web site.

Different with Web Tasks Evaluation, the main focus is to know the how hard or easy on the average, for users to perform typical tasks or reach particular usage goals with the web site. The measurement of 'Time on Task' will generate quantifiable data and it will be used as a yardstick for both the intuitiveness of a user interface and the efficiency with which the web site is used. The other quantitative measurement that could be captured from the user reviews tell the developer how users evaluate the product subjectively, such as how the web site made them feel and whether they believed the web site was simple or complex. The behavior made by the user when undergoing this usability testing will also show the usability of the web site.

The WUTA storyboard and its navigation will be put at the appendix section.

4.2.3 Components of Web Usability Testing Application

The prototype of Web Usability Testing Application (WUTA) will be using several checklists in order to determine the level of web usability. The checklists will be put as questionnaires under the Web Design Evaluation and Web Task Evaluation page. It will consist of the elements of navigation, functionality, control, language, feedback, consistency, error prevention and correction and visual clarity.

All these checklists are taken from the Journal of Information and Design (1998), retrieved from www.infodesign.com.au. The company is using these checklists for evaluating their clients' web site in order to enhance customer perception and ensuring an online presence in the face of similar moves by competitors, provide the potential to expand into other market, provide customers with the ability to do several functions in the web site, provide an opportunity to give as much information of the company in the web, thus enhancing customer service and increasing sales. As a conclusion, the report as the output of the evaluation will present the findings and recommendations arising from the evaluation.

4.2.3.1 Navigation

The navigation refers to the ability to find one's way within the web site. Navigation is particularly important on the internet, since people easily become lost. It is also crucial to support navigation because of the ease with which customers can switch to a competitor site. The checklists under the navigation's components will be:

1. There is a clear indication of the current location.
2. There is a clearly-identified link to the Home page.
3. All major parts of the site are accessible from the Home page.
4. If necessary, a site map is available.
5. Site structure is simple, with no unnecessary levels.
6. If necessary, an easy-to-use Search function is available.

4.2.3.2 Functionality

Functionality refers to the support of all the activities which may be carried out on the site. The checklists under the functionality's component are:

1. All functionality is clearly labeled.
2. All necessary functionality is available without leaving the site.
3. No unnecessary plug-ins is used.

4.2.3.3 Control

The control will ensure that customers should feel that they are always in control of the interaction. The checklists under the control's components will be:

1. The user can cancel all operations.
2. There is a clear exit point on every page.
3. Page size is less than 50kB/page.
4. All graphic links are also available as text links.
5. The site supports the user's workflow.
6. All appropriate browsers are supported.

4.2.3.4 Language

The language will concentrate the issues of jargon used and it is important to speak the language of the customer, in order to prevent confusion and frustration. The checklists under the language's component are:

1. The language used is simple.
2. Jargon is avoided.

4.2.3.5 Feedback

The feedback refers to the provision of information about what is happening at any time. The checklists under the feedback's components will be:

1. If necessary, online help is available.
2. It is always clear what is happening on the site.
3. Users can receive email feedback if necessary.

4. All feedback is prompt.
5. Users are informed if a plug-in or browser version is required.
6. Users can give feedback via email or a feedback form.

4.2.3.6 Consistency

The consistency will ensure that it is important to use language and visual cues in a manner that is both internally consistent and consistent with general practice, so that customers do not have to learn any new techniques in order to use the site successfully. The checklists under the consistency's component are:

1. The user can cancel all operations.
2. There is a clear exit point on every page.
3. Page size is less than 50kB/page.
4. All graphic links are also available as text links.
5. The site supports the user's workflow.
6. All appropriate browsers are supported.

4.2.3.7 Error Prevention and Correction

In error prevention and correction, the evaluator will have to aware of errors that should be prevented from occurring in the first instance wherever possible. When errors do occur, it is important to provide clear explanations of what has happened, and clear instructions for how to recover. The checklists under the error prevention and correction's components will be:

1. Errors do not occur unnecessarily.
2. Error messages are in plain language.
3. Error messages describe what action is necessary.
4. Error messages provide a clear exit point.
5. Error messages provide contact details for assistance.

4.2.3.8 Visual Clarity

In visual clarity, the evaluator will observe the visual attributes of the web sites whether it is compliance with the usability guideline or not. The checklists under the visual clarity are:

1. The layout is clear.
2. There is sufficient 'white space'.
3. All images have ALT text assigned.
4. Unnecessary animation is avoided.

4.2.4 Usability Testing and Score Calculation

Before the testing, the evaluator will be required to choose either to do the Web Design Evaluation or the Web Tasks Evaluation. In the testing page, the evaluator will view the web page as well as the questionnaires that need to be answered. The evaluator should answer all of the questions and give reviews if needed. After finish answering, they could view the summary or detail report as well as the scores got by the evaluated web site. The scores will show the usability level of the web and they can print or save the report.

Each of the questionnaires will have a specific value that will be added together in determining the usability of the web site. There are 37 questionnaires that will be represented by "Always", "Sometimes" and "Never" as the answer. The "Always" will carry 2 points; "Sometimes" will carry 1 point and "Never" is equal to zero. So, the highest score will be 74 points, 37 points will be the median and zero for no score at all. Between 37 points and 74 points, this score will show that the web is highly usable and if the testing shows that the web site gets below than 37 points, maybe the usability of the site is bad and need a lot of improvements. In other words, if the web gets below 50% for the scores, the prototype application will tell the evaluator that the web site needs a lot of amendments and if the scores show more than 50%, WUTA prototype will state that the web site is in a good usability condition. But, in order to do any amendments to the web site, a detail result is still be needed by the developer because it shows all the reviews by the evaluator and which part of the web elements that need to be improved.

CHAPTER 5

5.0 Conclusion and Recommendation

5.1 Relevancy to the Objectives

The first objective of the project is to do a research about the usability testing concepts, dimensions and procedures in developing an effective web site according to the three web elements; web design, web navigation and web function. The Author has done the thorough research including those three elements and it has been documented in the result and discussion section.

The second objective is to identify the good approach in testing the usability of different web sites especially the corporate web site. The guidelines are obtained from various sources such as Internet and research paper and it will be selected in order to be used as the criteria / questionnaires and put into the prototype application of WUTA.

The last objective of the project is to develop a prototype of a web usability testing application (WUTA) that can be used throughout the development phase and after the site has been deployed. The interfaces of the prototype application could be reviewed in the appendix section.

5.2 The Value of WUTA Prototype

From the management point of view, WUTA prototype is an application that would replace the traditional way of doing web usability testing. The current usability testing procedure is costly to setup and involve a lot of users on the same time. The company of the developed web site has to book a usability test room or lab and a lot of arrangement with the user and developer have to be done.

With WUTA, the web usability testing would become an easy procedure. The application could be downloaded from anywhere because the file is small and no cost incurred.

WUTA could be installed in any windows platform and the web usability test could be performed anywhere as long as there is an internet connection. Basically, this application allows anyone including the real user, developer, site owner, programmer or even the marketing people to use it in order to perform a usability test to any web site and they could identify the initial issues in establishing a usable web. So, before or after the web site would be deployed, the usability test could be done easily anywhere, anytime and by anyone. More over, with WUTA, the web site developer could get the test result on the spot compared to the traditional usability testing. In other words, WUTA is an easiest and cheapest way of doing the web usability testing.

5.2 Recommendation

The Author hopes that the development of WUTA could cater the objectives of to establish the application for usability testing.

For this project, the Author focuses on the guidelines of designing the web page, its navigation and the web functions. In other words, in doing the usability testing to the web site, the developer could use the WUTA to revise the crucial elements of web that is the design, function and navigation. The proper guidelines of usability also will help the developer to ensure that their web site is usable enough to drive more prospect customer into it.

As a conclusion, the Author hopes that this project meets the expectation and successful in achieving the objective of the project. The project has highlighted the problems faced by the web developer and web user and provides the useful guidelines for designing the web page, constructing the navigation and its function. The exposure and experience gained throughout the project will be a very good base for working environment. Hopefully, the knowledge and benefits gained must not be kept in mind but to be implies in daily life.

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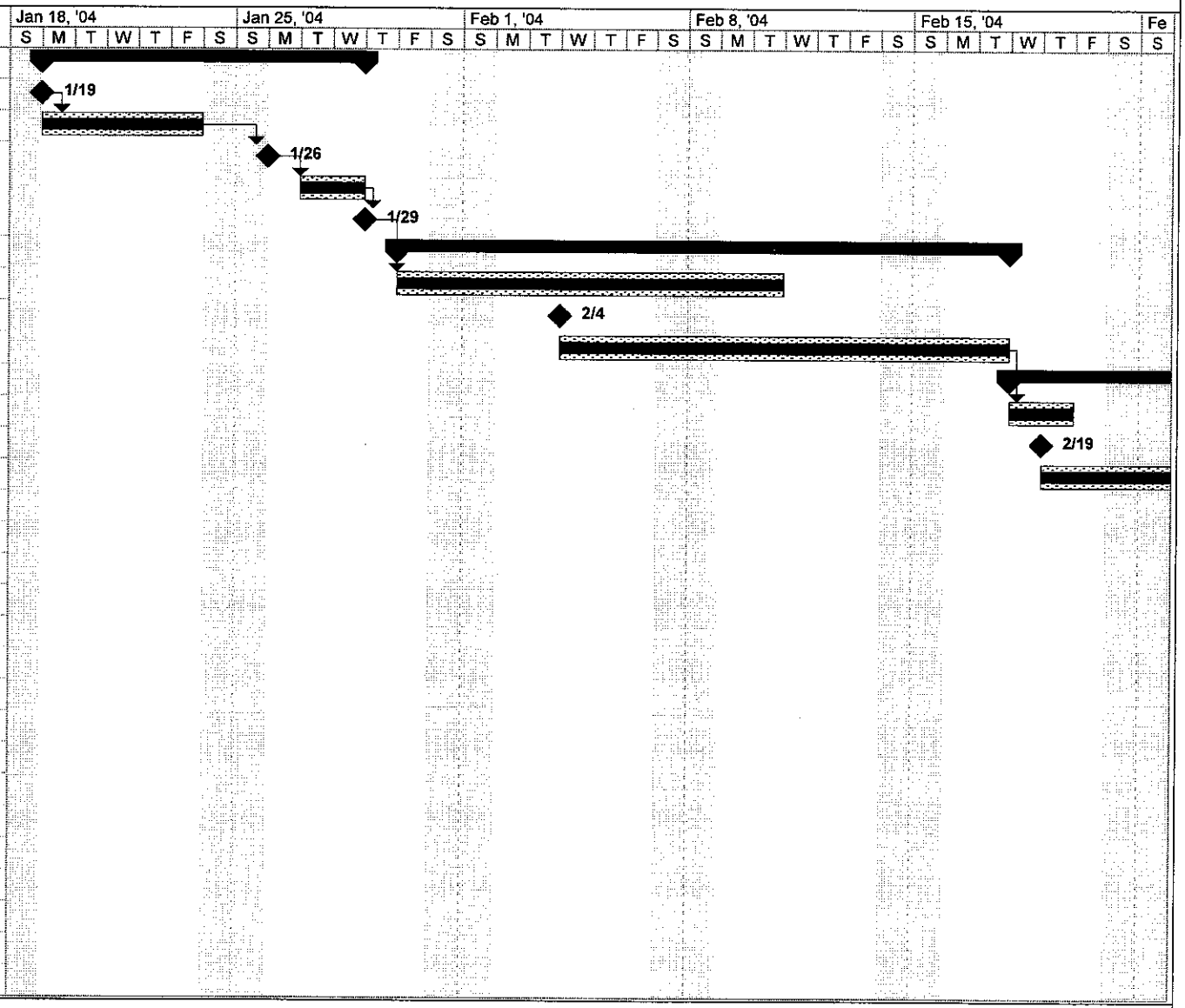
Appendices

APPENDIX 1 : WUTA GANTT CHART

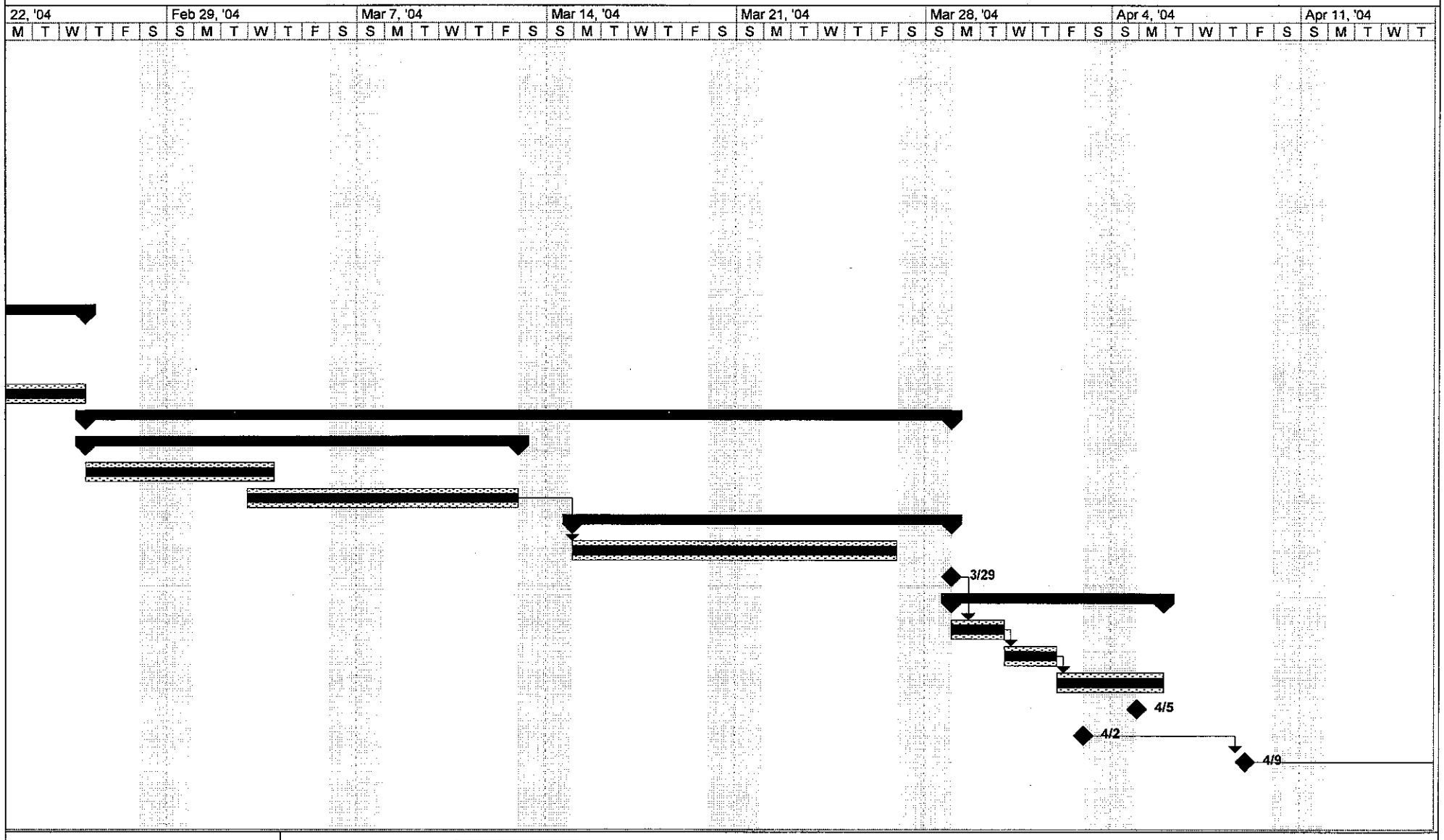
ID	Task Name
1	**Project planning**
2	Proposal submission
3	Preliminary study
4	First draft preliminary report submission
5	Feasibility study
6	Preliminary Report Submission
7	**Project analysis**
8	Problem analysis
9	Project scheduling submission
10	Project requirement analysis and specification
11	**Project design**
12	Architecture design
13	Progress report submission
14	Application interfaces design
15	**Project Development**
16	**Interfaces Construction**
17	Content selection and management
18	Interfaces coding and linkages
19	**Database and Internal Functions**
20	Functions coding
21	Project development complete
22	**Project Testing**
23	Interfaces linkages testing
24	Overall functions testing
25	Expected system debugging
26	Complete project testing
27	**Submission of Supervisor's Final Draft**
28	**Submission of Project's Final Draft**
29	**Oral Presentation**
30	**Submission of Project Dissertation**



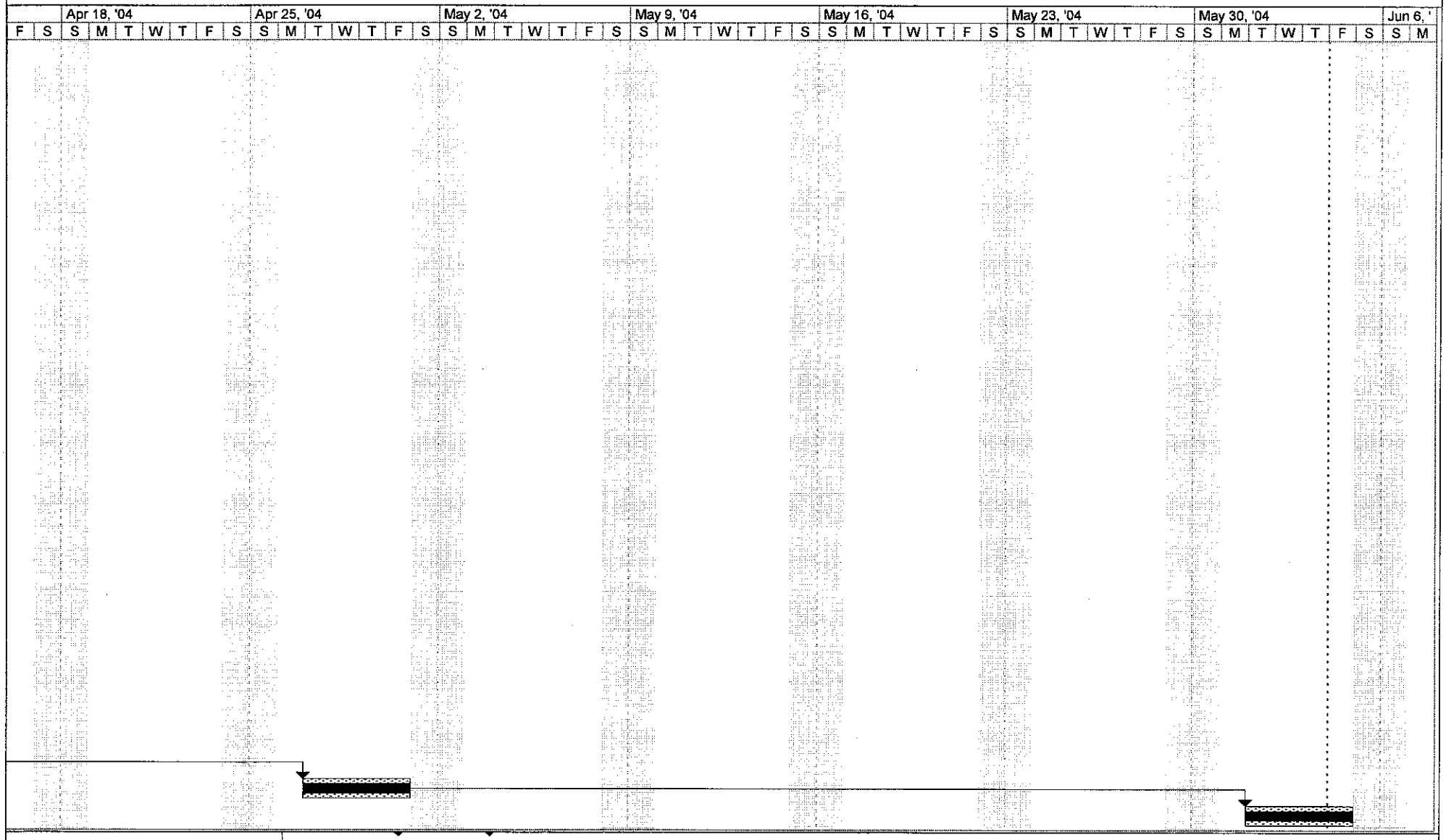
Project: Web Usability Testing Application
Date: Fri 6/4/04

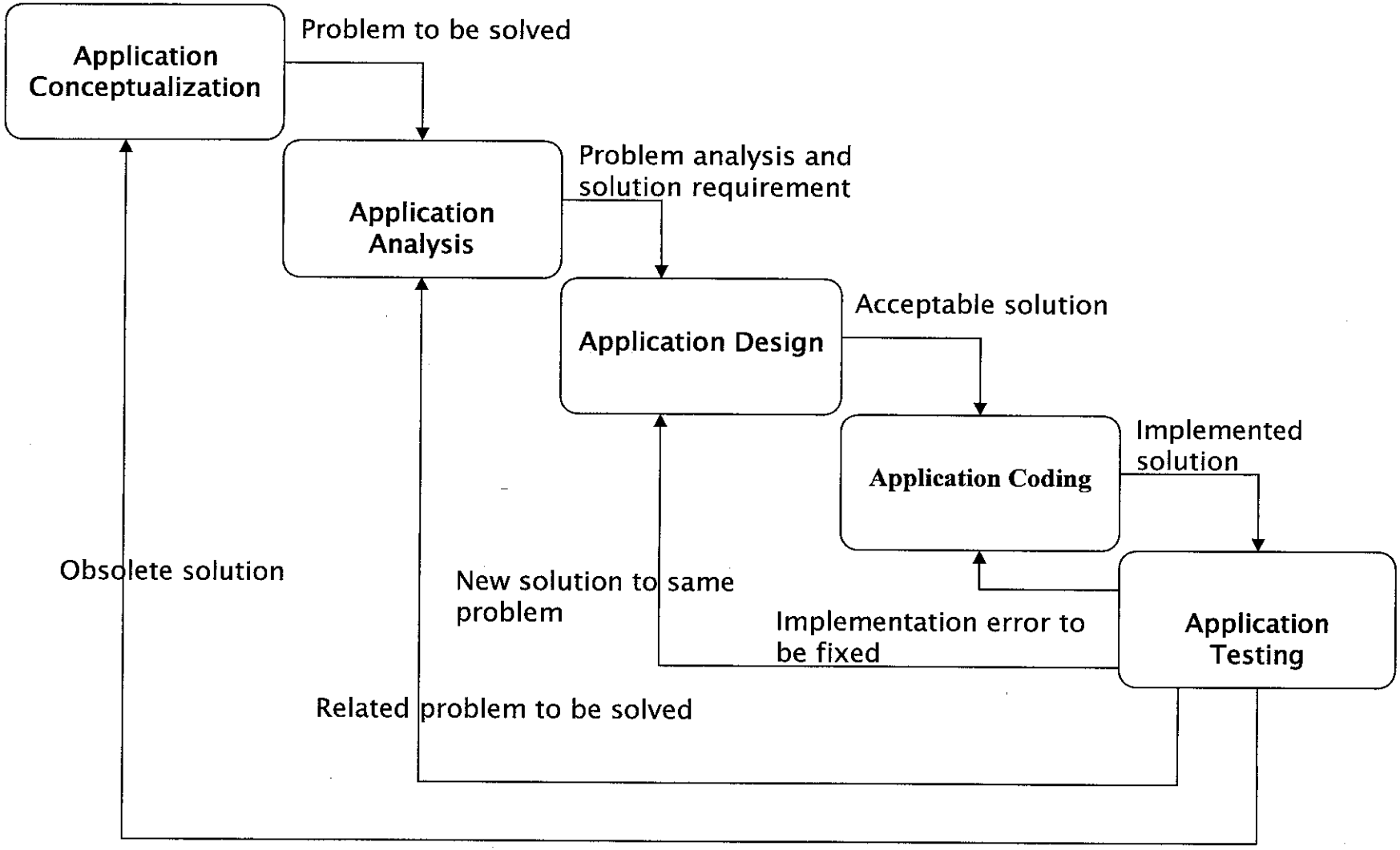
Task
Critical Task
Progress
Rolled Up Task
Rolled Up Critical Task
Rolled Up Milestone
External Tasks
Project Summary
Group By Summary

APPENDIX 1 : WUTA GANTT CHART



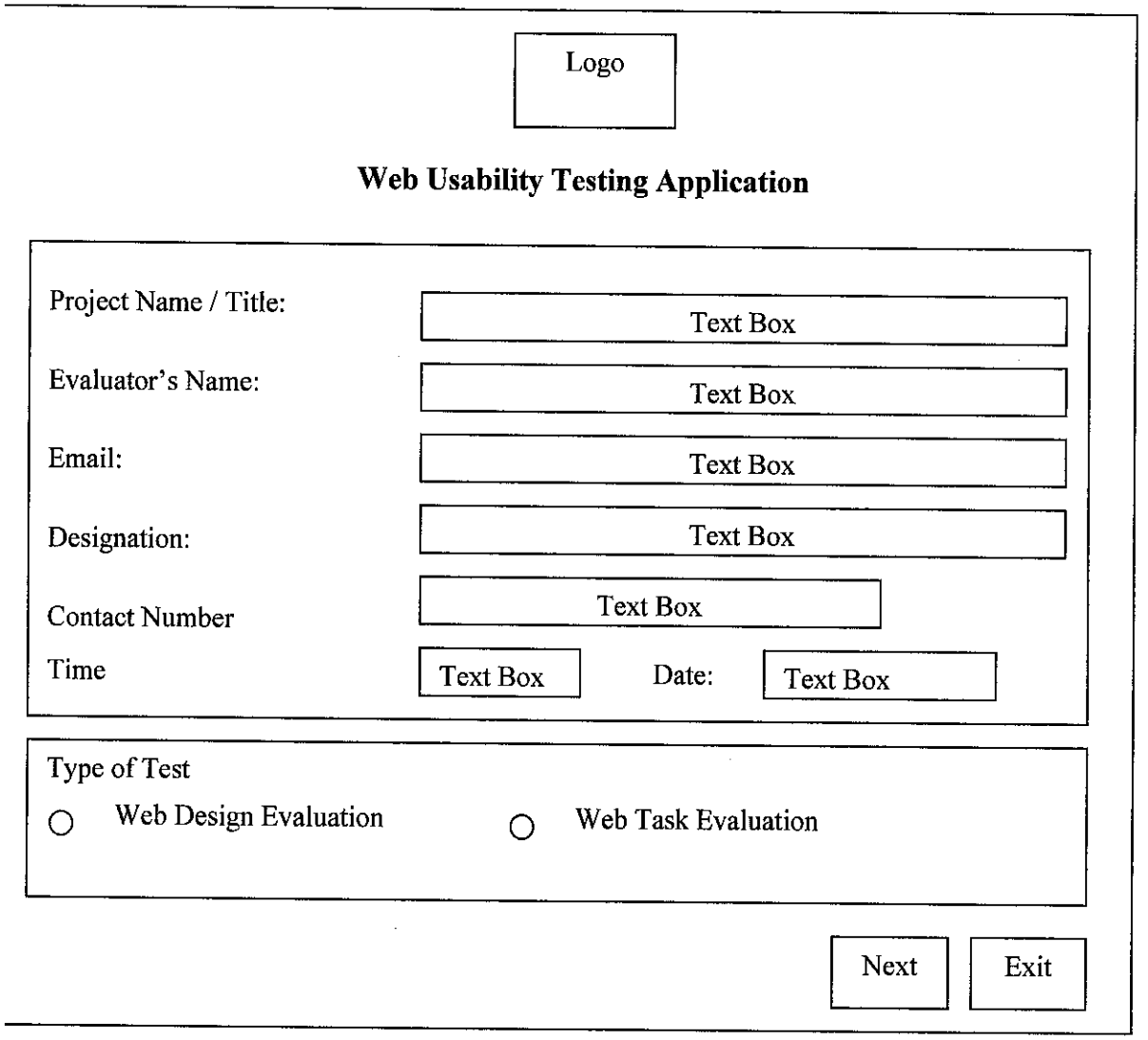
APPENDIX 1 : WUTA GANTT CHART




Application Conceptualization
Problem to be solved
Application Analysis
Problem analysis and solution requirement
Application Design
Acceptable solution
Application Coding
Implemented solution
Application Testing
Obsolete solution
New solution to same problem
Implementation error to be fixed
Related problem to be solved

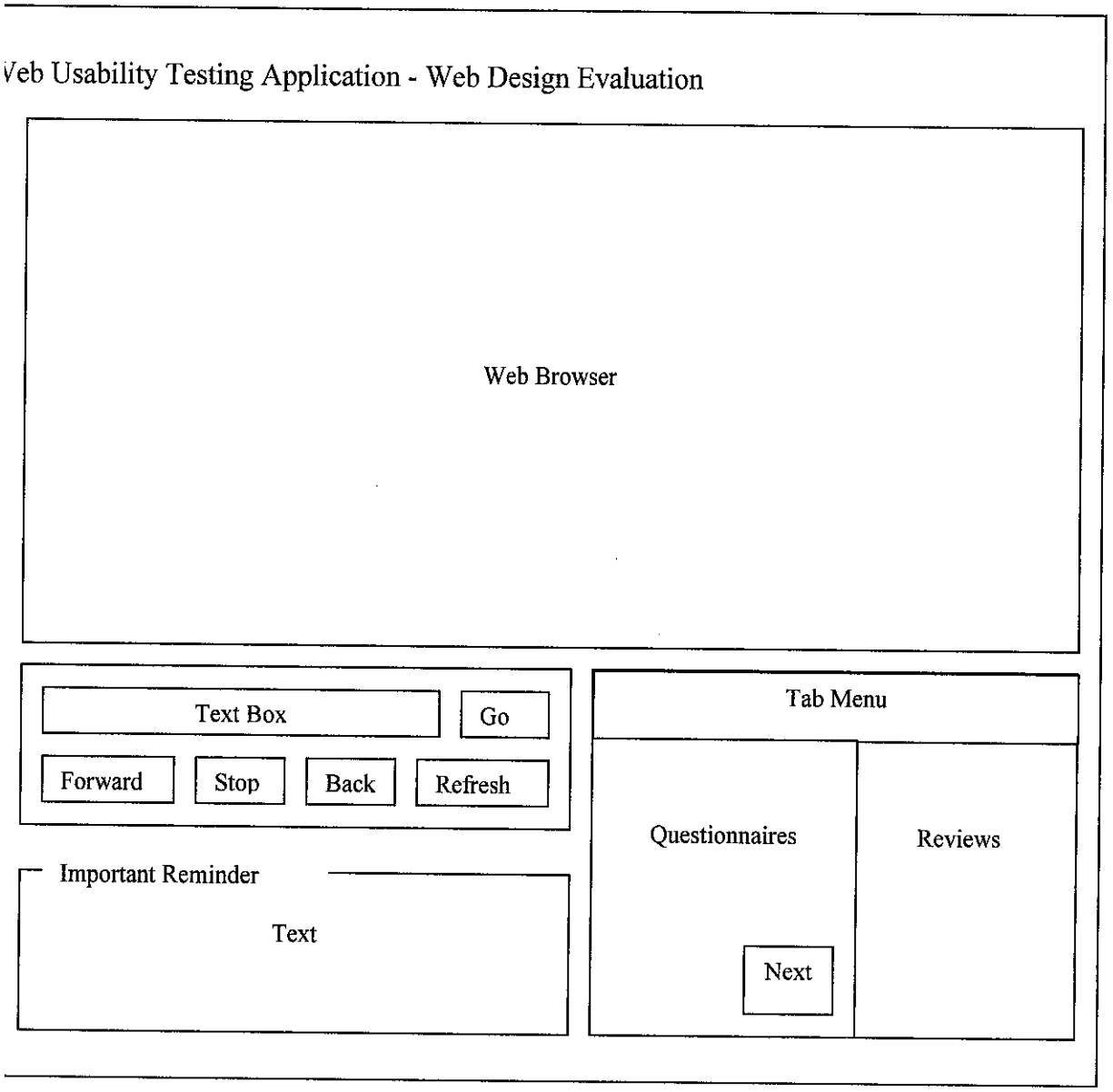
APPENDIX 3 : WUTA LAYOUT

Main Page



APPENDIX 3 : WUTA LAYOUT

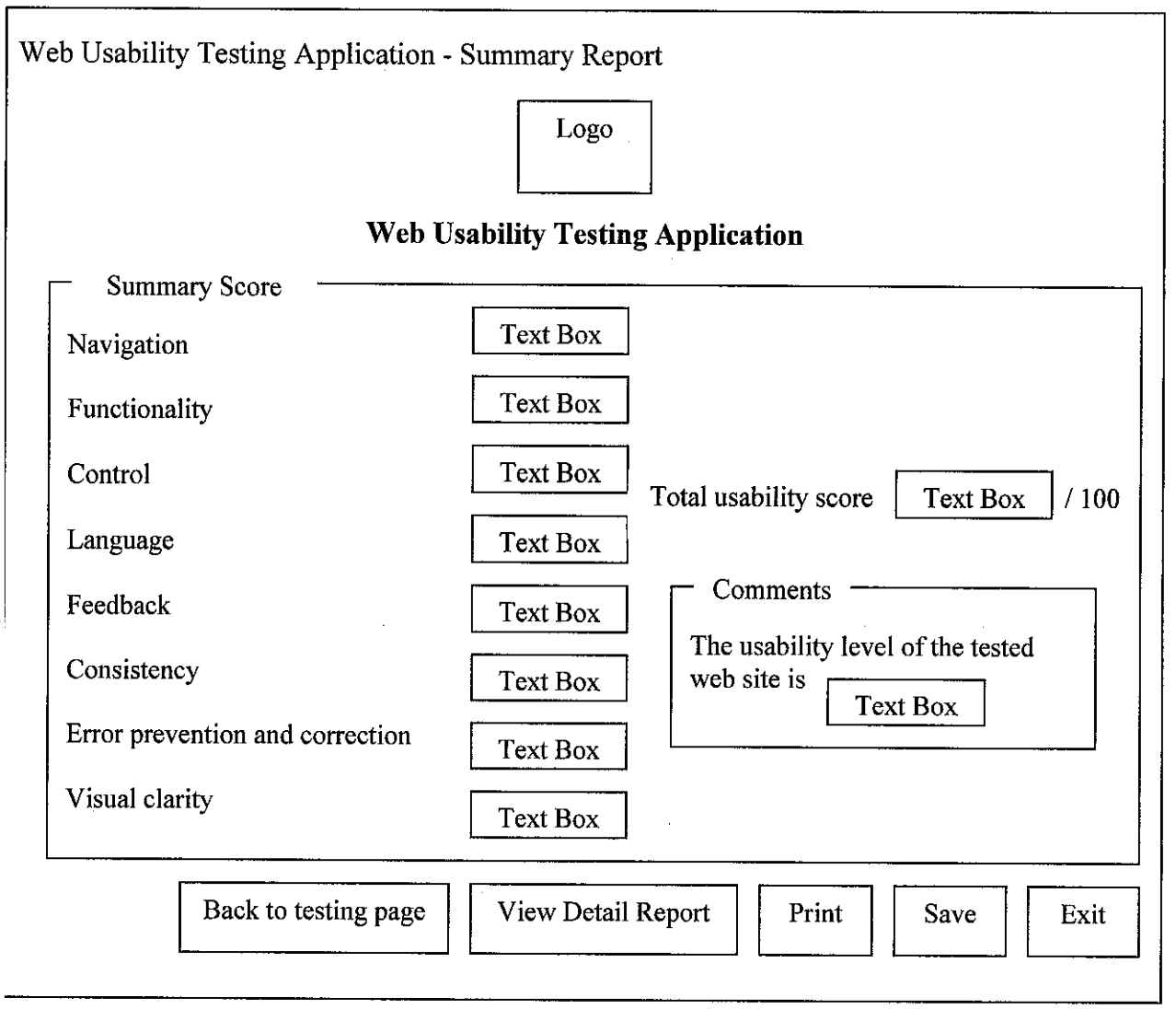
Web Design / Task Evaluation Page



Notes: For the Web Task Evaluation page, there is a "Web Task" section at the Tab Menu.

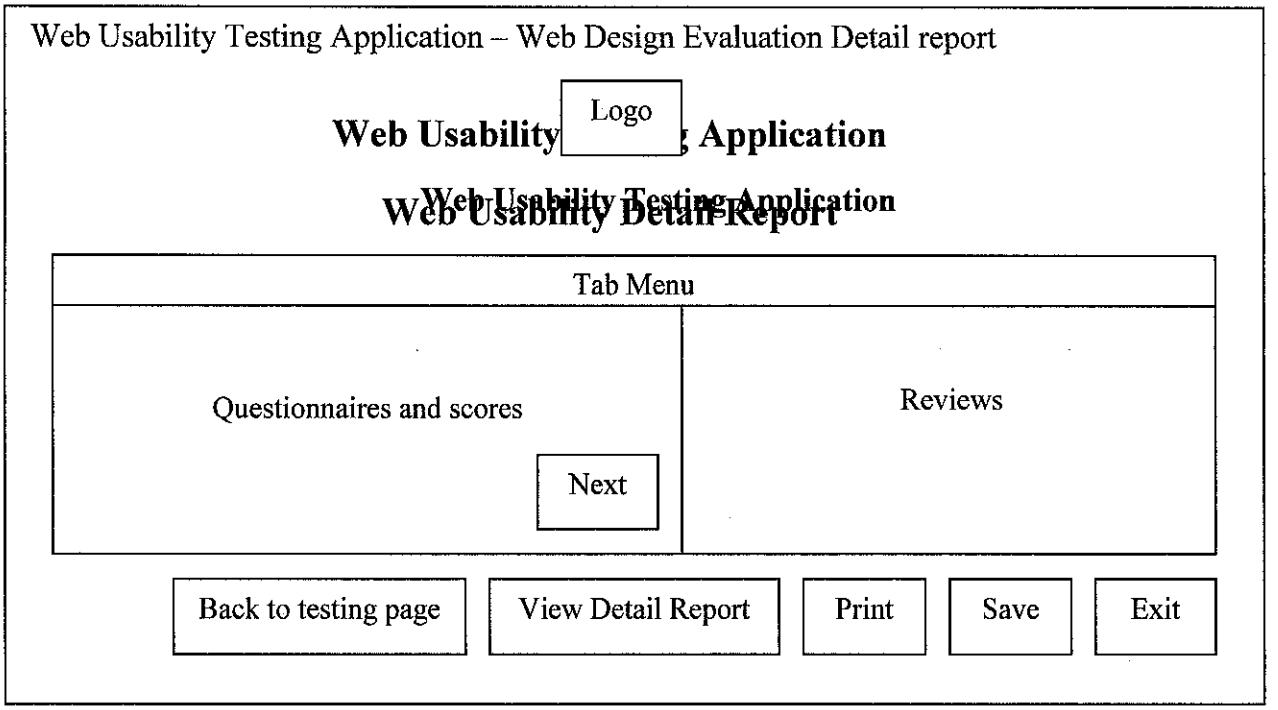
APPENDIX 3 : WUTA LAYOUT

Summary Report Page



APPENDIX 3 : WUTA LAYOUT

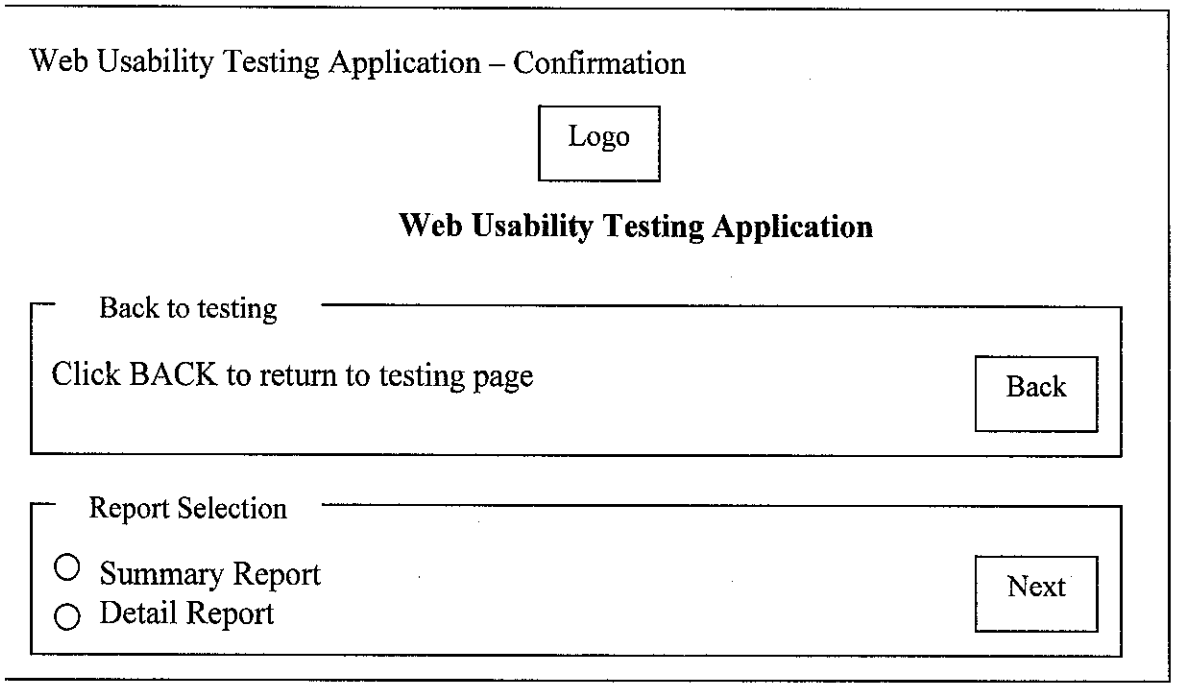
Web Design / Task Detail Report Page



Notes: For the Web Task Detail Report page, there is a "Web Task" section at the Tab Menu.

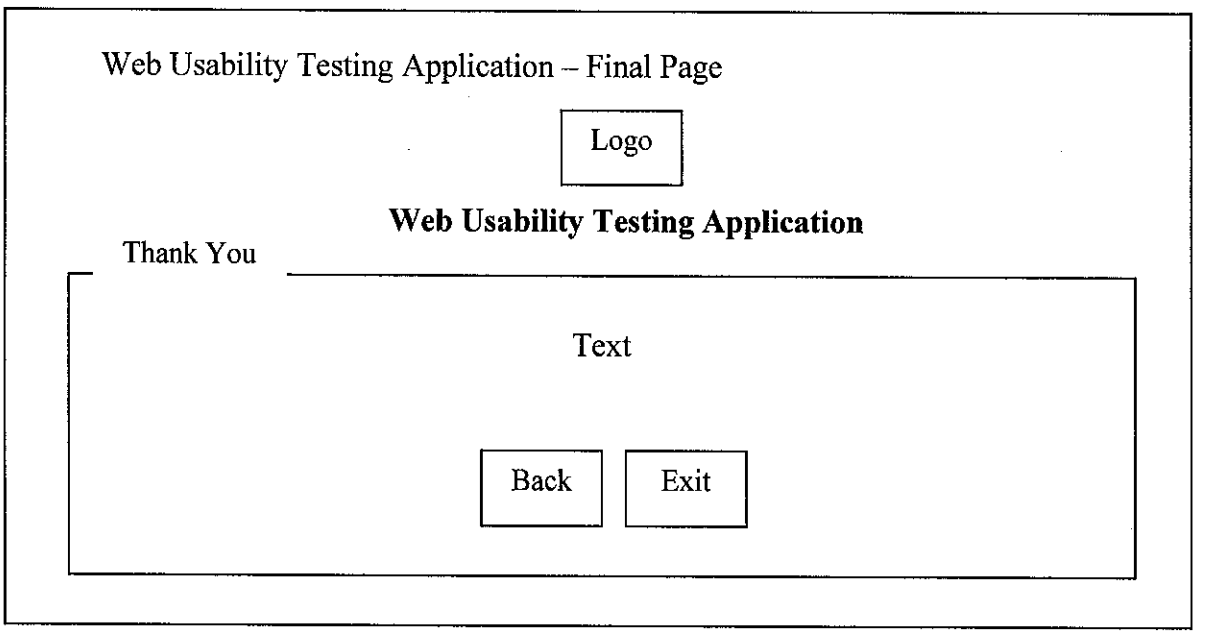
APPENDIX 3 : WUTA LAYOUT

Confirmation Page



APPENDIX 3 : WUTA LAYOUT

Final Page



APPENDIX 4 : WUTA VB INTERFACES

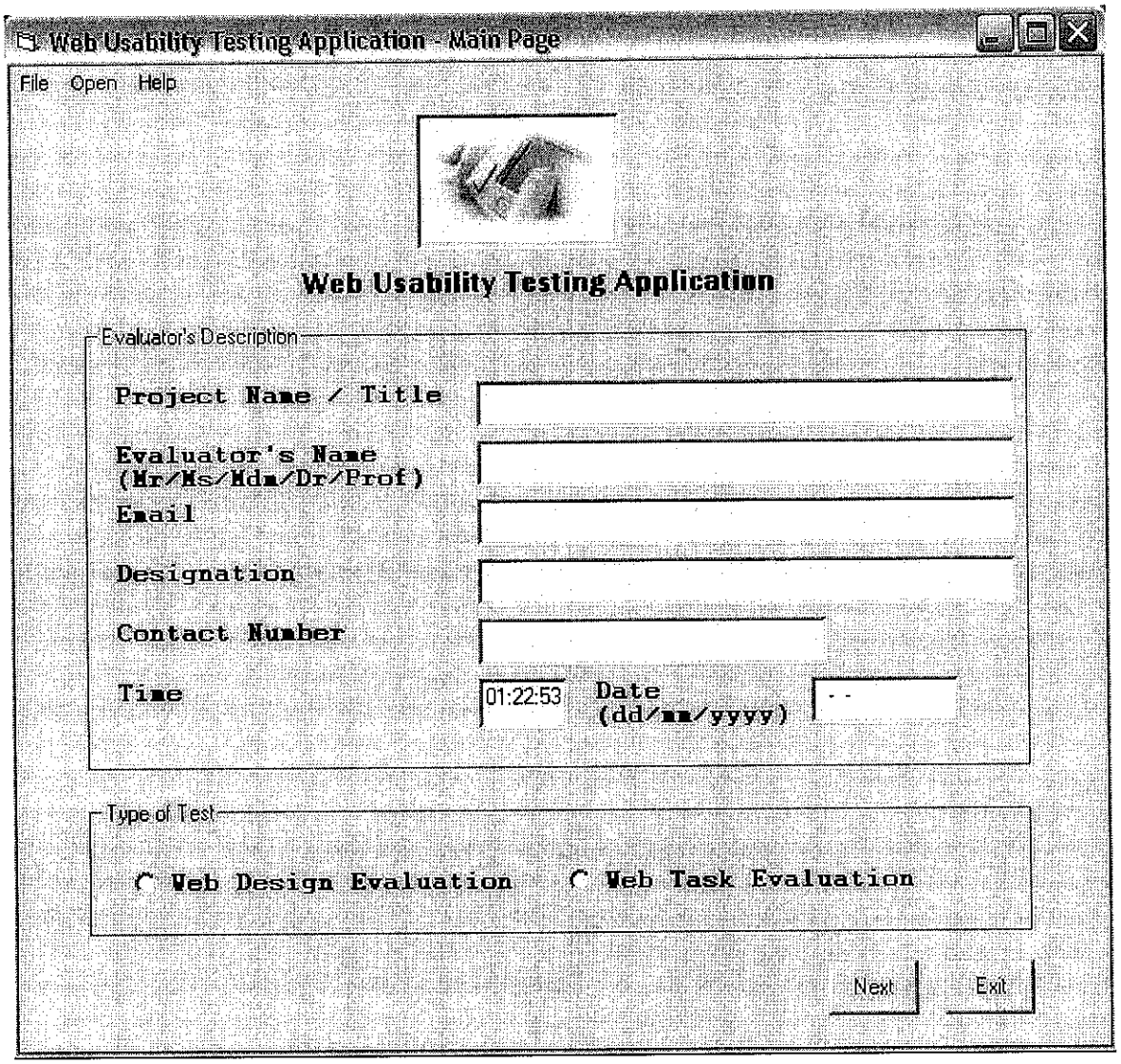


Figure 1: Main Page

APPENDIX 4 : WUTA VB INTERFACES

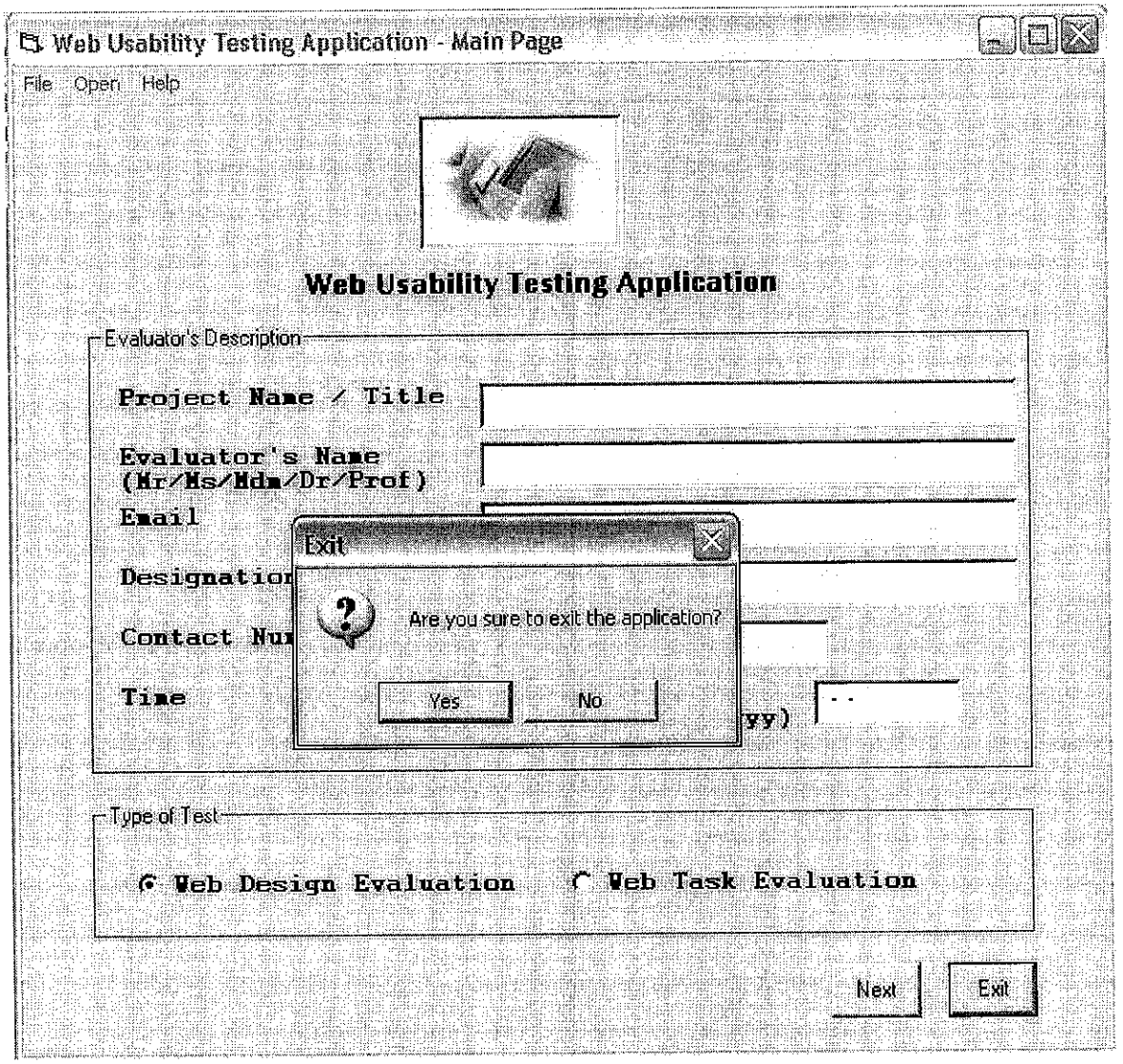


Figure 2 : Main Page with Exit button clicked

APPENDIX 4 : WUTA VB INTERFACES

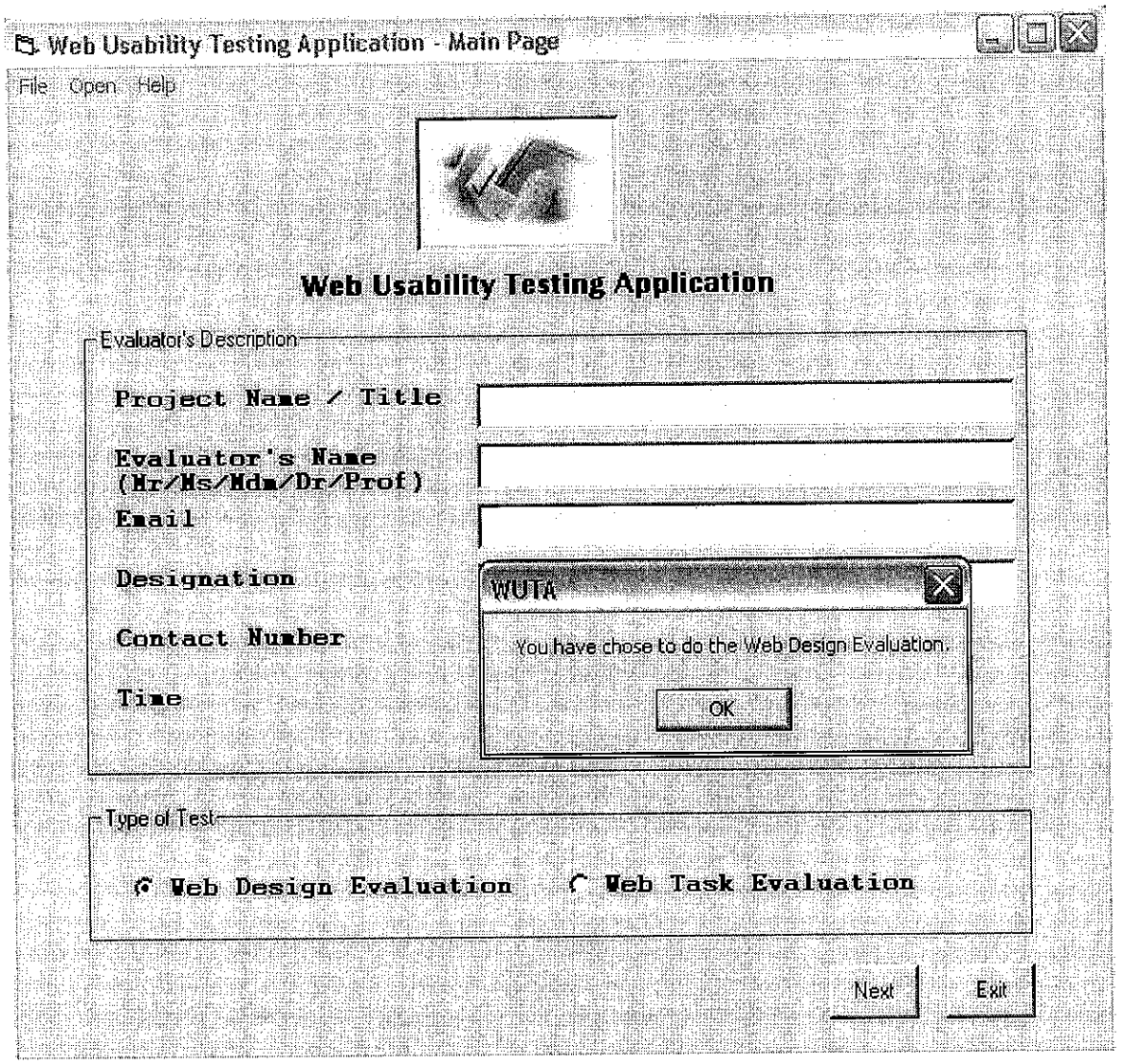


Figure 3 : Main Page with Web Design Evaluation selected

APPENDIX 4 : WUTA VB INTERFACES

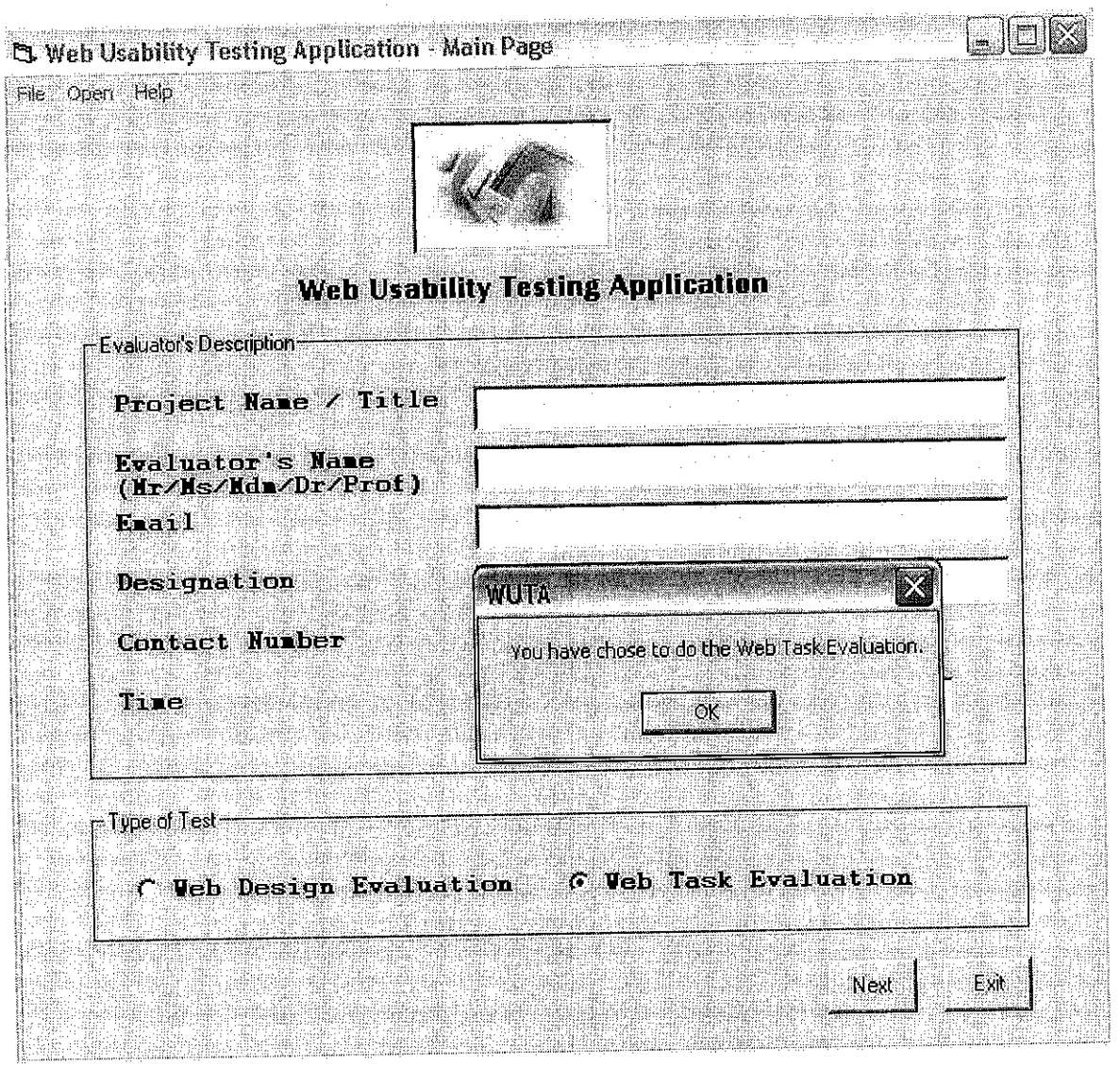


Figure 4 : Main Page with Web Task Evaluation selected

APPENDIX 4 : WUTA VB INTERFACES

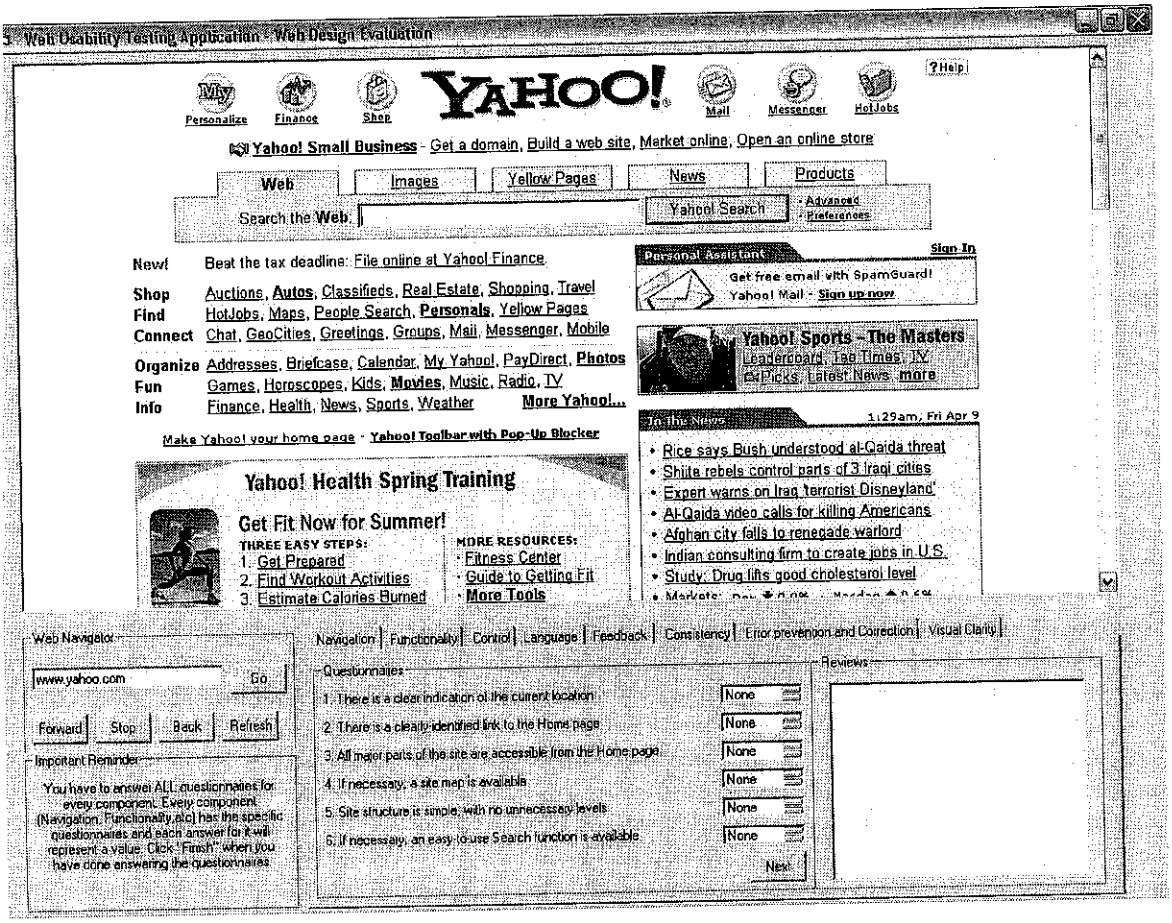


Figure 5 : Web Design Evaluation page

APPENDIX 4 : WUTA VB INTERFACES

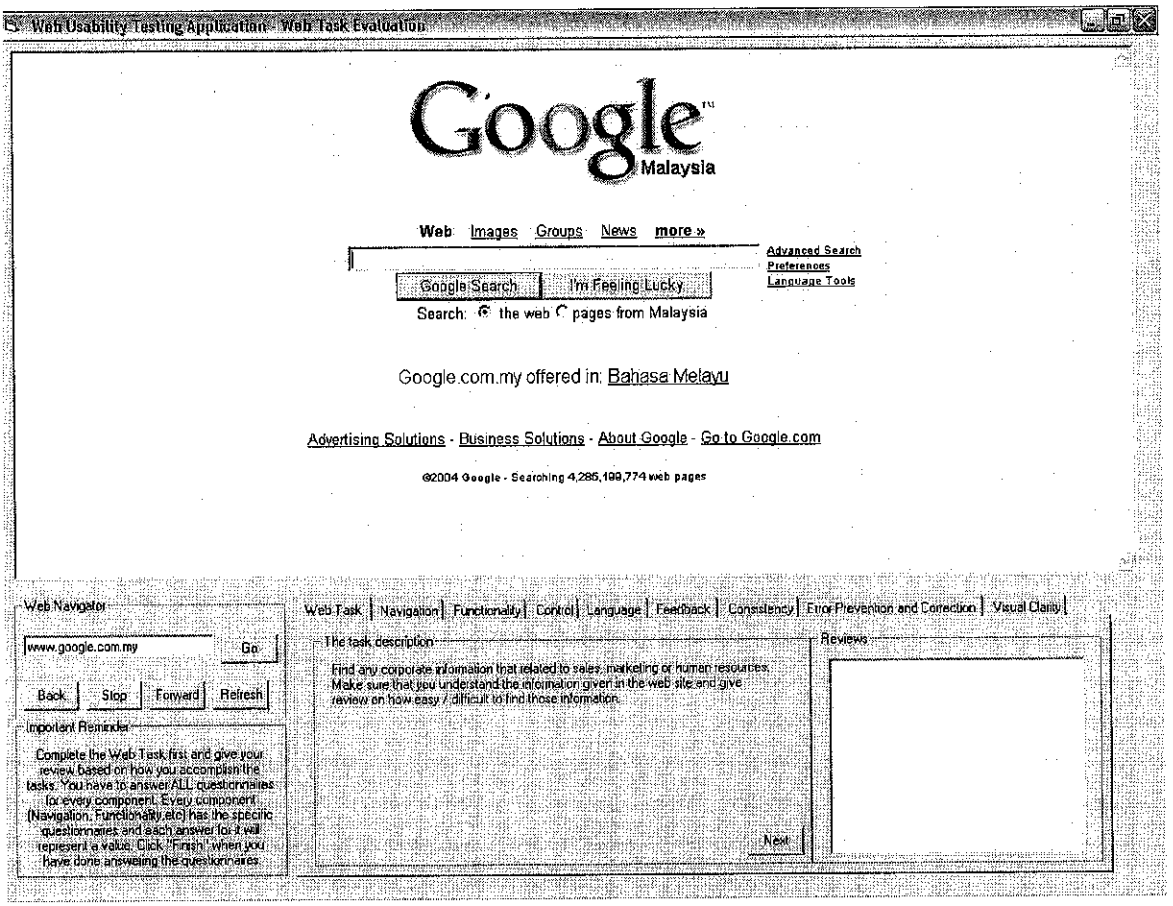


Figure 6 : Web Task Evaluation page

APPENDIX 4 : WUTA VB INTERFACES

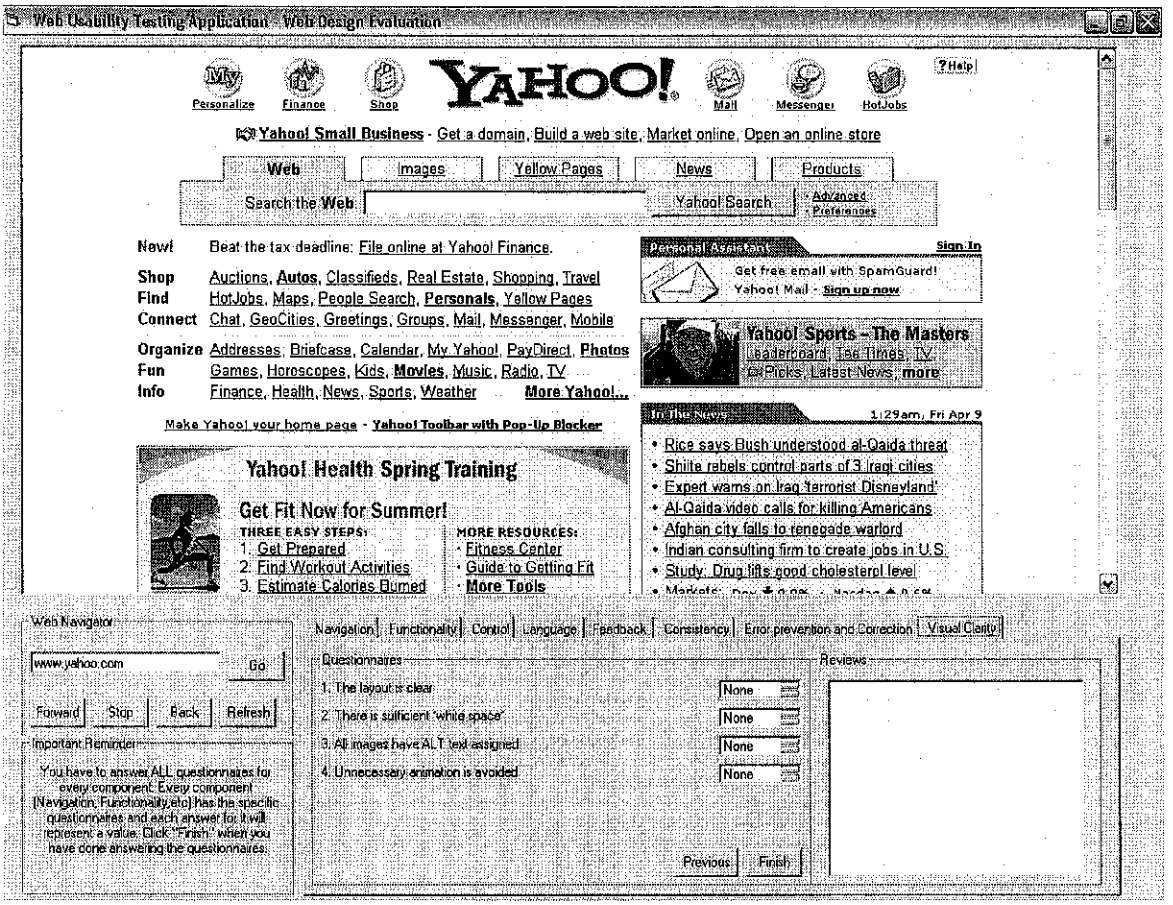


Figure 7 : Web Design Evaluation page with Visual Clarity elements tabbed

APPENDIX 4 : WUTA VB INTERFACES

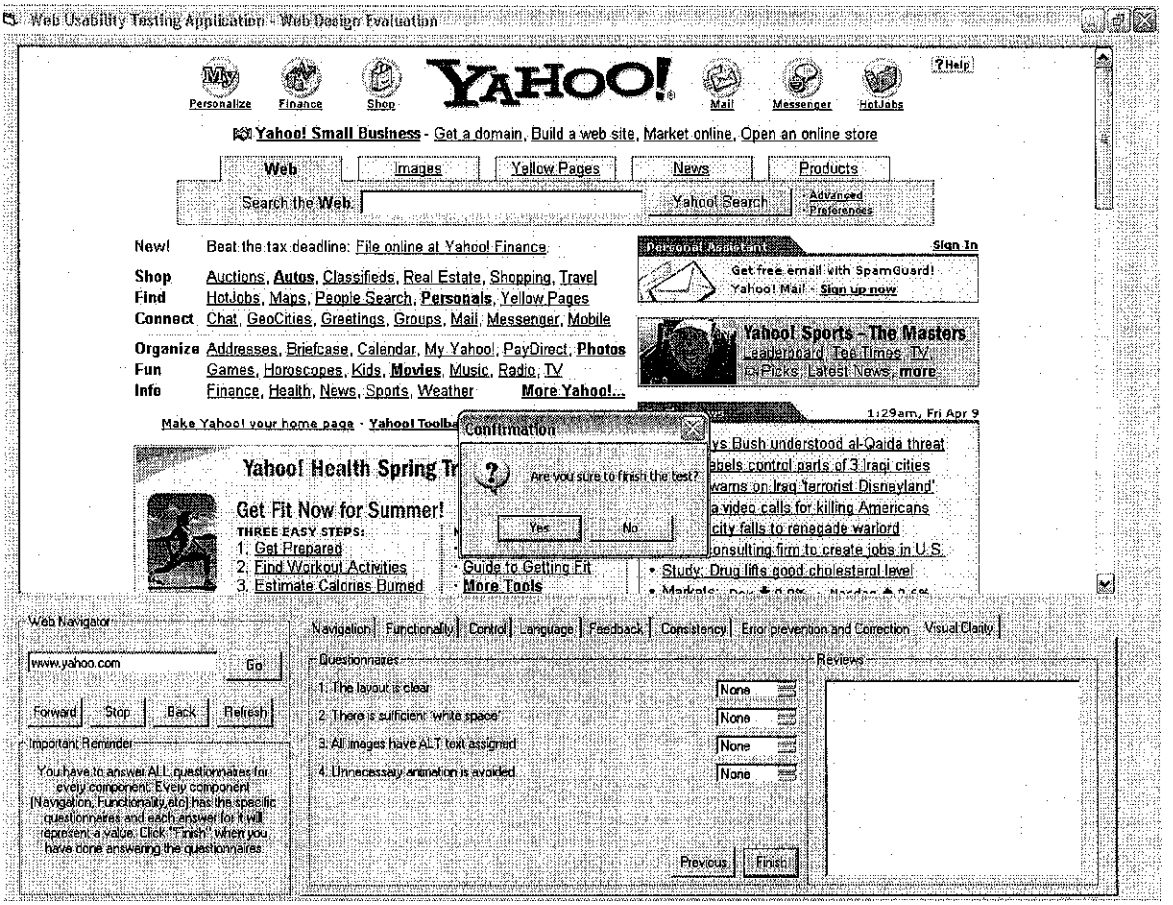


Figure 8 : Web Design Evaluation page with Finish button clicked

APPENDIX 4 : WUTA VB INTERFACES

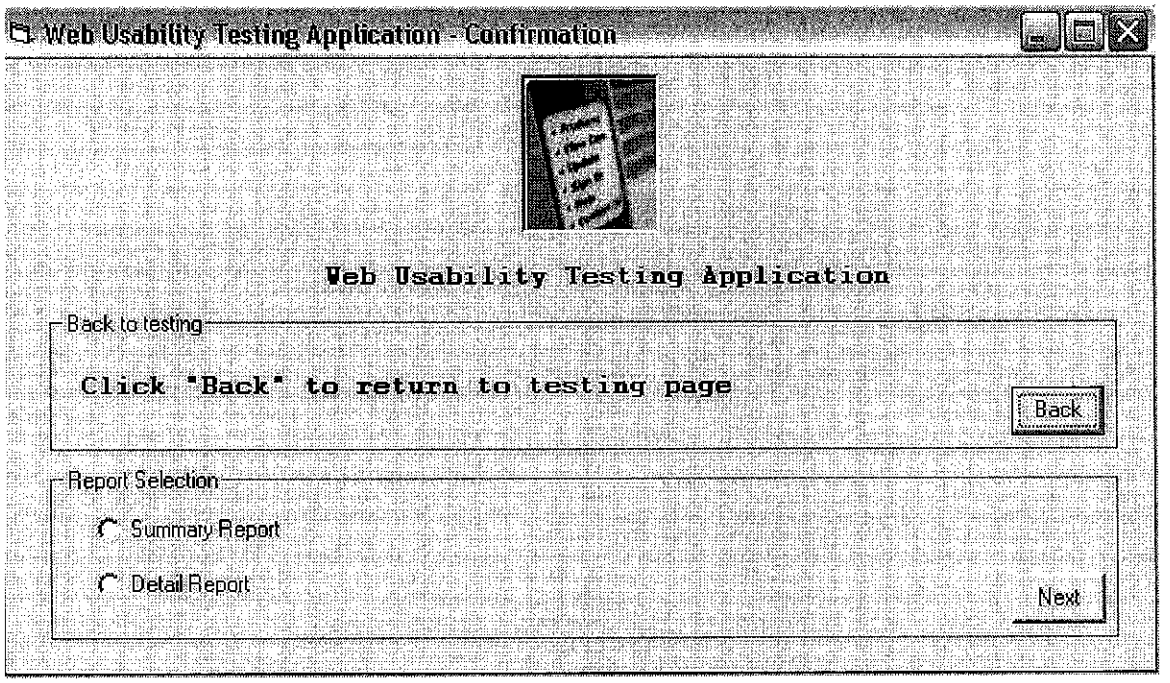


Figure 9 : Confirmation page

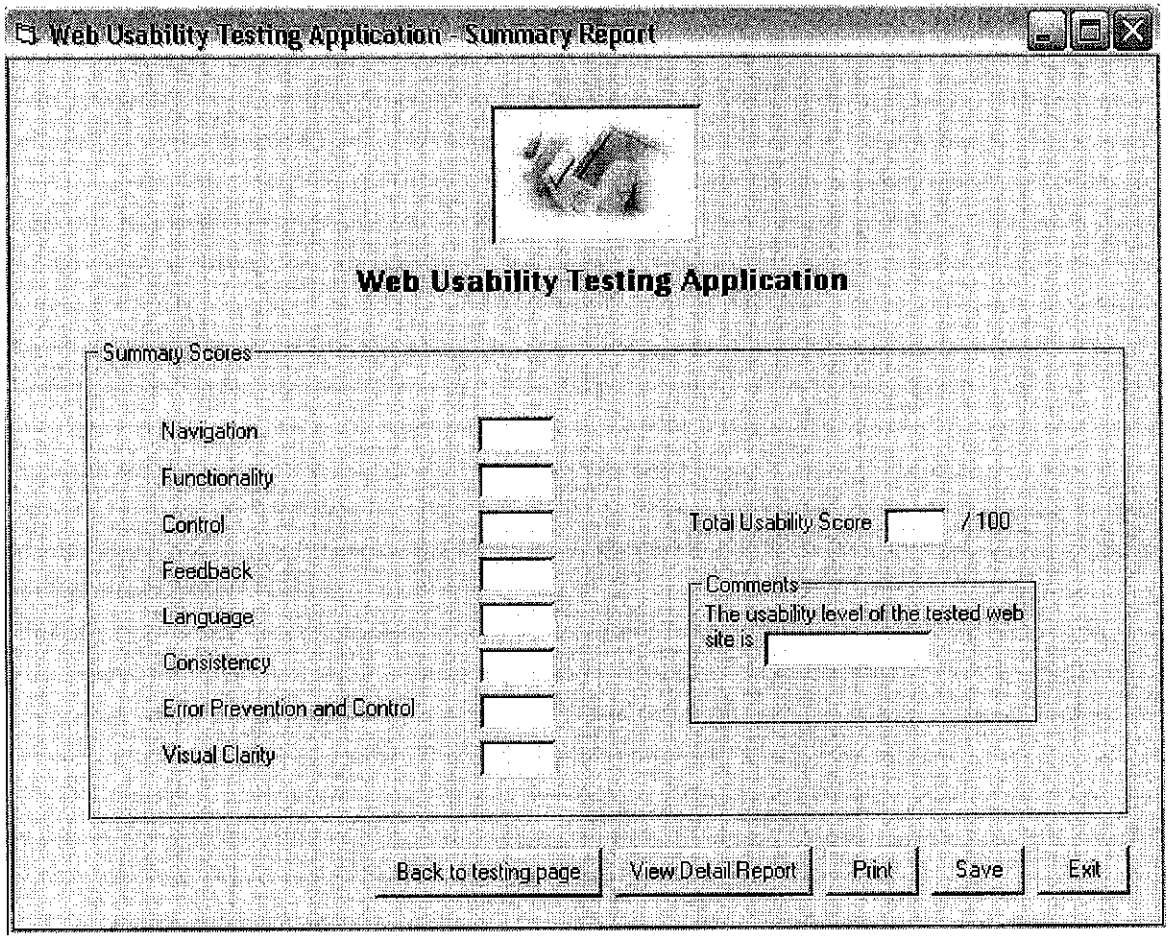


Figure 10 : Web Design / Task Evaluation Summary Report page

APPENDIX 4 : WUTA VB INTERFACES

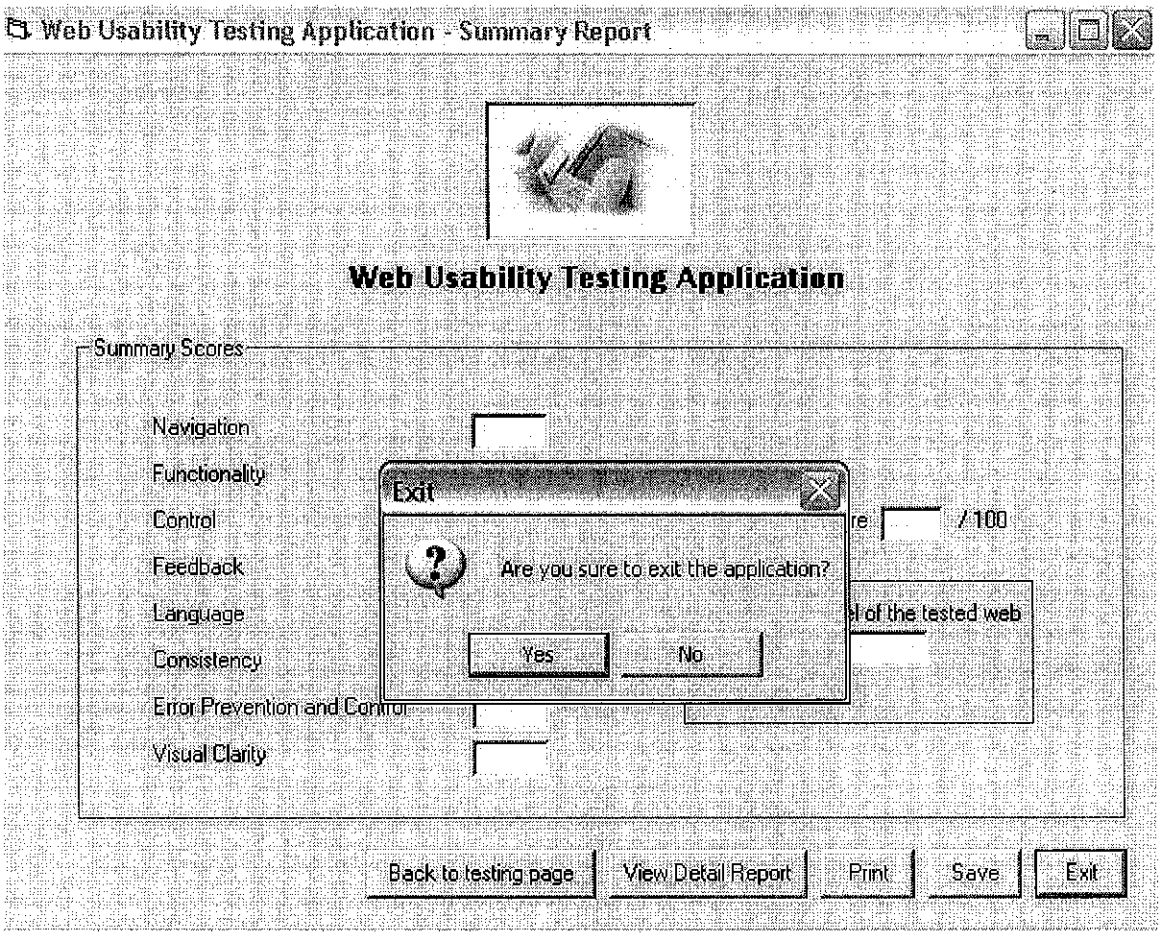


Figure 11 : Web Design / Task Evaluation Summary Report page with Exit button clicked

APPENDIX 4 : WUTA VB INTERFACES

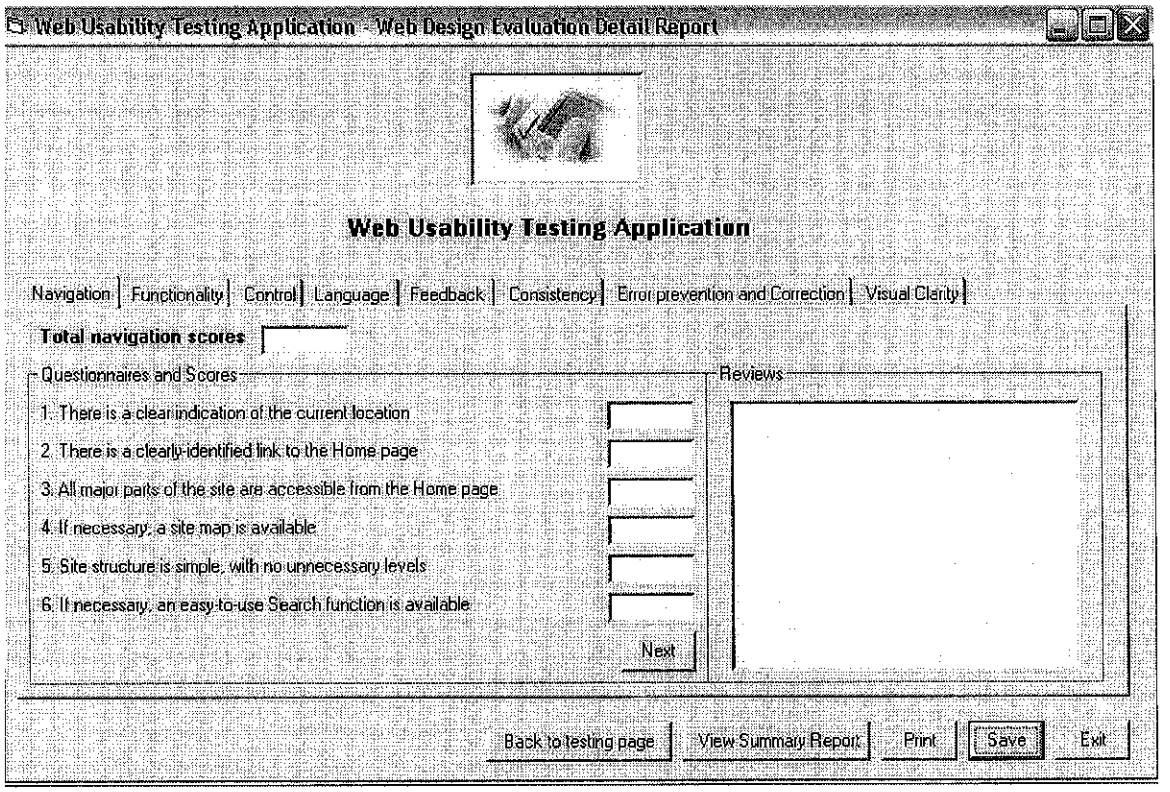


Figure 12 : Web Design Evaluation Detail Report page

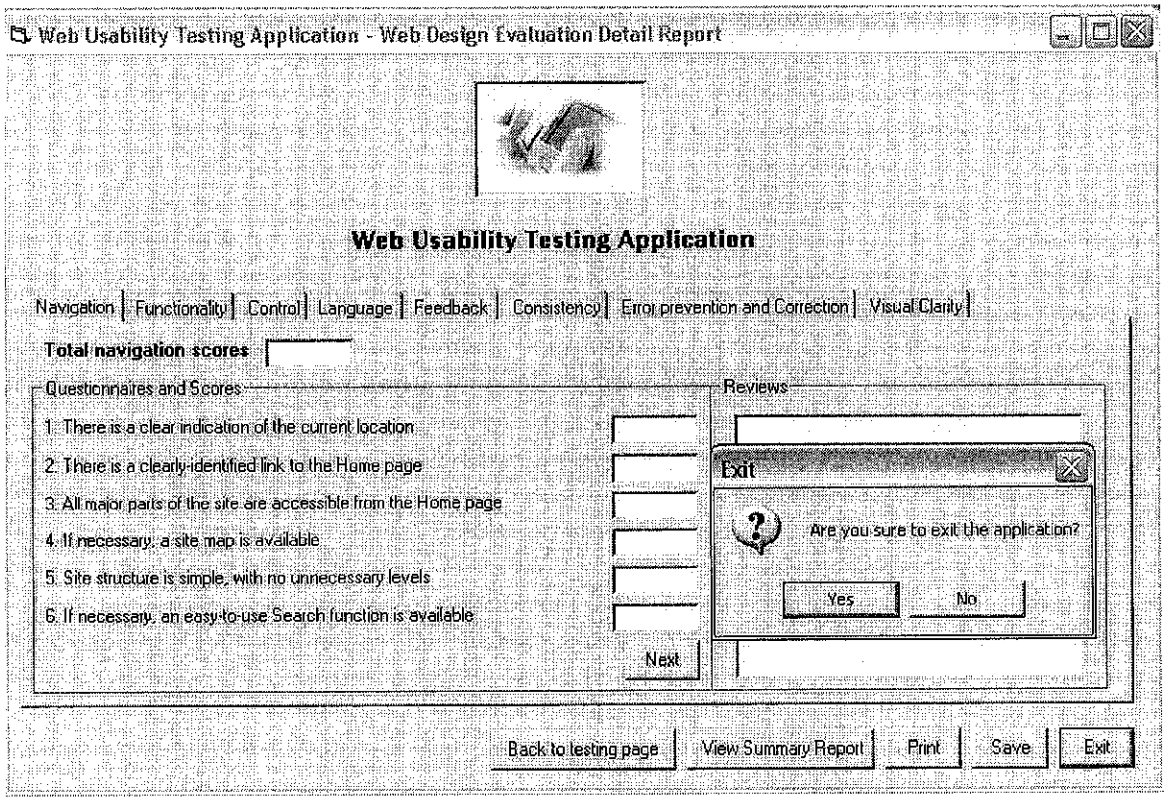


Figure 13 : Web Design Evaluation Detail Report page with Exit button clicked

APPENDIX 4 : WUTA VB INTERFACES

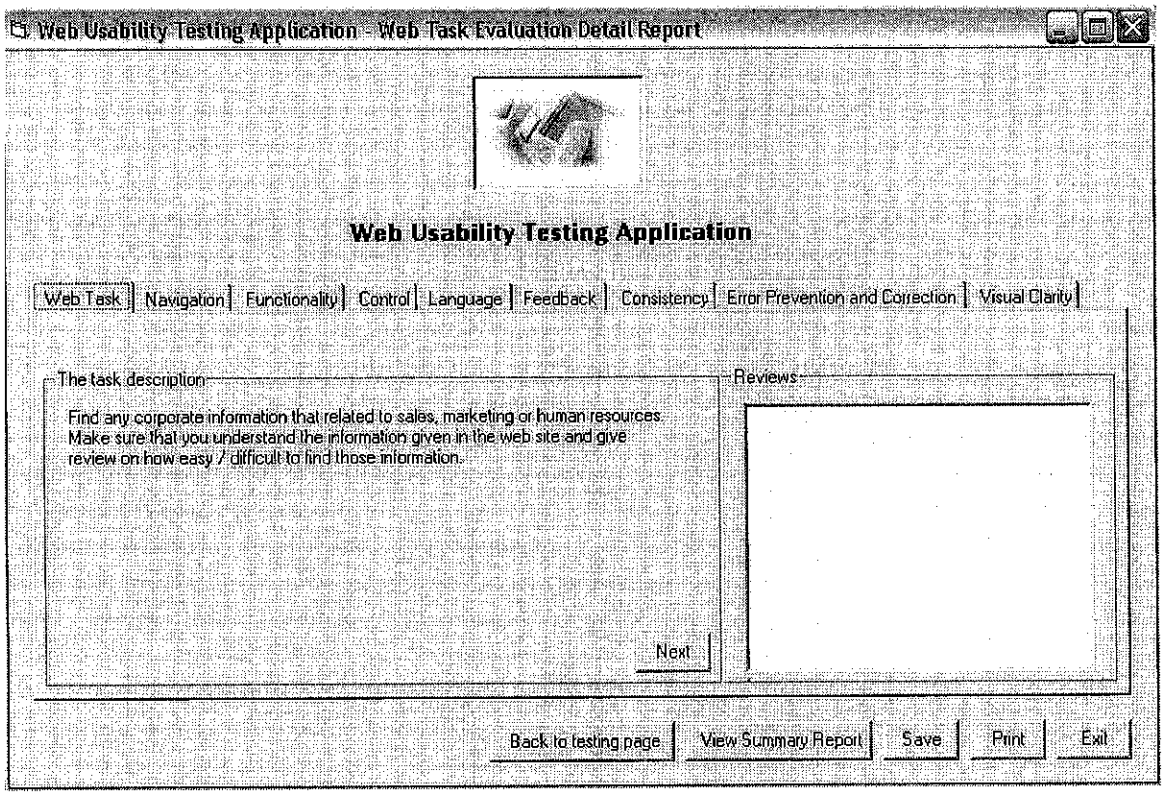


Figure 14 : Web Task Evaluation Detail Report page

APPENDIX 4 : WUTA VB INTERFACES

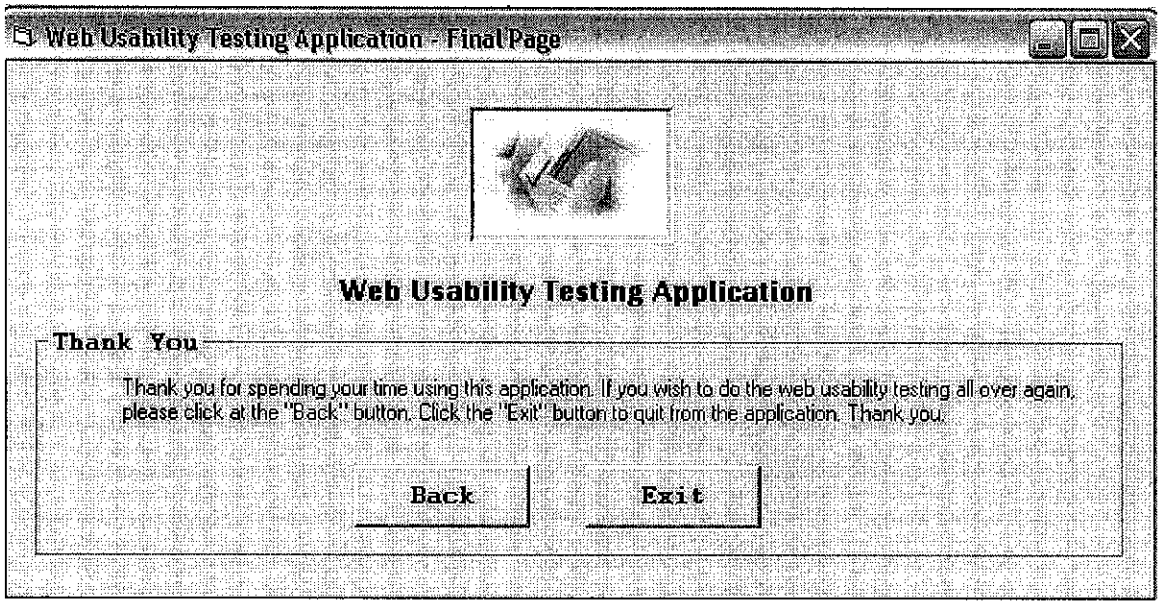


Figure 15 : Final Page

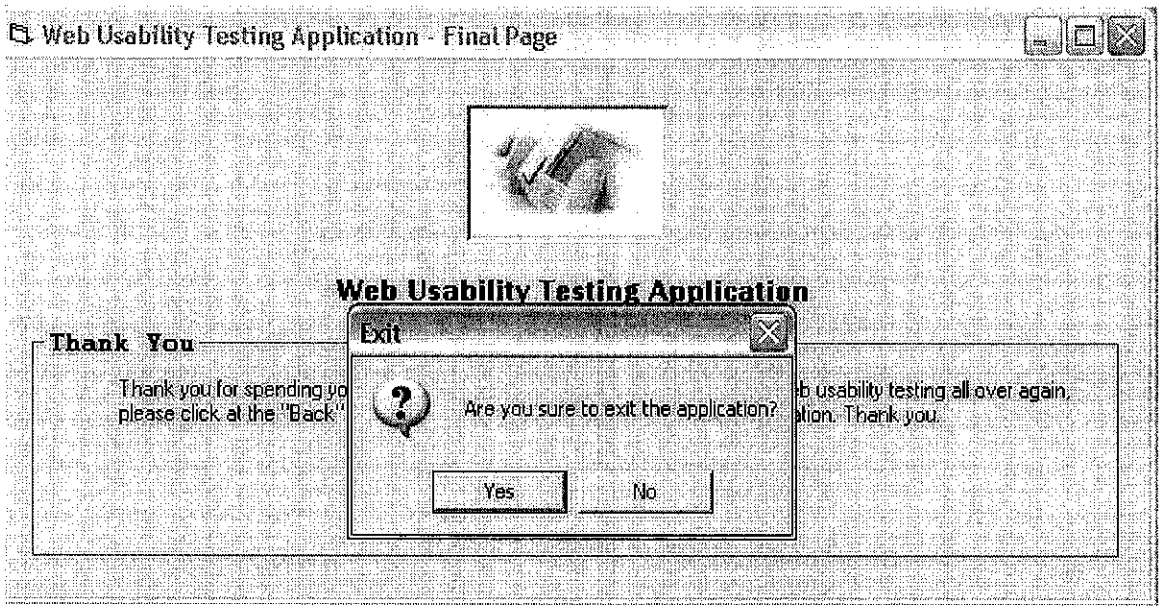


Figure 16 : Final Page with Exit button clicked

APPENDIX 5 : USABILITY REVIEW CHECKLIST

Navigation	Compliance			
	Always	Sometimes	Never	Notes
There is a clear indication of the current location	☐	☐	☐	
There is a clearly-identified link to the Home page	☐	☐	☐	
All major parts of the site are accessible from the Home page	☐	☐	☐	
If necessary, a site map is available	☐	☐	☐	
Site structure is simple, with no unnecessary levels	☐	☐	☐	
If necessary, an easy-to-use Search function is available	☐	☐	☐	

Functionality	Compliance			
	Always	Sometimes	Never	Notes
All functionality is clearly labelled	☐	☐	☐	
All necessary functionality is available without leaving the site	☐	☐	☐	
No unnecessary plug-ins are used	☐	☐	☐	

Control	Compliance			
	Always	Sometimes	Never	Notes
The user can cancel all operations	☐	☐	☐	
There is a clear exit point on every page	☐	☐	☐	
Page size is less than 50Kb/page	☐	☐	☐	
All graphic links are also available as text links	☐	☐	☐	
The site supports the user's workflow	☐	☐	☐	
All appropriate browsers are supported	☐	☐	☐	

Language	Compliance			
	Always	Sometimes	Never	Notes
The language used is simple	☐	☐	☐	
Jargon is avoided	☐	☐	☐	

Feedback	Compliance			
	Always	Sometimes	Never	Notes
It is always clear what is happening on the site	☐	☐	☐	
Users can receive email feedback if necessary	☐	☐	☐	
All feedback is prompt	☐	☐	☐	
Users are informed if a plug-in or browser version is required	☐	☐	☐	
Users can give feedback via email or a feedback form	☐	☐	☐	
If necessary, online help is available	☐	☐	☐	

Consistency	Compliance			
	Always	Sometimes	Never	Notes
Only one word or term is used to describe any item	☐	☐	☐	
Links match titles of the pages to which they refer	☐	☐	☐	
Standard colours are used for links and visited links	☐	☐	☐	
Terminology is consistent with general web usage	☐	☐	☐	

Error prevention and correction	Compliance			
	Always	Sometimes	Never	Notes
Errors do not occur unnecessarily	☐	☐	☐	
Error messages are in plain language	☐	☐	☐	
Error messages describe what action is necessary	☐	☐	☐	
Error messages provide a clear exit point	☐	☐	☐	
Error messages provide contact details for assistance	☐	☐	☐	

Visual clarity	Compliance			
	Always	Sometimes	Never	Notes
The layout is clear	☐	☐	☐	
There is sufficient 'white space'	☐	☐	☐	
All images have ALT text assigned	☐	☐	☐	
Unnecessary animation is avoided	☐	☐	☐	