

# **Emotions and User Interface Design focused on Web pages**

*A Thesis Presented to*

*The Faculty of the Computer Science Program*

*California State University Channel Islands*

*In (Partial) Fulfillment*

*of the Requirements for the Degree*

*Masters of Science in Computer Science*

*by*

*Shylu Rajakumar*

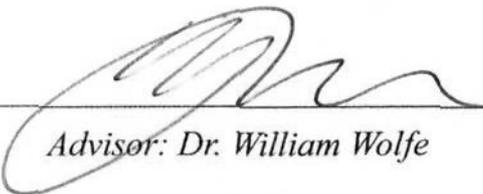
*October 2010*

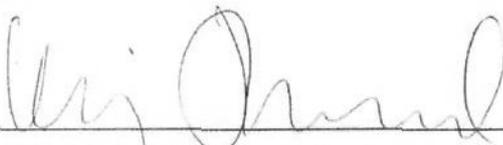
© 2010

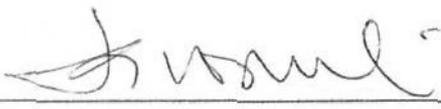
Shylu Rajakumar

ALL RIGHTS RESERVED

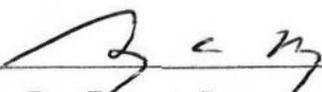
APPROVED FOR THE COMPUTER SCIENCE PROGRAM

  
\_\_\_\_\_  
*Advisor: Dr. William Wolfe*      *10/22/10*  
*Date*

  
\_\_\_\_\_  
*Dr. Andrzej Bieszczad*      *10/22/10*  
*Date*

  
\_\_\_\_\_  
*Dr. Richard Wasinowski*      *Oct 22, 2010*  
*Date*

APPROVED FOR THE UNIVERSITY

  
\_\_\_\_\_  
*Dr. Gary A. Berg*      *11-8-10*  
*Date*

# **Emotions and User Interface Design- focused on Web pages**

*by*

*Shylu Rajakumar*

*Computer Science Program*

*California State University Channel Islands*

## **Abstract**

This paper presents an overview of web user's emotional reactions to different designs of web pages and the influence of badly designed web pages on its users. There is a detailed analysis of the common mistakes the designers make and the do's and don'ts of web designing to create a user friendly, enjoyable web pages. A list of 50 points – based on the usability design guidelines is drawn that would be helpful in designing effective, easy to use web pages. Based on the design guidelines few web pages were designed, tested for usability features and finally subjected to user evaluation.

The different stages of the research undertaken are: exploration of the theories of emotion in the psychological science, modeling of the emotional concerns about interfaces(web pages), testing of the different websites with different evaluation methods-automatic test tools, emotional interface evaluation of poorly designed and better web pages (online surveys based on usability). The evaluation shows the user's emotional responses towards different types of interfaces, highlighting the emotional improvements in users when browsing through a better designed web page. Finally a road map is drawn to illustrate the sequence of steps to be followed to pass the emotional interface evaluation.

## **Acknowledgments**

I would like to thank Professor Bill Wolfe for his guidance and great support without which this work would not have been completed. In addition, I would like to thank Dr. Andrzej Bieszczad, the program director, the committee members and other faculties of California State University Channel Islands who indirectly supported and motivated in completing this work. Finally I would like to sincerely thank my husband for his help, support, guidance and patience, and without whom the Masters Program would have been only a dream for me.

## TABLE OF CONTENTS

<b>OVERVIEW OF THIS PAPER.....</b>	<b>7</b>
<b>CHAPTER 1: INTRODUCTION.....</b>	<b>8</b>
1.1 EMOTIONS .....	8
1.2 WEB PAGES AND EMOTIONAL IMPACT ON USERS.....	9
1.2.1 OTHER DESIGN MISTAKES THAT FRUSTRATES THE USER.....	9
1.2.2 BAD WEBSITES AND WEBSTRESS.....	10
1.3 HOW TO MAKE USERS EMOTIONALLY FEEL GOOD.....	11
<b>CHAPTER 2: STARTING WITH WEB DESIGNING.....</b>	<b>13</b>
2.1 WIRE FRAME AND WHY IS IT NEEDED.....	13
2.2 POINTS TO BE FOLLOWED TO AVOID COMMON MISTAKES.....	14
2.3 FEW ADDITIONAL POINTS AS DO'S AND DONT'S IN DESIGNING THE WEB PAGE.....	28
<b>CHAPTER 3: TECHNICAL DETAILS OF THE WORK.....</b>	<b>35</b>
3.1 FOCUSING ON USER EXPERIENCE.....	35
3.2 IMPROVED USABILITY THROUGH DESIGN.....	36
3.3 DESIGN BALANCED WITH EMOTIONS AND EYE FLOW.....	37
3.3.1 CAUSES OF FLOW.....	38
3.3.2 FLOW AND EMOTION.....	39
3.4 POSITIONING OF ELEMENTS.....	40
3.5 USABILITY GUIDELINES.....	45
<b>CHAPTER 4: EXPERIMENTS.....</b>	<b>50</b>
4.1 MY WEBSITES CREATED AFTER A DETAILED STUDY .....	50
<b>CHAPTER 5: EVALUATION.....</b>	<b>55</b>
5.1 EVALUATION METHODOLOGIES .....	55
5.1.1 AUTOMATIC EVALUATION TOOLS.....	55
5.1.2 SURVEY QUESTIONNAIRES.....	71
<b>CHAPTER 6: ANALYSIS OF RESULTS.....</b>	<b>76</b>
6.1 ANALYSIS OF AUTOMATIC EVALUATION TOOLS.....	76
6.2 ANALYSIS OF SURVEY QUESTIONNAIRES.....	77
<b>CHAPTER 7: CONCLUSIONS.....</b>	<b>93</b>
<b>CHAPTER 8: FUTURE WORK.....</b>	<b>94</b>

# Overview of this Paper

The goal of this thesis paper is to present a detailed study of how user friendly web pages can be created and how such web pages emotionally satisfy users. The first chapter talks about how poorly designed websites cause emotional stress to users. Also, the chapter talks about major design flaws, focusing on the most common mistakes and areas where designers fail to concentrate.

The second chapter presents the web designing methodologies starting from a layout design- wireframe, the steps to be followed, the DO's and DONT's in web designing.

The third chapter focuses on the technical details which includes how to obtain user attention, the design aesthetics, balance between emotions and eye flow and finally positioning of design elements in a page. It is also pointed out that to create a best user friendly pages, the design usability guidelines can be followed.

The fourth chapter covers the websites created for this paper, explaining few design elements and functionality.

The evaluation methodologies which includes automatic evaluation tools and survey questionnaires are discussed in the fifth chapter. A brief description of all the test tools used and the test results of the websites are also included in this chapter.

Analysis of results are discussed in chapter six. The results of the test tools and the survey questionnaires are also presented.

Chapter seven and eight presents the conclusion and future work.

# Chapter 1: Introduction

## 1.1 Emotions

Emotion plays a powerful role in our lives [16] and has gained significant attention as a priority area of study in interaction design. Emotion is one of the strongest differentiators in user experience because it triggers unconscious responses to a product, website, environment or interface. Emotion is not an exclusive factor in defining a successful user experience. Hekkert [15] found that every product feature affects the experience, which can be complex and multifaceted. Further, emotions are culturally specific and variable [17], which may explain anomalies found in responses to the emotions of ‘desire’ and ‘disappointment’ when testing emotion in Japan, compared to responses found in the USA, Netherlands or Finland. Intensity of emotional expression in user interface design is also highly dependent on the personal goals, attitudes and expectations the user brings to the product.

Until recently, emotion in web field was studied as a separate, distinct facet of human cognition. This is because, the field of Human Computer Interaction has distanced usability research from emotion and it is reflected by the field of Cognitive Science. Ratner [17] noted that emotions and thinking seem so different, that we classify them as different kinds of phenomena: Emotions appear so antithetical to thinking that they are said to interfere with it. Clear thinking supposedly requires eliminating emotions.

Using the paradigm of a computer to describe human information processing, cognitive research has tended to emphasize humans as problem solvers. The idea that cognitive functions, such as thinking, rise above emotional processing, is a historic relic of the research practice of separating emotion from cognition. Vygotsky [18] believed that separating affect from cognition was a major weakness in the field of psychology and cognitive science. According to Davidson [19], the perception that affect and cognition are independent, separate information processing systems is flawed. New breakthroughs in neuroscience using functional Magnetic Resonance Imaging (fMRI) have validated the

assertions that cognition and emotion are a unified process. Ratner pointed out that Heather M. Gray [20] found that emotion and cognition ‘conjointly and equally contribute to the control of thought and behavior’. Not only does emotion contribute to the regulation of thought and behavior, but also cognition contributes to the regulation of emotion [5]. Separating emotion from cognitive functions does not seem helpful from a research or design perspective. Instead, an integrated view of emotion and cognition appears to be taking hold, not only in neuroscience and artificial intelligence but also in interaction design as well.

## **1.2 Web pages and Emotional Impact on Users**

Emotional design and usability, when focused keenly, makes the user happy. This can be easily achieved by concentrating in designing the pages that minimizes the common emotions related to poor usability such as anger, confusion, frustration and annoyance.

- Perception of credibility
- Trust
- Perception of security
- Overall perceived ease of use

Also, slow, balky, and confusing websites aren’t a good thing. Traffic metrics show this, as does conversion data. Google, whom some think of as passively indexing the web, believes quick-loading pages are essential to a good user experience. Google is, in fact, actively trying to speed up websites (and keep their search users happy) by making page load time a ranking factor thereby avoiding frustration in users.

### **1.2.1 Other Design mistakes that frustrates the users**

- Poor navigation
- Crowding the web pages with new browser windows
- Squeezing advertising in the contents
- Moving pages to new URLs

- Too much scrolling

## 1.2.2 Bad Websites and Web stress

Bad designed websites and slow loading times are causing ‘web stress’ for internet users. This is the result of a new neurological study by CA in cooperation with one of the leading customer experience and consultancy consulting firms Foviance. The study even shows that bad websites have a negative effect on the user health.

During the study, which was conducted at the Glasgow Caledonian University [7], volunteers (eight women and five men between the age of 25 and 42 years) were wired up to sophisticated neurological and physiological testing equipment (incl. an Electroencephalography cap) which was used to monitor brain wave activity. The volunteers carried out a series of everyday online tasks such as finding and buying a laptop PC and travel insurance. During the test the internet connection was slowed down to increase the stress factor.

With the generated data, CA and Foviance found the two most stressful points of the online sales cycle which caused a high level of ‘web-stress’: search and checkout. Although the volunteers completed the purchase, more than three quarters of customers will abandon the site in reality. And it took the volunteers up to a minute to recover from that ‘web stress’. This result corresponds with CAs Web Stress Index study. In 2009 CA interviewed 2500 consumers. The key finding was that slow loading websites were a frustrating experience for 92% of the respondents. No wonder that volunteers in the experiment were leaving bad websites, or wanted to call the company’s hotline.

*“The results of this study sends out a clear message – businesses need to reduce ‘web stress’ and improve the online experience of their customers if they’re going to maximize returns from their web channel” . It’s not just about website design or internet connection speeds – the performance of a website is dependent on the performance of the web applications that support it. Businesses need an Application Performance Management (APM) solution which not only provides real insight into how customers are experiencing their web applications, but will proactively manage the performance and availability of these applications. This translates into better customer service, improved brand loyalty and increased sales.”- Kobi Korsah, Director, EMEA Product Marketing, CA [14]*

*“Consumers have very high expectations of web applications and web sites – to be always available and instantly responsive. This experiment simulated the experience of under performing web applications for our volunteers. The results show that when online expectations aren’t met, people quickly become agitated, confused and have to concentrate 50% more than normal. All these problems can be detected and prevented as long as businesses take a proactive approach to measuring the customer’s experience of web applications.”- Catriona Campbell, Director and Founder, Foviance and leading behavioural psychologist [14]*

### **1.3 How to make Users emotionally feel good**

Web design is an effort at direction and communication. The look and feel of the website should convince its visitors to visit the site more often and compel them to do so. In order to do that the web page must engage in advisable psychology (through design and copy) while avoiding distracting and irrelevant purposes that run counter to the primary function of the page [9]. Also the index page must not attempt to dump the entire site’s content into the viewer’s eyes in one fell swoop. Rather, the page must make a concise and clean first impression; an impression focused on a specific rather than all-encompassing purpose.

**A website design can be more appealing and easy to use by avoiding some common mistakes.**

**Some of the common mistakes are:**

**Too flashing or extra fancy web page :** The less flashy the website, the more the visitors likes it as there are times when the visitors enter the website and when they see too much of flashing, they immediately get out of it.

**Usage of tiny /fancy fonts that are unreadable:** If the fonts are too tiny and cannot be easily read and isn’t clear enough then the website visitors will feel that the website is too descriptive and switch to another website which is brief and readable. Fancy fonts that are unreadable, are to be avoided, sure there are some fonts that will give a sophisticated look to your website. But are they readable? If the main objective is to deliver a message and get the visitors reading the stuff, then the design process should be made comfortable for them.

**Lengthy flow of contents:** The content blocks should be broken into bullets or points. Online readers always like every thing fast. They always like to read the contents that are short and sweet. The best solution is to break longer paragraphs or using points or bullets that are easy to read.

**No brief and clear description about the website:** Just by entering the website, the online guests should understand immediately what the website is all about. The reason is quite simple, if they do not understand quickly about the website, they will not bother to research on it.

**Using auto playing music:** Auto playing music irritates the visitors. Another point is that, if they are at work and they do not want everyone to know what they surfing, then a sudden music blast is definitely going to be a turn off.

**Too much of scrolling :** A little bit of vertical scrolling might be necessary, but has to be limited to a maximum of 3 clicks to reach the bottom of the page. Also, horizontal scrolling should be avoided at all costs, being user friendly while maintaining the creativity, thinking for those who might be using smaller screen like notebook.

**Cluttered web page :** Lots of banners, association labels, badges and other things will confuse the entity of your website.

**No contact details:** There is nothing worse than a website that has no contact details. This is not bad only for the visitors, but also for the company or designers who might lose important feedback along the way.

**Using blinking text:** The blinking text frustrates the visitor to a greater extent.

**Broken links:** Getting messages like the page no longer exists after clicking the link makes no sense and has to be taken care of.

**No index.html (or equivalent) in the root directory:** By default the index.html (or an equivalent such as index.htm, index.php, default.htm, etc.) is displayed when the user visits any site, for example, <http://www.yourdomain.com>. If the index.html is not included, then the visitors will get an error message or be required to type out the full URI including the file name.

**Duplicate meta information on all pages:** The keywords and description meta tags in the head of each web page helps the search engines to categorize the web pages. If the meta tags are duplicated across all pages of the website, they will look alike to searchers. Customizing the keywords and descriptions for each page is very important.

# **Chapter 2: Starting with Web Designing**

The Web Designing starts with making a rough layout (wireframe) that can be used as a guide tool for creating a live website. The position of various design elements, navigation techniques are all done by following the usability design guidelines. Some of the common mistakes done by the designers can be avoided if the design guidelines are properly followed. Once the wireframe is done a manual check can be done to make sure that visual design elements including the font style and font size are followed as per the guidelines.

## **2.1 Wire frame and why is it needed**

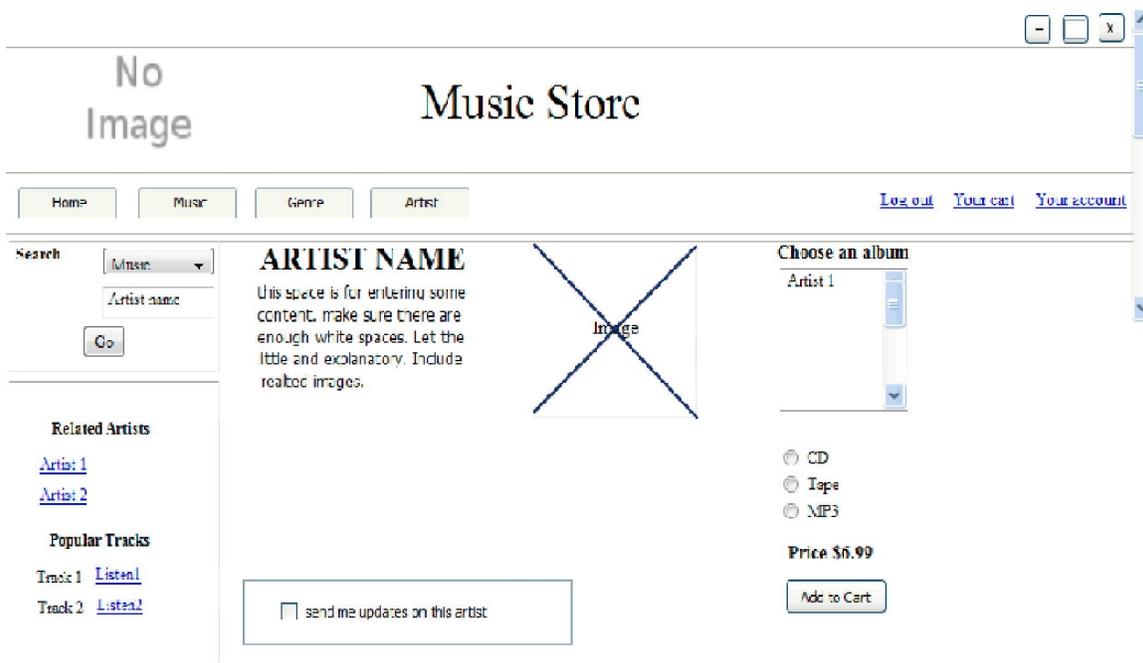
A website wireframe is a basic visual guide used in interface design to suggest the structure of a website and relationships between its pages. A web page wireframe is a similar illustration of the layout of fundamental elements in the interface. Typically, wire frames are completed before any artwork is developed.

Wire frames allow for the development of variations of a layout to maintain design consistency throughout the site. This is an important part of the initial development stage because it creates user expectations and helps develop familiarity with the site.

Creating a set of wire frames for a project also acts as a way to communicate with clients and stakeholders such as content creators, engineers, and developers. Over the course of a project the wire framing exercise functions as a stable base on which to consider changes, diverse user paths, and new requirements. The information architect and information designer typically use the wire frames as a meeting of the minds and as solid working documents on which to establish the language, content, and structure of interactions users will have with a given site or project.

The creation of wire frames also helps to define the positioning of global and secondary levels of navigation in a prominent and intuitive position, as well as providing an area for utilities such as helpful information and search facilities. Generally, it is after creating wire frames that branding is applied to the site to communicate the identity and personality of the site.

Wire frames can range from simple structural drawings of the site to a high-fidelity simulation of the navigation, which has movements, functional links and complex interactions. For simple drawings, paper prototyping is the most common technique, but it's becoming increasingly common to use software for more complex projects. The Pencil Draw software tool is used to draw the following wireframe. The tool has commonly used web elements which can be dragged and dropped as needed.



**Figure 1.** A common wireframe to understand the positioning of design elements.

## **2.2 Points to be followed to avoid the common mistakes.**

### **1. Visual balance of the page**

When 'users' visit a website, their initial focus starts at the top left of the page and hovers there before slowly tracking to the right. Contrary to what many think, the web user is focused more on the text of the page, rather than images or graphics. This is where balance comes into place.

Balance not only makes the page more visually appealing, but it also makes the page easier to read and items easier to find. A good layout will help the objects on the web page to flow.

Good Web design, perhaps even more than other type of design, is about information. One of the biggest tools to do this is precedence. When navigating a good design, the user should be led around the screen by the designer. It's about how much visual weight different parts of the design have.

A simple example of 'precedence' is that, in most sites, the first thing any user sees is the logo. This is often because it's large and set at what has been shown in studies to be the first place people look (the top left). This is a good thing since any designer would probably want a user to immediately know what site they are viewing.

But “precedence” should go much further. The design should direct the user's eyes through a sequence of steps. For example, the design should guide the user to go from logo/brand to a primary positioning statement, next to a punchy image (to give the site personality), then to the main body text, with navigation and a sidebar taking a secondary position in the sequence.

What the user should be looking at is up to the designer.

### **To achieve precedence the areas to concentrate on are as follows:**

Position — where something is on a page clearly influences in what order the user sees it.

Color — using bold and subtle colors is a simple way to tell the user where to look.

Contrast — being different makes things stand out, while being the same makes them secondary.

Size — Big takes precedence over little (unless everything is big, in which case little might stand out thanks to Contrast)



*Figure 2.* A good visual balance of the page.



*Figure 3. Poor visual balance.*

## 2. A simple layout

Less is more. A web page should look clean so all the unnecessary visual elements should be removed. This will allow important items to stand out. Leaving some white space on the page gives an uncluttered look. The illusion of space is visually pleasing, as well as easier to navigate. Otherwise, the visitor will get whiplash by darting their head from left to right in an attempt to look at all the information crammed on the screen. Or worse, they'll leave the website in a hurry.



Figure 4. Simple layout.



Figure 5. Crowded layout.

### 3. Fix your fonts

The size and type of font used in a web page will have an effect on how the reader takes in the information. San-serif fonts such as Arial and Verdana are popular choices for on-screen reading. The font size should be no smaller than 10 points and no larger than 14 points.

#### 4. Clean backgrounds

A subtle background is always a good choice. The background textures and colors should have the ability to gauge the overall appeal of the website. Lots of texture and graphics in the background can be distracting. The more the texture added to the background, the less noticeable the text and images become. When choosing a color on the background, there should be a significant contrast between the background color and the text. Therefore a good balance on the web page promotes better readability.

Choosing a black text on a white background is the best choice of all. It's crisp, clean, and easy to read features would invite more visitors. Using darker and brighter colors such as red or yellow may cause visual fatigue and the reader will lose their focus on the text.



*Figure 6.* Clean background.



*Figure 7. A cluttered background.*

## 5. Graphics

Graphics are often overused on web pages. Cluttered pages with objects looks cool but serves no purpose other than to increase the download time. Here are some instances where graphics can be used to enhance the look and feel of the page:

**Logo** – The logo is the brand recognition and it adds visual appeal to all web pages.

**Title bar** – The title bar helps the visitors to know in which page they are while navigating.

**Horizontal rules** – Graphic lines (horizontal rules) are often used to separate categories or sections of a web page.

**Background images** – Are used to add visual appeal or make a web site easier to navigate.

**Photos** – To personalize a website and make it inviting.

**Navigation icons**, such as 'home' and 'back' enhance a page because they are familiar and users anticipate seeing them.



*Figure 8.* Too many graphics used.

## 6. Easy navigation

Positioning a toolbar in an appropriate position is a real challenge. Creating a navigation bar with links that are easier to navigate is one of the most important task in web designing. Web users often look for the toolbar across the top or down the left hand side of the page. Going with the norm will create a sense of familiarity and facilitate the ease of navigation. A link to the homepage is a must. It's often forgotten but very important to direct the users to the home page. [www.impactdesigners.com](http://www.impactdesigners.com) is an example of easy and well structured website navigation.



Figure 9. Well designed top navigation bar.



Figure 10. The navigation menus that are too confusing.

## 7. Text readability

Displaying the contents effectively makes them easier to read. Also, if longer paragraphs are broken in to smaller parts it will help the users to quickly browse through the important points.

The key points on each page including the headings and subheadings should be highlighted or differentiated using different colors. Choosing colors and font sizes are also important. Colors such as yellow and pink, don't stand out well if a white or black background is selected. It is better if the number of font sizes used in a page is limited to one or two. Choosing one font for the headings and subheadings and another for the body text gives a neat look.



Figure 11. Too small font size.

## 8. Scrolling

Horizontal scrolling should be avoided. Users hate to scroll left to right. It's disorienting and annoying.

The most used screen resolution nowadays is 1024 x 768 pixels, so designing the web page that fits inside it makes a perfect layout.

Vertical scrolling can be an excuse if it cannot be avoided, but it is a better idea to move blocks of information to another page and to provide links. There's also the danger of missing vital information that falls below the screen if a user decides not to scroll down to view it. So if the website has a scrolling page, all important information should be above the fold.

## **9. Making it quick**

We all get impatient when it takes more than 5 seconds to connect to a website. All web pages should be designed to load as quickly as possible. Unnecessary graphics, especially flash graphics can be eliminated as they can be time hogs. Designing the homepage to make an immediate positive impression should be the goal of the designer.

## **10. Being consistent**

Consistency means making everything match. Heading sizes, font choices, coloring, button styles, spacing, design elements, illustration styles, photo choices, etc. Everything should be themed to make your design coherent between pages and on the same page.

Keeping the design consistent is about being professional. Inconsistencies in a design are like spelling mistakes in an essay. They just lower the perception of quality. Whatever the layout design looks like, keeping it consistent will always bring it up a notch. Even if it's a bad design, at least it should be made as a consistent, bad design.

The simplest way to maintain consistency is to make early decisions and stick to them. With a really large site, however, things can change in the design process.

Having a good set of CSS style sheets can also go a long way to making a consistent design. Core tags like `<h1>` and `<p>` should be defined in such a way as to make the defaults match properly and avoid having to remember specific class names all the time.

## **11. Using CSS over HTML tables**

In the beginning “HTML tables” were used to create page layouts. With the advent of CSS, however, there is no reason to stick to them. CSS is faster, more reliable and it offers many more features.

## **12 . Making sure that users can search the whole website**

Search option makes it very easy to find the information the user is looking for. In case of a huge website, it is much easier to find what they are looking for.

## **13. Avoiding “drop down” menus:**

The user should be able to see all the navigation options straight way. Using “drop down” menus might confuse things and hide the information the reader was actually looking for.

## **14. Using text navigation**

Text navigation is not only faster but it is also more reliable. Some users, for instance, browse the Internet with images turned off.

## **15. Making the website cross-browser compatible**

Not all browsers are created equal, and not all of them interpret CSS and other languages on the same way. The website designer should make the website compatible with the most used browsers on the market, to keep the visitors over the long term.

## **16. Including anchor text on links**

It is easier to tell people to “click here”. But this is not efficient. Including a relevant anchor text on each links makes the site self explanatory. It will ensure that the

reader knows where he is going to if he clicks the link, and it will also create SEO benefits for the external site where the link is pointing.

## 17. Making links visible

The visitor should be able to recognize what is clickable and what is not, easily. The links should have a contrasting color (the standard blue color is the optimal most of the times) and possibly underlined.

## 18. Making clicked links to change color

This point is very important for the usability of a website. Clicked links that change color helps the user to locate him more easily around a site, making sure that he will not end up visiting the same pages unintentionally.

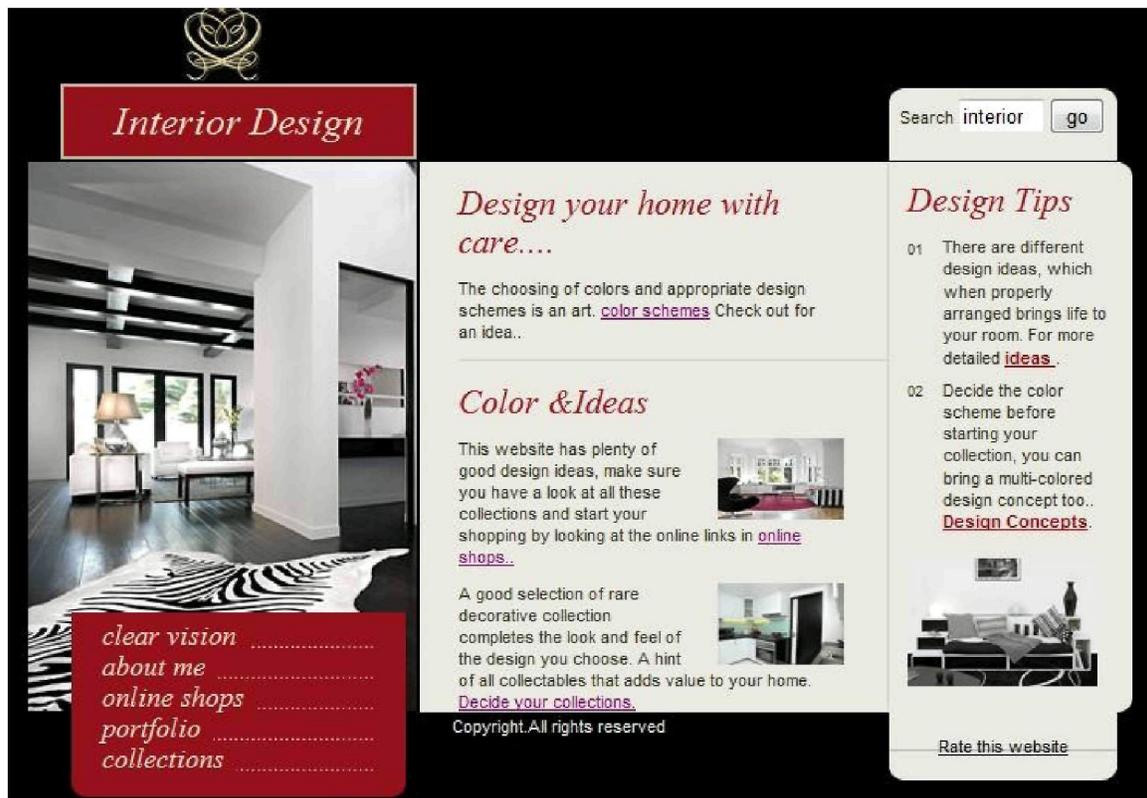


Figure 12. Links made visible and differentiated.

## 19. Using the ALT and TITLE attributes for images:

Apart from having SEO benefits the ALT and TITLE attributes for images will play an important role for blind users.

## **20. Including functional links on footer**

People are used to scrolling down to the footer of a website if they are not finding specific information. At the very least it is important to include a link to the Homepage and possibly a link to the “Contact Us” page.

## **2.3 Few additional points as Do’s and Don’ts in designing the web page.**

### **Do’s**

#### **DO MAKE THE WEB SITE SEARCH ENGINE FRIENDLY**

Whether a Web site is for professional or personal use, it should be search engine friendly.

#### **DO TEST YOUR WEB SITE**

The tested should be tested in advance of its launch and regularly thereafter, even if the website would be updated infrequently. Make sure the site works on different browsers especially Internet Explorer and Fire fox as well as across different fonts and screen resolutions. Broken links prevents a visitor from getting access to their desired information.

#### **DO ADHERE TO STANDARDS**

There are certain things people expect, and not giving them causes confusion. For example, if text has an underline, users expect it to be a link. Doing otherwise is not good usability practice. However, some conventions, can be modified but most of the Web site should be exactly how people expect it to be!

## **DO CONCENTRATE ON LINE SPACING AND PADDING**

### **Line Spacing**

The space between the lines directly affects how readable it appears. Too little space makes it easy for user's eye to spill over from one line to the next; too much space makes it an uncomfortable reading experience. The website designer can use line spacing in CSS with the 'line-height' selector.

### **Padding**

Text and other elements should be properly spaced. Images, for example, should not be touching text, neither should borders or tables.

Padding is the space between elements and text. The simple rule here is that you should always have space there.

### **Don'ts**

#### **DON'T ELIMINATE ALL WHITE SPACE**

Some Web sites have no white space, also known as the blank space between texts or other graphics. If used well, white space can help direct a reader's eye to specific information that has to be highlighted. White space can also cut down on clutter and create invisible boundaries across texts. A no-white-space policy may result in a disorienting reader-based experience.

#### **DON'T MAKE THE USER WAIT**

Don't make the user follow along with a load box. If music is embedded in with the site, the users should be given an option to mute it. The Web site should load quickly. On the home page and throughout the site, the pop-ups, banner ads and other ad-like content should be minimized or avoided.

#### **DON'T BOUNCE AROUND**

The look of the Web site should be consistent throughout. If the logo is on the upper left hand side of the Web site, for example, it should be the same across all pages. Also there should be a tab on every page that lets users link back to the home page. If the reader has to rely on the browser's back button to navigate around, then it is not a good design.

### **DON'T OPEN NEW BROWSER WINDOWS**

If new browser windows are opened for external links, eventually the windows will be covered with several windows thereby annoying the user. By opening new windows the visitor is forced leave to another website, the user will get back if he wants to or else he may leave the site.

### **DON'T FORCE THE VISITOR FOR REGISTRATION**

Do not force the visitor to register up and leave his personal information and other details unless it is absolutely necessary.

You should never subscribe the visitor for something without his consent. For example, subscribing a visitor to newsletters without his permission when he registers may leave a bad impression about the site.

### **DON'T JUDGE THE VISITOR**

The user should start the music file if a music file is included upon his interest, some situations might require an audio file. The website designer might need to deliver a speech to the user about a guided tour that might have an audio component. In such a case, the user should push the “Play” button as opposed to jamming the music on his face right after he enters the website.

### **DON'T USE ANIMATED GIFs**

In situations where advertising banners require animation, using them is an excuse, and it is better to avoid it. Animations make a site look unprofessional and detract the attention from the content.

### **DON'T USE HARSH COLORS**

The color palette for website design should match the designer’s objectives (i.e. deliver a mood; let the user focus on the content, etc.). If the user is getting a headache after visiting the site for 10 consecutive minutes, the color scheme should be changed.

### **DON'T USE POP UPS**

It is a best practice to avoid pop ups of any kind. Even user requested pop ups are a bad idea given the increasing amount of pop blockers out there.

### **DON'T MAKE SPELLING OR GRAMMATICAL MISTAKES**

Spelling or grammatical mistakes is one of the most important factors affecting the overall quality of a website. It is very important to double check all links and texts before launching the website.

## DON'T BLEND ADVERTISING INSIDE THE CONTENT

Blending advertising like Ad sense units inside the content might increase the click-through rate on the short term. Over the long run, however, this will reduce the readership base. An annoyed visitor is a lost visitor.

## 2.4 Examples of few websites with common mistakes



Figure 13. An example of a website that has no white space.

The image shows a screenshot of the Lingscars.com website. The main header reads "CAR LEASING - CONTRACT HIRE - CHEAP LEASE CARS". A large pop-up advertisement is overlaid on the page, featuring a green Škoda car and the text "Škoda 180bhp DSG 1-year deal! £270/mth including VAT". The pop-up also includes the phrases "Goin' FAST!" and "Wah! BOOT". The background website shows a navigation menu with options like "Cars and Vans", "How It Works", "Price Lists", "About Ling", "Customers", "Fun Stuff", and "Quote/Order". There are also various promotional banners and a "PLAY QUIZ" button.

Figure 14. An example of a website where pop up ads are used.



*Figure 15.* An example of a website where harsh color is used.

**MSY Technology Pty Ltd**  
 The name you can trust - More than 12yrs in IT industry - The best price everyday with widest range. Top brand cost you no more

**Live Now MSY Technology Online**  
 View Stock Level For All Stores Nationwide  
 New Shopping Cart Reservation System - Get 1st Priority and No Waiting Anymore  
 No Phone Calls, No Hassle

**Parts Pricelist** Update Every Day | **Notebook Pricelist** Update Anytime | **System Pricelist** Latest Update 05th of July | **Vendor Promotion** Best Price Everyday

MSY Carry Wide Range Of Premium High Speed Flash Products For Professional Power Users who using Digital Camera and Recorder  
 MSY Carry Wide Range of USB3.0 Cable - USB3.0 AM-AM, USB3.0 AM-BM (Printer Cable), USB3.0 AM-FM (Extension Cable)

State Special Clear Out Promotion: VIC (Geelong), NSW (Auburn), QLD (Stacksrock), SA (Adelaide CBD), WA (Balmain)

**July-August Promotion Save Up To \$140**  
 Promotion: Buy Any Intel or Any AMD CPU And / Or Buy Any Asus AMD or Intel Motherboard  
 Save \$10 On Any Asus Case | Save \$10 On Patriot Signature 4GB Kit (DDR3 1333)  
 Save \$40 On Samsung 23" E3220 or 24" E3240 or Save \$20 On 20" LG (2300) PS LED Monitor  
 Save \$30 On Patriot PS-100 32G SSD 1070 | Save \$30 On Thermaltake LVO Blue 100Watt PSU  
 Save \$20 On LG 1.5TB Lockhard 1070 with 4 Year Premium Further Cooling Guide (Blue Mac OS/Win)

**EDIMAX**  
 Easy 3 Year Advanced-Replacement Warranty On Whole Range Of Networking Products  
**Best Service in Australia**  
 Buy Any EDIMAX Networking Product  
 Get EDIMAX EW-771HUTN USB Wireless-11N Network Adapter \$19

**New Branch Open NOW : VIC-Geelong CBD Branch "Best IT Shopping Place In Geelong"**  
**New Branch Open NOW : VIC-Geelong-Noriane Branch**  
**New Branch Open NOW : QLD-Ipswich-Bundamba Branch "Best IT Shopping Place in Ipswich"**

Figure 16. An example of a website where title is used as a banner ad.

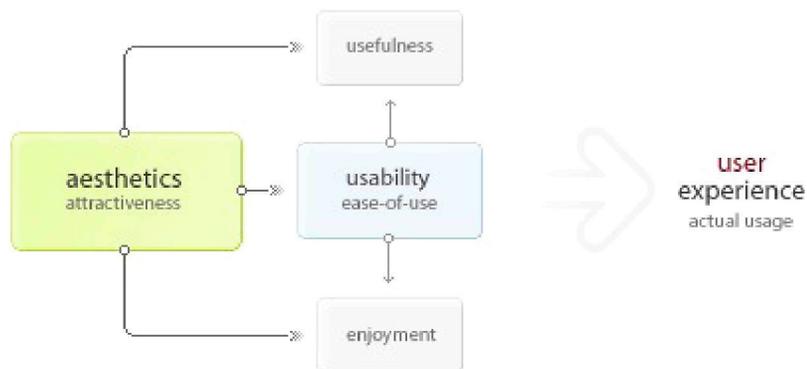


**Figure 17.** An example of a website where no navigation menus are used.

# Chapter 3: Technical details of the work

## 3.1 Focusing on User Experience

Design, focused with usability, is the main driver in shaping user experience. That is, aesthetics, thus attractiveness, directly affects perceived ease-of-use, usefulness and enjoyment. Consequently design, or more specifically usability focused aesthetics, is the chief enabler keeping in mind to make sure that minimal or no graphics is used to improve download time, large type and high contrast is focused on for improved readability. In short: improved usability on Web sites.



ADAPTED FROM: TECHNOLOGY ACCEPTANCE MODEL, DAVIS 1989

**Figure 18.** A diagram to illustrate how usability focused design improves user experience.

Usability contributes a lot to the good impression when the user visits any web page. The overall impression includes Web site usefulness, its ease-of-use, and how enjoyable navigating the page can be. Web site’s visual design plays a major role. In

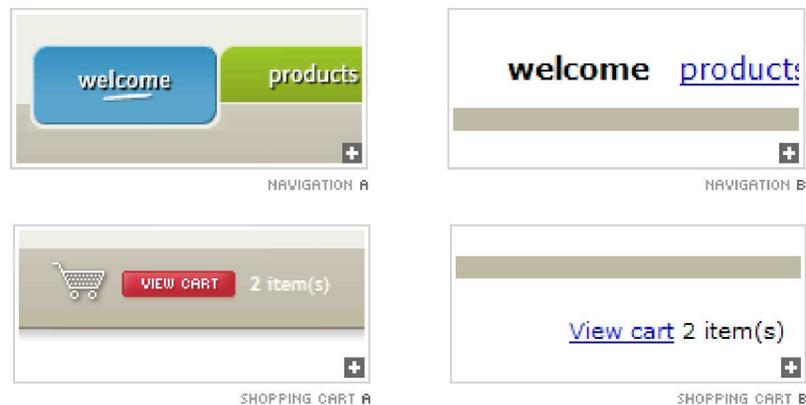
essence, attractiveness directly shapes perceived ease-of-use. Design is a process or practice to shape and communicate effective branding. Choices you make in selecting color, style and type will affect aesthetic quality.

### 3.2 Improved Usability through Design

Navigation is one of the principal tools that have to be focused on as users have at their disposal to find their way around on a Web site. Failure to implement a good navigation design, scheme and structure is asking for bad user experience.

Tabs are self-evident and create an apparent visual hierarchy. Graphical version is definitely more pleasing to look at, and by using fundamental design principle in contrast type and color with good use of shape, the result contributes for excellent scanability. Good design gives users useful clues about what's what on a page. Color is practical as an additional clue.

The following are some examples to show how aesthetic quality can noticeably improve user experience. Users quickly scan pages for something to click (in this particular case a shopping cart).



**Figure 19.** An example to show design improves usability.

Buttons make users click; this convention has proven itself many times in the past. In the graphical version, the shopping cart icon stands out and is thus easier to target with the eye. Furthermore, the small cart image next to the button instantly confirms the purpose of this widget.

### **3.3 Design balanced with emotions and eye flow**

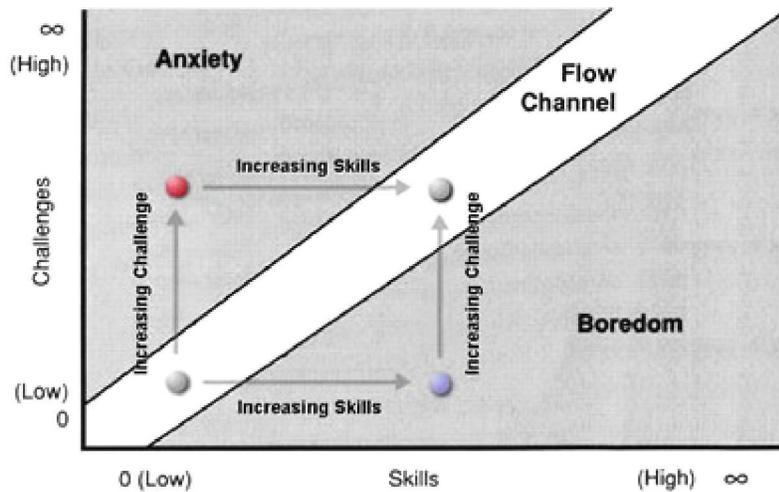
A good design focuses on the elements that precede or cause flow. Users visit sites with pre-existing goals (e.g., finding information about a product) [11]. These goals evolve over time as users complete tasks and their attention is drawn to other information. The main elements designers can control are:

- Providing immediate feedback
- Balancing the perception of challenge against user's skills

Giving a focused attention on the desired outcome of every interaction by removing anything that distracts the user from accomplishing that outcome is necessary. For both physical and interactive products, it is important to reduce or eliminate both external (i.e., environmental) and internal (i.e., pain, discomfort, anxiety) distractions that may cause emotional responses like frustration or physical discomfort. Emotions demand and divert the user's attention. Providing immediate feedback for all user actions helps to reduce user anxiety. The effective use of layout, information design, typography, interaction design and information architecture all help in balancing the perception of challenge against the user's skill level.

When it comes to balancing the user's perception of challenge, thinking of it in a way that too much challenge with too little skill causes anxiety; and too little challenge with too much skill causes boredom.

Flow occurs at the boundary between boredom and anxiety which could be considered as a channel that runs between anxiety and boredom. (Figure 4)



*Figure 20.* Anxiety, Boredom and Flow (Csikszentmihalyi, 1990)

As the challenges we face increase, we become more anxious and lose flow. Re-entering flow involves increasing our skills to match these challenges and reduce anxiety. As we increase our skill level, we become bored unless we increase the challenge to match our greater abilities.

### 3.3.1 Causes of Flow

#### 1. A clear goal

To accomplish any task, like seeking information on a particular topic or even surfing for fun the user navigates around the site which could be considered as an evolving goal. This is dependent on the options presented to the user and aided by logical information architecture, intuitive navigation, effective way finding and clear options for proceeding like information scent, meaningful labels, clear page titles, etc.

#### 2. With immediate feedback on the success of attempts to reach that goal

Quick, sensory feedback should be received by the user in the form of a visual shift and/or sound from links, buttons, menus, or other navigation items.

### **3. Presented as a challenge that you have the skills to handle.**

The opportunities for action are balanced with the user's ability. At a basic level, this is accomplished by providing an uncluttered interface and eliminating unnecessary information to limit the user's cognitive load. As the users' skill increases over time, the interface can increase its complexity as well. Adaptive interface technologies allow the user to adjust the complexity of the interface to meet their enhanced skills.

### **3.3.2 Flow and Emotion**

With higher levels of challenge and skill the flow occurs. When the user skill levels are very high or the challenge faced by him is too easy, anxiety can be so low that there is little motivation to do anything. This level of activation or "arousal" in the body is the physiological (i.e., bodily) dimension of emotion. The level of arousal affects how intensely we experience a given emotion, and intense emotions demand our attention [5].

Frustration and the excitement both increase arousal levels. Both pleasant and unpleasant objects and experiences can increase arousal levels. So do large images, bright colors, and high contrast.

Matching the perceived challenge to the user's skill level may be the best way to balance arousal. Skill levels differ from user to user and are based on their previous experiences. The interfaces should be very user-friendly to perform all kinds of task and should also allow more advanced users to find challenges appropriate for their skill level. These challenges can include the visual aspects as well as the content [10]. To put it simply, everything about a site, including content, information architecture, interaction design, and visual design can contribute to flow.

Design aspects changes with different motivations in order to generate the flow [10]. There is a distinction between experiential and goal-directed use as novice users tend to see the Internet in a playful way, while more experienced users tend to view the Internet in a more utilitarian way [11]. Flow tends to occur more often during goal-directed use, because of the higher challenge involved.

### **Novice Users – Experiential use**

- Less challenging
- More exploratory
- Entertainment-oriented

### **Experienced Users – tendency towards Goal-directed use**

- More challenging
- Less exploratory
- Connected with tasks (e.g. research, work and shopping)

In an entertainment-oriented and experiential site the level of challenge is low which means there is a lower level of anxiety connected with its use. A less anxious user is more capable of using creative thought to determine how to navigate a website and overlook minor problems. Motivation here is driven by subconscious arousal triggered by interesting visual elements, bright colors or high contrast. Experiential sites can and should be more arousing visually to demand the greater attention that can lead to flow experiences.

The user would visit a goal-directed site under greater challenge of completing tasks possibly under deadlines which makes him anxious. Anxiety restricts any users from thinking creatively especially when problems are encountered. Any product used in a stressful environment, makes usability crucial. All relevant information needs to be close at hand where it is visible and feedback should be clear and immediate. A goal-directed site can be less visually rich so that users, who are already anxious at the prospect of a challenging task, are not overwhelmed.

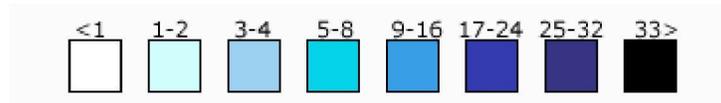
Finding the right balance of design and challenge focuses user's attention on the right page and create flow, which results in immersive and engaging user experiences [5].

## **3.4 Positioning of Elements**

The survey conducted by Bernard [12] by the year 2001 and 2005, to determine the expected location for a variety of web objects concluded that users do have a schema or mental model of where web objects should be located. When mental models are consistent with user expectations, it is expected that the users are likely to be more satisfied with the site and are able to locate information quickly and efficiently. The study split web users into novice and experienced groups and evaluated expected location for the following web objects: back to home link, internal links, external links, internal search engine, and advertisements [12].

**Home Link:** The result showed that the expected location of the home link to be the top-left of the web page also fairly high percentage of participants also expected the home link to be located in the footer area of the web page. The figure below shows that 44% expected the "Back to Home" link to be in the upper left corner of the web page. Approximately 15% of the participants expected the "Back to Home" link to be in the center of the footer and 11% expected it to be in the left area of the footer.

The percentages are represented by increasingly darker shades of blue (white is <1% and black is >33%)

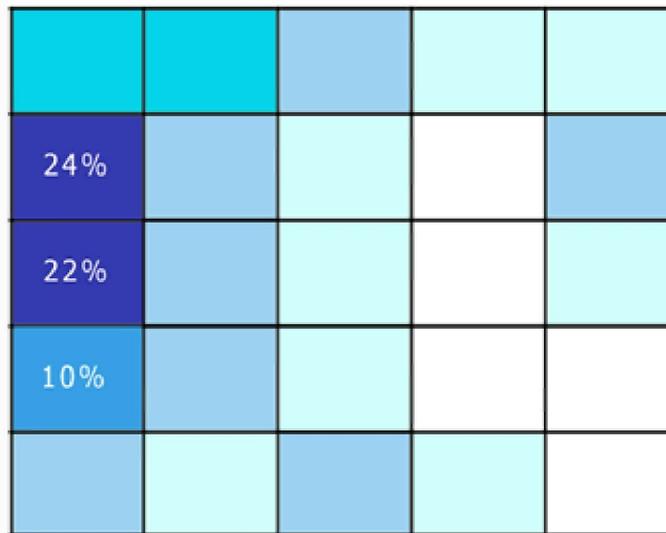


**Figure 21.** Scale representing percentage of users choosing the grid square for the web object location.



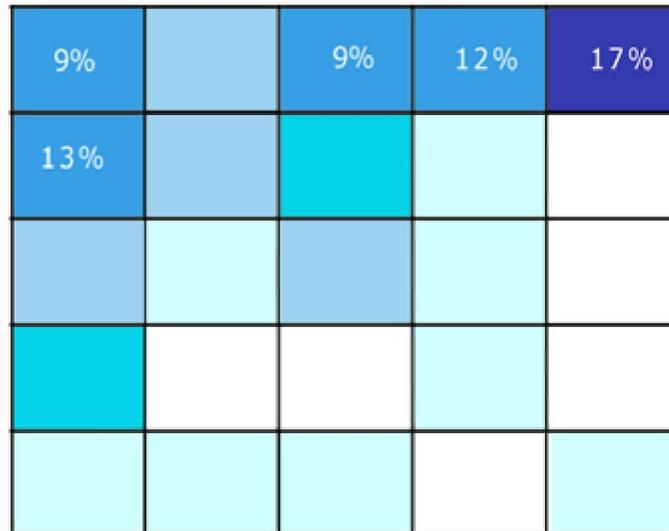
*Figure 22.* Expected location of Home link.

**Internal Links:** The users expected (2001) the internal links to be located on the left side of the web page. However, the 2005 data showed a tendency for users to also choose locations along the top of the web page for internal links. The location of internal links has likely been affected by the increased use of DHTML/JavaScript menus. The technology that is more prevalent today is more conducive to multilevel navigation being displayed across the top of the web page.



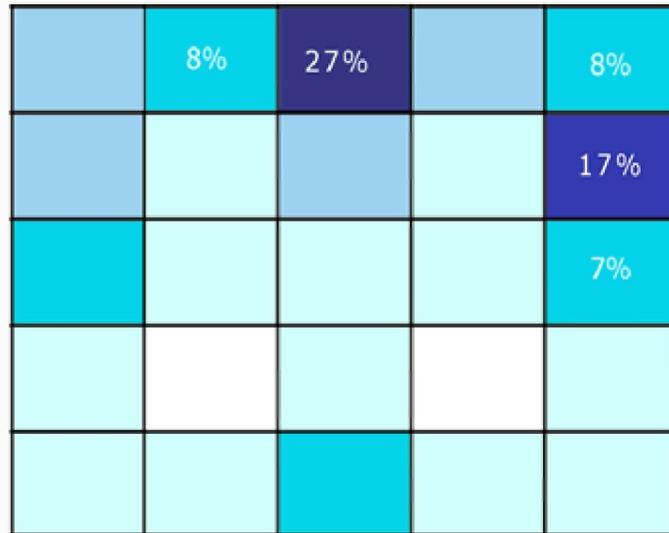
**Figure 23.** Expected location of Internal links.

**Site Search Engine:** The users expected the site search engine to be located in the top right corner or the top left corner of the web page. The 2001 study also showed a preference for the lower center section of the web page.



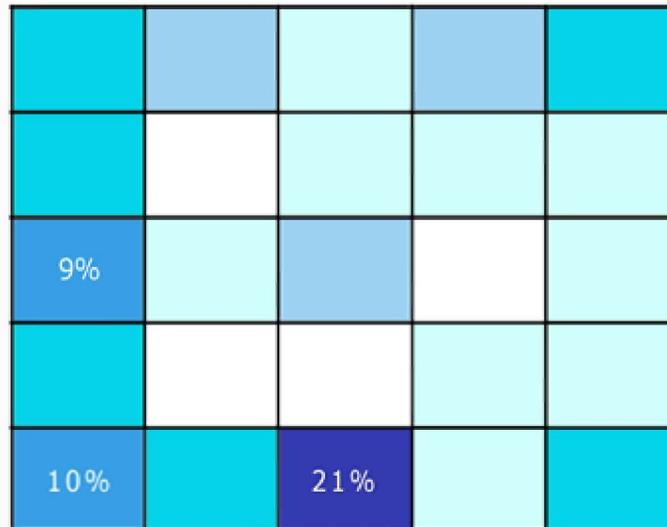
**Figure 24.** Expected location of Search Engine.

**Advertisements:** The study by **Bernard (2001)** revealed that participants expected advertisements to be located in the upper area of the web page. Participants in the 2005 study showed a similar preference for the upper area of the web page.



*Figure 25.* Expected location of Advertisement.

**About Us Link:** The previous study by Bernard did not evaluate the location of the About Us link. In the 2005 study, users reported the About Us link to be in the footer area of the page.



*Figure 26.* Expected location of About Us link.

In conclusion when distinctive choices are combined into a composite page we can get an idea of the web page that a user is most expecting to see. This strongly matches common layout used by many websites. Users will almost immediately catch on to a website with a right oriented navigation structure and have no problem navigating the site – as long as the site is consistent in having elements (links) where it is expected.

Back to Home		Ads	Site Search	
				Ads
Internal Site Links				
About Us		About Us		

*Figure 27.* Expected location all links at a glance.

### 3.5 Usability guidelines(Design)

#### Content Organization

1. Lengthy flow of contents should be avoided and the prose text should be minimized on the homepage.
2. Brief and clear description about the website should be provided.
3. Web Pages should not be cluttered (the information should be organized clearly and all the necessary details should be displayed in the homepage).
4. Contact information should be provided.
5. Visual balance of the page should be focused.
6. No spelling or grammatical mistakes.
7. Advertising should not be squeezed inside the content.

### **Optimizing the user experience**

8. Crowding the pages with new windows should be avoided. (Acceptable for external links)
9. The page down load time should be minimized and the images should load faster.
10. Information should be formatted for easy reading and printing (text readability).

### **Accessibility**

11. Should adhere to standards (section 508, W3C guidelines etc).
12. Should use anchor text on links.
13. Should use the ALT and TITLE attributes for images.
14. Should include functional links on your footer.

### **Hardware and software**

15. The website should be cross-browser compatible

### **Homepage**

16. Harsh colors should be avoided.
17. A positive first impression of the site should be focused.

### **Page Layout**

18. Simple layout should be followed.
19. All elements should be placed in appropriate positions as expected by the user (Place important items like logo in a consistent place every time).

## **Navigation**

20. Site maps should be provided for a huge website.
21. Descriptive navigation tabs should be used.
22. Related navigation elements should be grouped and differentiated.
23. Tabs should be used for effective and easy navigation.
24. Text navigation is comparatively better than images.

## **Scrolling and paging**

25. Horizontal scrolling should be eliminated.
26. The number of clicks to reach the end of the page should be minimal.

## **Headings, titles and labels**

27. Heading sizes should be consistent and colors- no more than three font sizes should be used in the page.

## **Links**

28. Broken links should be checked.
29. Index.html (or equivalent) in the root directory is mandatory.
30. It is necessary to include anchor text on links (meaningful link labels).
31. Links should be made visible.
32. Links should be differentiated ( Visited, hover etc.)
33. Links should open to related content.

## **Text appearance**

34. Too flashing or extra fancy webpage should be avoided.
35. Usage of tiny /fancy fonts that are unreadable should not be used.
36. Blinking texts are to be avoided.
37. Clean background is essential.
38. White spaces should not be completely eliminated.
39. CSS and HTML should be used in a proper way.
40. Line spacing and padding should also be concentrated.
41. Fix the font- fonts of desired size and color that matches the background should be used.
42. Bold or italics should be used when appropriate.

#### **Screen based controls**

43. The user should not be forced for registration.
44. Pop ups and drop-down menus should be avoided.
45. Required and optional data entry fields should be differentiated.
46. Push buttons should be labeled clearly and should be visually known that it is click-able; also data entry fields should be labeled clearly.

#### **Graphics, Images and Multimedia**

47. Animated GIF's should be avoided and if used they should not look like banner ads- animation, graphics and audios should be used meaningfully.
48. Using auto playing music should be avoided.

#### **Writing web content**

49. It is better to use familiar words and to avoid jargons.

## **Search**

50. Duplicating meta information on all pages should be greatly avoided to make the website search engine friendly and make sure users can search the whole website.

Finally it is mandatory to do Usability Testing- Do test your website for usability and accessibility.

# **Chapter 4: Experiments**

## **4.1 My websites created after a detailed study**

After a detailed study and research, three websites were created following the Usability Guidelines [Section 3.4] and User Expectation of link elements [12]. Each website has a unique concept with clear focus on Visual balance.

### **Interior Design:**

This interior design website was created using the X-HTML editor and coded using CSS, HTML and JavaScript. CSS was used to generate style sheet and JavaScript was used for embedding videos and slide shows. Search tag enables the external search. The color balance and font styles were chosen for better readability.

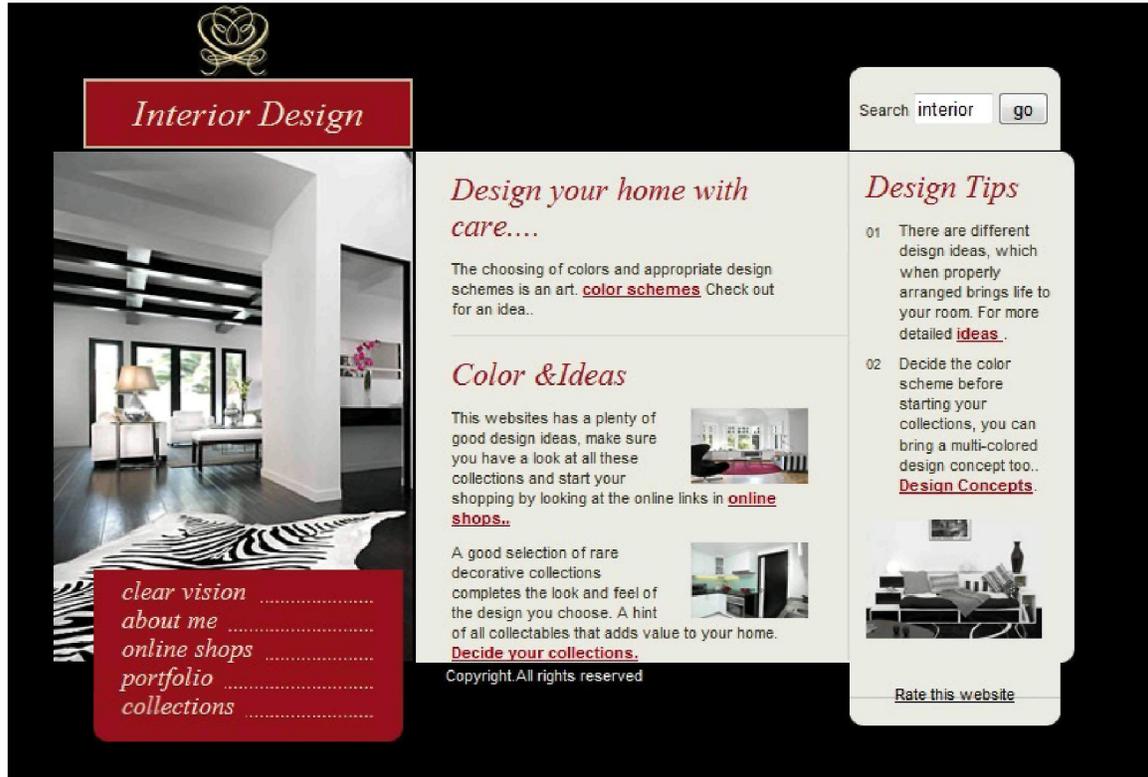
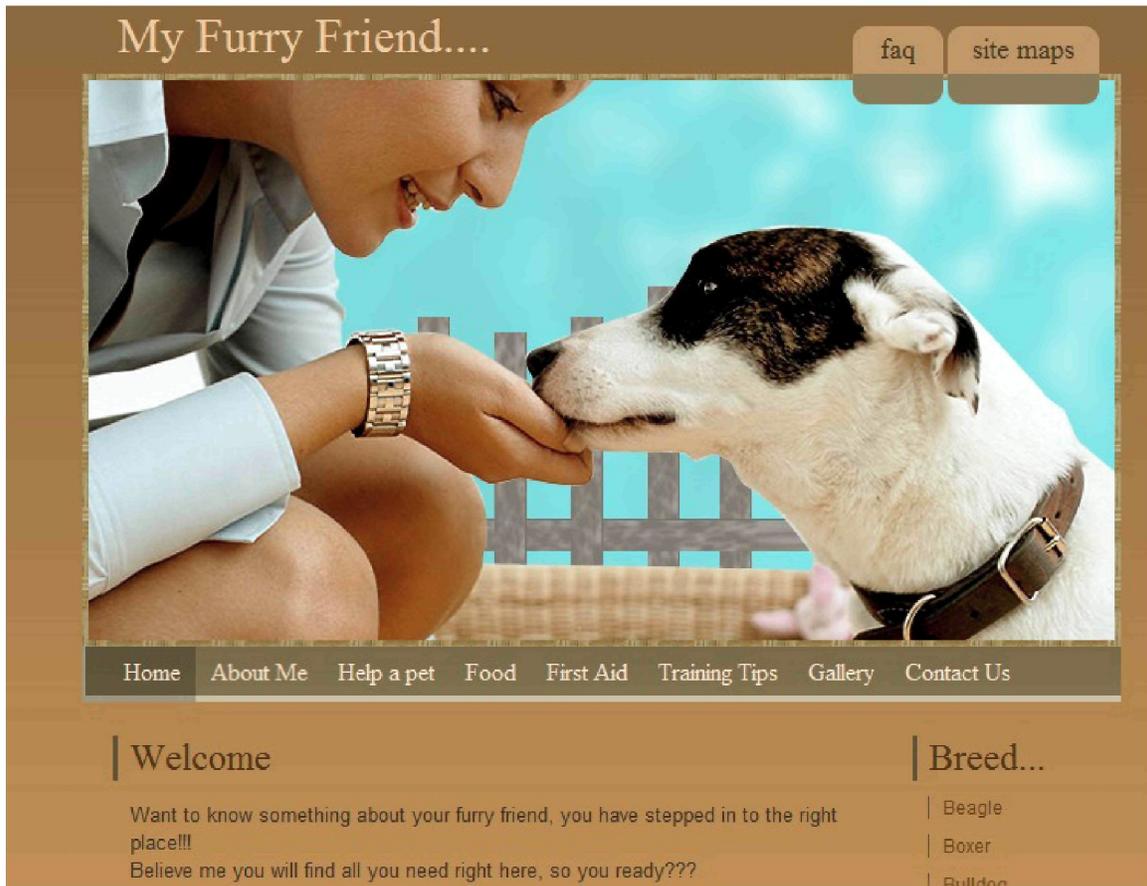


Figure 28. Interior design Website.

Link: <http://www.littleflurryones.com/interiordesign/index.html>

### My Furry Friend:

In this website, the FAQ and Site Map are at the top right corners. The navigation bar is placed at the top with few internal links that takes to several internal pages. The links to any external websites are previously tested before using them.

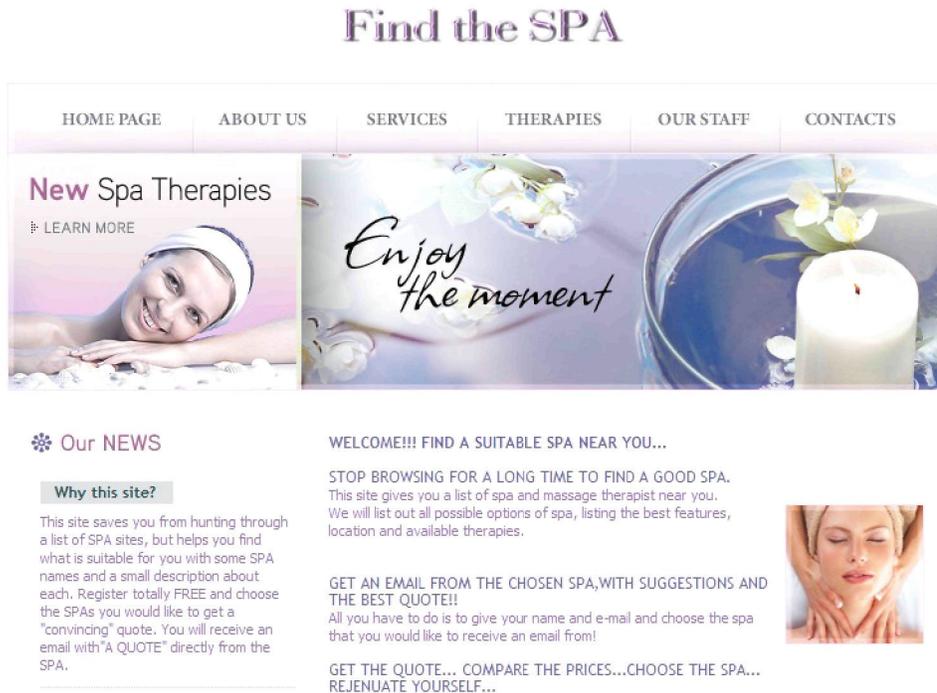


*Figure 29.* My Furry Friend Website.

Link: <http://www.littleflurryones.com/>

**Find the SPA:**

This site can be used for getting quotes from multiple spa service providers. The



user can request for quote from the list of spas mentioned in the site by providing his name and email. The user request is sent to the selected spa centers. For now, only three spa locations are included. The spa salon can respond to the user by sending price quote to the user's email. The advantages of this site are user's need not contact the spa salons separately. Also, spa salon would have presence online.

**Figure 30.** Find the SPA Website.

Link: <http://www.spafindyou.com/customer>

### **Portfolio:**

This website is to give a quick summary of my design skills and the websites that I had created. The website was created using flash with the help of Wix tool editor. Wix editor helps us to create and publish high quality Flash websites. Small icon images were created to explain the sites. Flash has become a popular tool in internet marketing and is now widely used across the web. But, there can be drawbacks so it needs to be

carefully determined whether or not a site will benefit from its use. One of the benefits of using Flash is the visual appeal of it. It can be used with navigation, by adding interesting visual graphics. Although, one disadvantage about using Flash is that not all internet browsers have a Flash player moreover, not all users may want to download it.

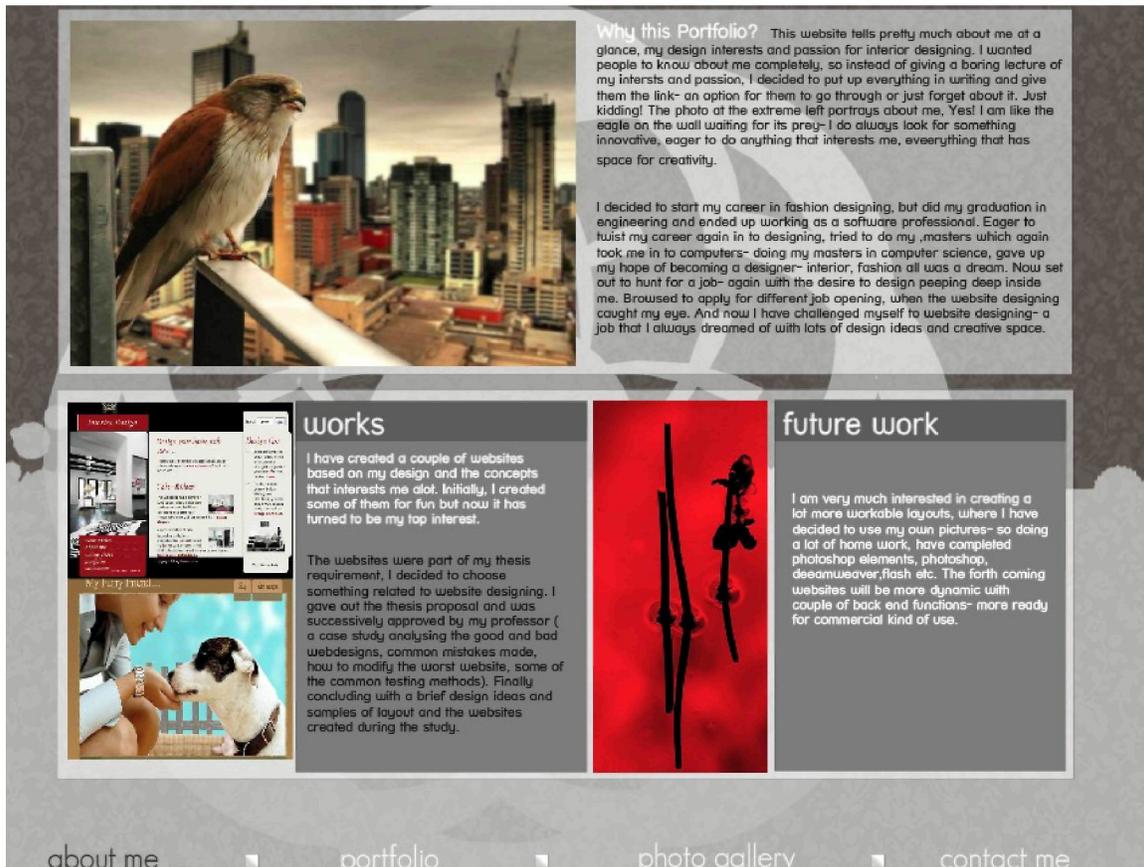


Figure 31. Portfolio.

Link: <http://www.wix.com/myportfolioio/portfolio>.

# **Chapter 5: Evaluation**

## **5.1 Evaluation Methodologies**

Usability tests for the evaluation of software applications are the response to the increasing relevance of user's requirements in order to deliver successful products and increase individual productivity [4]. According to ISO 9241-11 (1992) usability is defined as the “extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use”. Evaluation tests should rely on usability actually perceived rather than on obtained performances. The resources to be optimized are those spent by the user and this can be summarized merging effectiveness and satisfaction to indicate a comfortable and successful completion of a task from the user's point of view.

Evaluation methodologies to test the usability of the created websites are the automatic evaluation tools and user questionnaires. The tools are used to make sure that the website pass the required guidelines and the questionnaires are used to analyze the emotional impact of the website on users.

### **5.1.1 Automatic Evaluation Tools**

Automatic tools aim to provide software support for evaluation. Most of the tools can perform an analysis to identify potential usability problems. Problem tracking is most often performed to check conformance to a given set of guidelines. Different test tools are selected to check whether the websites created passes the set of usability guidelines [9]. Some of the most popular automatic tools available for websites evaluation are listed below with brief explanation and the test results.

WAVE is a free web accessibility evaluation tool provided by WebAIM. It is used to aid humans in the web accessibility evaluation process. Rather than providing a complex technical report, WAVE shows the original web page with embedded icons and indicators that reveal the accessibility of that page. The different web pages are to be checked to find out whether the accessibility guideline is passed. The test result of one of the websites is shown below.

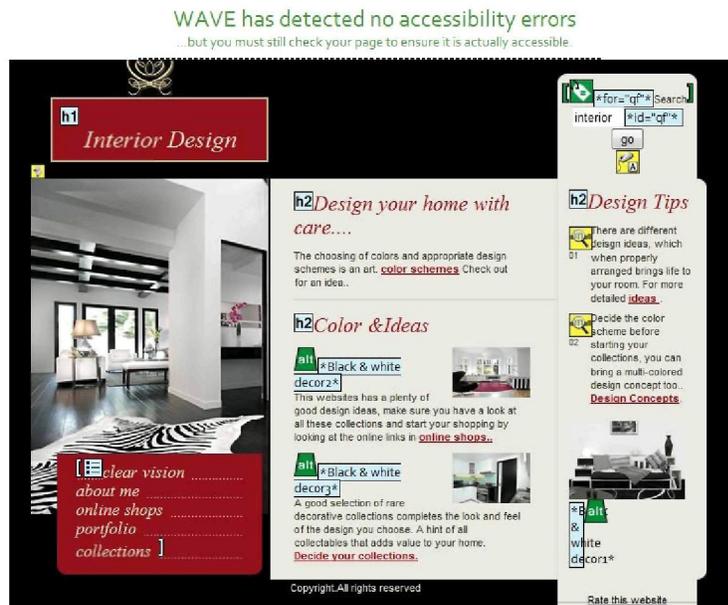


Figure 32. Test result of WAVE.

Section 508 test tool checks the HTML code of the page against 508 checklist [13] implemented by the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d) which requires that individuals with disabilities, who are members of the public seeking information or services from a Federal agency, have access to and use of information and data that is comparable to that provided to the public who are not individuals with disabilities, unless an undue burden would be imposed on the agency. The different web pages are checked to make sure they pass the Section 508 checklist. The test result of one of the websites is shown below.

## Section 508 results

### Passed automatic check

Your page has cleared all automatic violations for Section 508. Please check the following cautions, these are manual checks you are required to carry out before qualifying this page as accessible.

Please add this code to your web page.

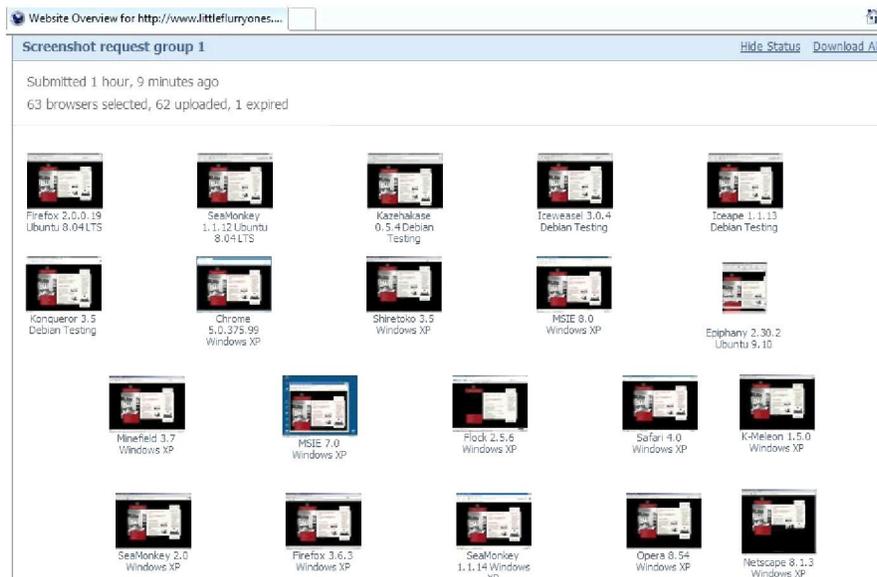
```
<a href="http://www.section508infocheck.this-site.com/508check.html" title="Section 508 approved by www.508infocheck.com" style="float:right; text-align:right; font-size:small; font-weight:bold; color:#000080; text-decoration:underline;">

</a>
```

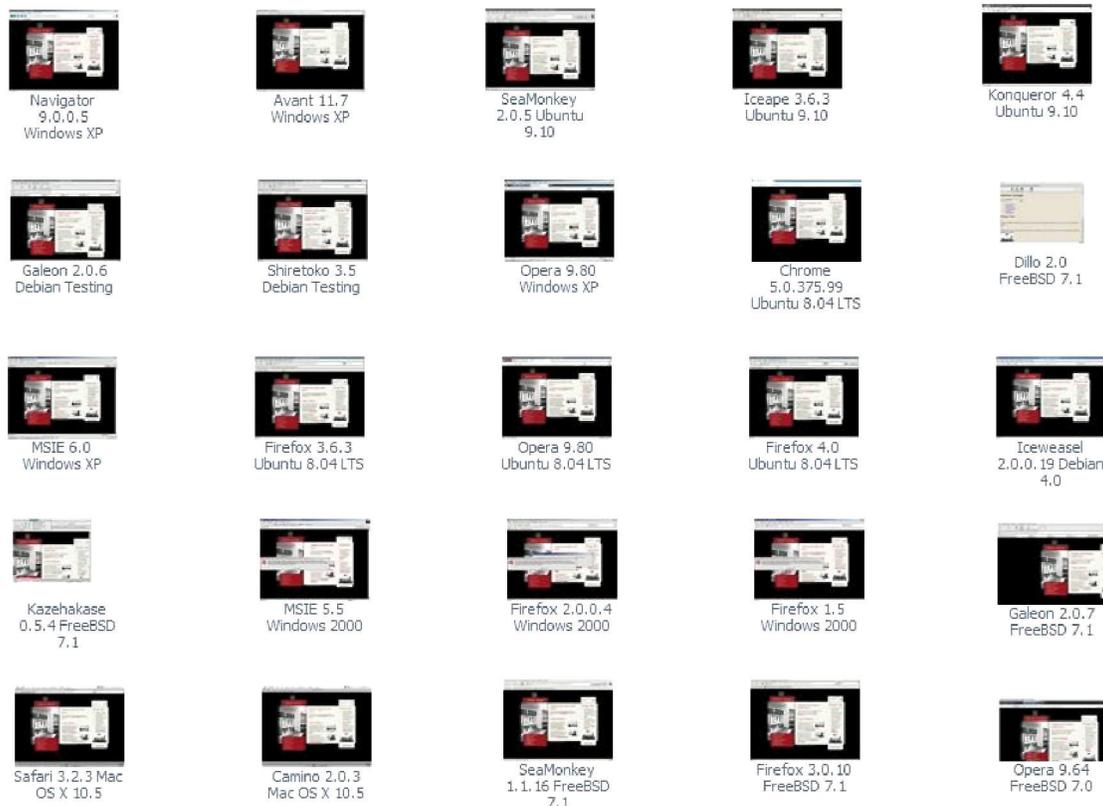
Rate	Qty	Issue	Requirement	Point
	N/A	Color	Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.	C
	N/A	Flickering	Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.	J
	N/A	Timed Response	When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.	P
	N/A	<Script>	When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.	L

**Figure 33.** Test result of Section 508 checker.

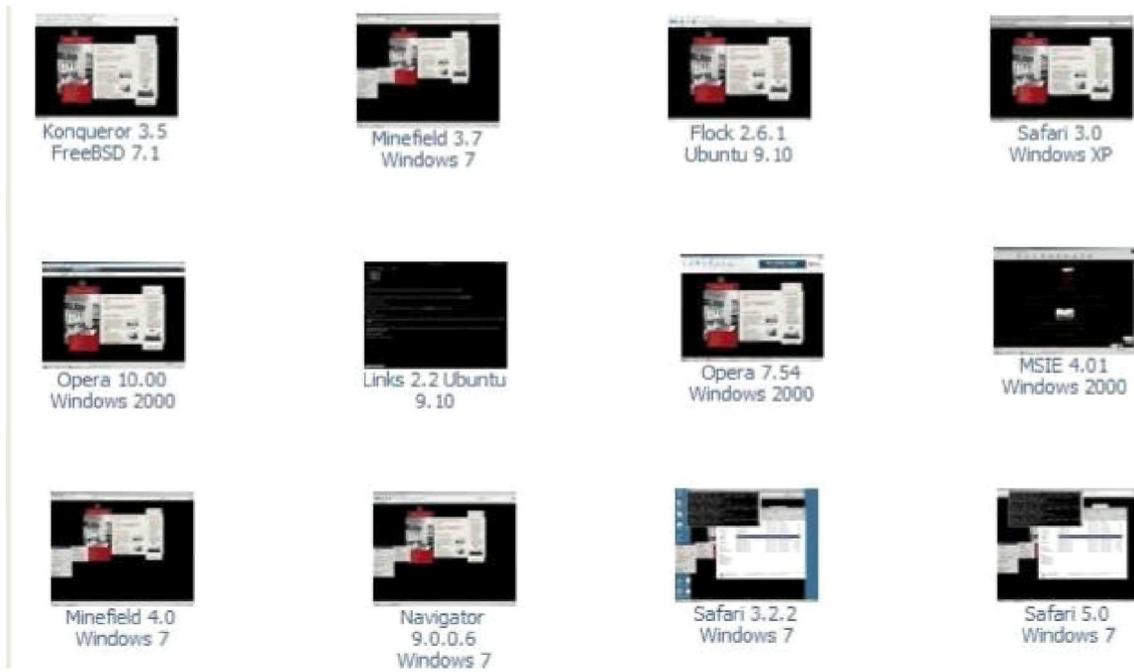
**Browser Shots** makes screenshots of the web design in different operating systems and browsers. It is a free open-source web application providing developers a convenient way to test their website's browser compatibility in one place. It is important to make sure that the web pages look similar when opened with any browser. When the website URL is submitted, it will be added to the job queue. A number of distributed computers will open the website in their browser. Then the screenshots are uploaded in the central dedicated servers for user's review. The test results for one of the websites are shown below.



**Figure 34.** Test result set1 of Browser Shots.



**Figure 35.** Test result set2 of Browser Shots.



*Figure 36.* Test result set3 of Browser Shots.

**Test i Phone** is a web browser based simulator for quickly testing your i Phone web applications. Just like how cross browser compatibility for a website is very important, to make sure the site perform is compatible on the popular web browser options like Firefox, Safari, Google Chrome and Internet Explorer, it is also very important to check the mobile device compatibility as well to view the website functionality across these devices such as i Phone, i Pad, and smart phones.

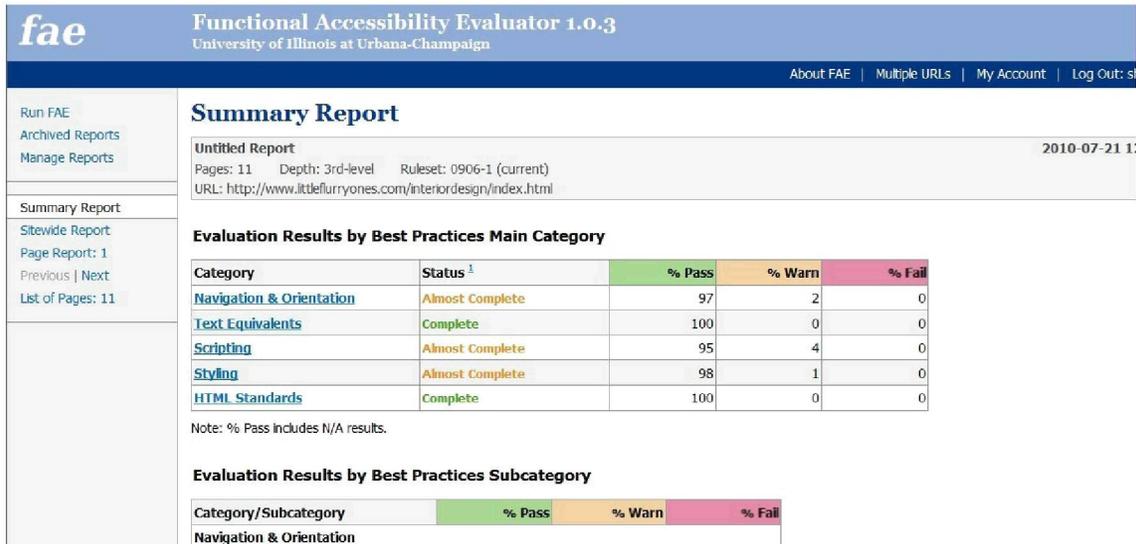


**Figure 37.** Test result Test i Phone.

**The Functional Accessibility Evaluator (FAE)** analyzes web pages for markup that is consistent with the use of iCITA HTML Best Practices for the development of functionally accessible web resources that also support interoperability.

The iCITA HTML Best Practices are not a new standard, but rather a statement of techniques for implementation of the W3C Web Content Accessibility Guidelines (WCAG), the United States Federal Government Electronic and Information Technology Accessibility Standards (Section 508) and the Illinois Information Technology Accessibility Act (IITAA). Following the best practices in developing web resources not only improves accessibility for people with disabilities, but also improves interoperability, giving everyone the benefit of having more options for accessing and using those resources.

FAE checks the entire website and check for almost all the major checkpoints including scripting, styling and W3C standards for HTML validation. The test result of one of the websites is shown below.



*Figure 38.* Test result of FAE.

<sup>1</sup> Status Value Definitions

Status values are based on aggregated evaluation results of Pass, N/A (not applicable) and Warn, as defined in the following table.

Value	Percent	Result
Complete	100	Pass + N/A
Almost Complete	95–100	Pass + N/A + Warn
Partially Implemented	40–94	Pass + N/A + Warn
Not Implemented	0–39	Pass + N/A + Warn

*Figure 39.* Status value definitions of FAE.

### Evaluation Results by Best Practices Subcategory

Category/Subcategory	% Pass	% Warn	% Fail
<b>Navigation &amp; Orientation</b>			
<a href="#">Titles (title &amp; h1)</a>	90	9	0
<a href="#">Subheadings (h2..h6)</a>	100	0	0
<a href="#">Navigation Bars</a>	100	0	0
<a href="#">Form Control Labels</a>	100	0	0
<a href="#">Default Language</a>	100	0	0
<a href="#">Data Tables</a>	100	0	0
<a href="#">Access Keys</a>	100	0	0
<a href="#">Frames</a>	100	0	0
<b>Text Equivalents</b>			
<a href="#">Informative Images</a>	100	0	0
<a href="#">Decorative Images</a>	100	0	0
<a href="#">Image Maps</a>	100	0	0
<b>Scripting</b>			
<a href="#">onclick</a>	100	0	0
<a href="#">onmouseover &amp; onmouseout</a>	93	6	0
<b>Styling</b>			
<a href="#">Text Styling</a>	100	0	0
<a href="#">Layout Tables</a>	90	9	0
<b>HTML Standards</b>			
<a href="#">W3C Specifications</a>	100	0	0

Note: % Pass includes N/A results.

*Figure 40.* Test report (continued) of FAE.

**Link valet** is a WWW Link checker. Based on the URL, Link Valet will fetch the page, and print a report on it. Link Valet would also spider your site. When a link references another HTML page at the same site and hierarchy as the URL, Link Valet will recursively follow the link and prepare a similar report on the page referenced. Each page report includes a summary of all links from the page. These include a brief description of the link.

This tool checks the linked style sheet, images and links to internal and external web pages displaying the details of when the link was modified. It generates a lengthy

report with separate sections for each page and checks all the links in the entire site. The test results of few pages are shown below.



### Link Valet

**Report for <http://www.littleflurryones.com/interiordesign/>  
Wed, 21 Jul 2010 23:40:23 GMT**

---

**Page Design collection**

<a href="http://www.littleflurryones.com/interiordesign/images/collection2.jpg">http://www.littleflurryones.com/interiordesign/images/collection2.jpg</a>	200 OK JPEG Image Last Modified Fri, 05 Mar 2010 04:32:04 GMT
<a href="http://www.littleflurryones.com/interiordesign/images/collection1.jpg">http://www.littleflurryones.com/interiordesign/images/collection1.jpg</a>	200 OK JPEG Image Last Modified Fri, 05 Mar 2010 04:32:05 GMT
<a href="http://www.littleflurryones.com/interiordesign/style.css">http://www.littleflurryones.com/interiordesign/style.css</a>	200 OK CSS Stylesheet Last Modified Fri, 11 Jun 2010 23:06:42 GMT
<a href="http://www.littleflurryones.com/interiordesign/home.html">http://www.littleflurryones.com/interiordesign/home.html</a>	200 OK HTML document Last Modified Fri, 11 Jun 2010 23:06:39 GMT
<a href="http://www.littleflurryones.com/interiordesign/images/fav.jpg">http://www.littleflurryones.com/interiordesign/images/fav.jpg</a>	200 OK JPEG Image Last Modified Fri, 05 Mar 2010 04:31:45 GMT

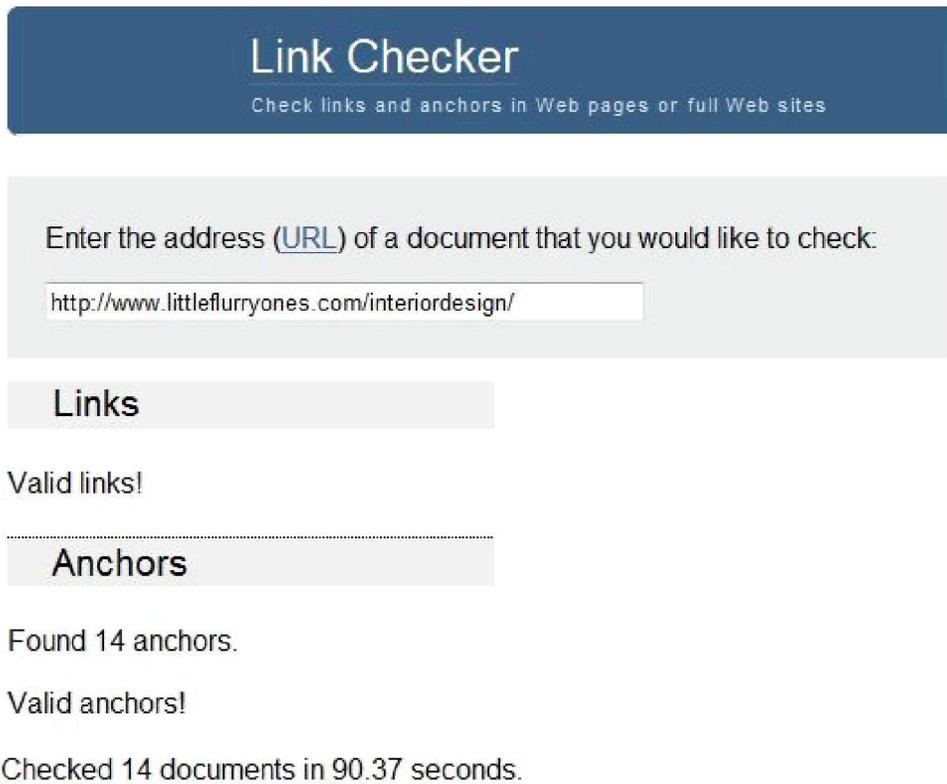
---

**Page Online Shops**

<a href="http://www.thefind.com/">http://www.thefind.com/</a>	200 OK HTML document Last Modified Sun, 16 May 2010 07:37:36 GMT <i>Varies with Accept-Encoding</i>
<a href="http://www.littleflurryones.com/interiordesign/about%20me.html">http://www.littleflurryones.com/interiordesign/about%20me.html</a>	200 OK HTML document Last Modified Fri, 11 Jun 2010 23:06:38 GMT
<a href="http://www.littleflurryones.com/interiordesign/style.css">http://www.littleflurryones.com/interiordesign/style.css</a>	200 OK CSS Stylesheet Last Modified Fri, 11 Jun 2010 23:06:42 GMT
<a href="http://www.littleflurryones.com/interiordesign/images/allp.jpg">http://www.littleflurryones.com/interiordesign/images/allp.jpg</a>	200 OK JPEG Image Last Modified Fri, 05 Mar 2010 04:32:20 GMT
<a href="http://www.littleflurryones.com/interiordesign/images/all.jpg">http://www.littleflurryones.com/interiordesign/images/all.jpg</a>	200 OK JPEG Image Last Modified Fri, 05 Mar 2010 04:32:24 GMT
<a href="http://www.littleflurryones.com/interiordesign/portfolio.html">http://www.littleflurryones.com/interiordesign/portfolio.html</a>	200 OK HTML document Last Modified Fri, 11 Jun 2010 23:06:42 GMT
<a href="http://www.littleflurryones.com/interiordesign/index.html">http://www.littleflurryones.com/interiordesign/index.html</a>	200 OK HTML document Last Modified Sat, 17 Jul 2010 23:50:28 GMT
<a href="http://www.buy.com/">http://www.buy.com/</a>	200 OK HTML document
<a href="http://www.littleflurryones.com/interiordesign/tableing.html">http://www.littleflurryones.com/interiordesign/tableing.html</a>	200 OK HTML document Last Modified Wed, 21 Jul 2010 05:05:18 GMT
<a href="http://www.littleflurryones.com/interiordesign/online%20shops.html">http://www.littleflurryones.com/interiordesign/online%20shops.html</a>	200 OK HTML document Last Modified Fri, 11 Jun 2010 23:06:41 GMT
<a href="http://www.novica.com/">http://www.novica.com/</a>	200 OK HTML document Last Modified Wed, 21 Jul 2010 06:02:03 GMT

**Figure 41.** Test report of Link Valet.

**W3C Link Checker** checks for broken links( if any) with a detailed summary report pointing out the broken links, checks the entire website reporting the number of links and stating whether they are valid or not.



*Figure 42.* Test report of Link Checker.

**Etre's Accessibility Check** evaluates the web pages against subset of the WAI guidelines which includes WCAG 1.0 and WCAG 2.0. These guidelines form the basis of most global legislation relating to accessibility. This site evaluates the site for the possible accessibility checkpoints satisfying both WCAG 1.0 and WCAG 2.0.

## Accessibility Check

Enter a web address (URL)

### Hooray!

The verdict is in it appears that the page you tested meets the WAI accessibility guidelines we evaluated it against.

*Figure 43.* Test report of Etre's Accessibility check.

**Cynthia says Hi Software Portal and A checker** evaluates the web page in a similar way as Etre's Accessibility Check evaluating the web pages against subset of the WAI guidelines which includes WCAG 1.0 and WCAG 2.0, for testing the pages against each independent set of guidelines either WCAG 1.0 or WCAG 2.0, these tools can be used. By checking the checkpoints against each priority the results are produced accordingly.

Test Your Site Now

Web Page (Required)

e.g. <http://www.hisoftware.com/>

Accessibility Report Mode

Section 508   
WCAG - Priority 1   
WCAG - Priority 1.2   
WCAG - Priority 1.2.3

for WCAG 1.0 Priority 2 and 3 errors, simply warn me.

Include the Alternative Text Quality Report

Include file source on accessibility failures

Emulate this Browser:

---

**Verified File Name:** <http://www.littleflurryones.com/interiordesign/>  
**Date and Time:** 7/22/2010 8:57:09 PM  
**Passed Automated Verification**

*Figure 44.* Test report of Cynthia Hi Software Portal.

The screenshot displays the AChecker Web Accessibility Checker interface. At the top, there are links for 'Login' and 'Register', and the 'Web Accessibility Checker' title. The main content area is titled 'Input' and contains two sections: 'Check Accessibility by URL' with a text input field containing 'http://www.littlefurryones.com/interiordesign/' and a 'Check It' button; and 'Check Accessibility by File Upload' with a 'Browse...' button and a 'Check It' button. Below this is an 'Options' section. A message states: 'This tool checks single HTML pages for conformance with accessibility standards to ensure the content can be accessed by everyone. See the Handbook link to the upper right for more about the Web Accessibility Checker.' At the bottom of the main area, it says 'Web site engine's code is copyright © 2009'. The footer includes the AChecker logo (WCAG 2-AA), the ATRC logo, and the Ontario logo. A summary box titled 'Accessibility Review' indicates 'Accessability Review (Guidelines: WCAG 2.0 (Level AA))' and '🎉 Congratulations! No known problems.'

**Figure 45.** Test report of A Checker for individual priority check.

**Feng-GUI heat map** simulates human vision during the first 5 seconds of exposure to visuals, and creates heat maps based on an algorithm that predicts what a real human would be most likely to look at. The intensity of the color varies according to viewer’s interest (from blue to red). In this way it is possible to make out if the flow of the page is good.



Figure 46. Test result of Feng-GUI heat map

**Website Pulse** test verifies the server status, downloads the full HTML content and measures the response time of the test website. The test results display the times for DNS lookup, connect, download the first byte and download the complete HTML of the tested website.

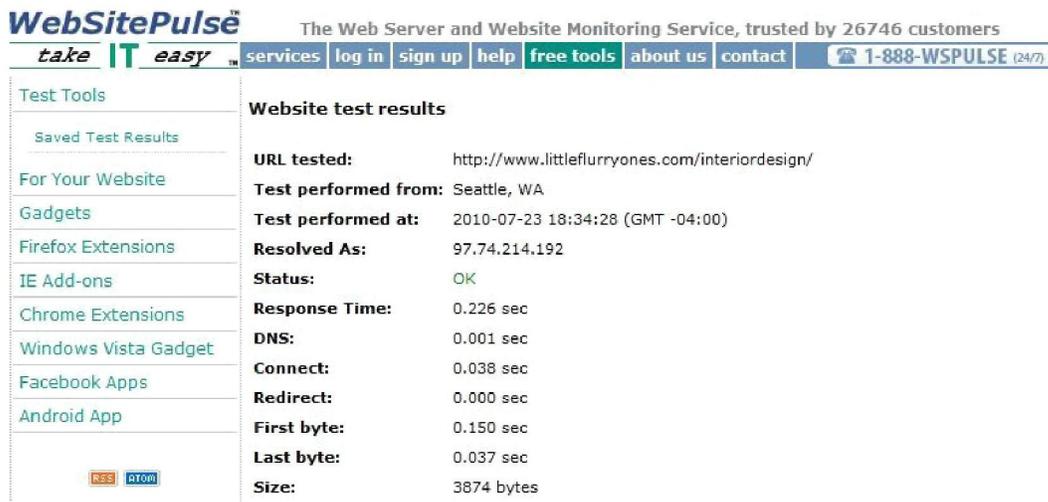


Figure 47. Test result of Website Pulse

**Web Wait** is a website to measure the speed of the websites. It times precisely how long the website takes to load and render in the user's browser, including any images, style sheets, and JavaScript. Web Wait works by placing the site inside an IFrame embedded on the Web Wait website.

The screenshot displays the Web Wait website interface. At the top, the 'webwait' logo is prominent. Below it, there are navigation links: 'How Long is your WebWait? (Dainty Beta Mode) FAQ', 'UPDATED! March 2010', 'Webwait screenshots', 'Ajax Wiki', 'Mahemoff's Twitter', and 'Mahemoff's Blog'. A text input field contains 'www.littleflurryones.com/inter' and a 'time it!' button. Under 'Options', 'no. of calls (0=forever): 5' and 'Call interval (secs): 5' are set. A large box shows the result: 'www.littleflurryones.com/inter', 'Average load time after 5 runs:', '0.59s', and a 'S' icon. Below this is a 'Save Results' link and a table with columns '#', 'URL', 'Average', 'Median', and 'StdDev'. The table contains one row: '#1 www.littleflurryones.com/inter 0.59 0.15 0.87'. To the right, a preview of the website being tested is shown, with a smaller Web Wait overlay reporting 'www.littleflurr loaded in 0.13s finished all runs'.

**Figure 48.** Test result of Web wait

**SEO Validator** tests the effectiveness of web pages against web content against Search Engine Ranking Factors. Search Engine Optimization is the process of adapting the code of web pages so that search engines 'read' the page in the way in which the programmer intended. In this way the search engine will store more accurate information about the contents of a page and thereby increase the likelihood of it appearing in search results.

## SEO Validator

URL

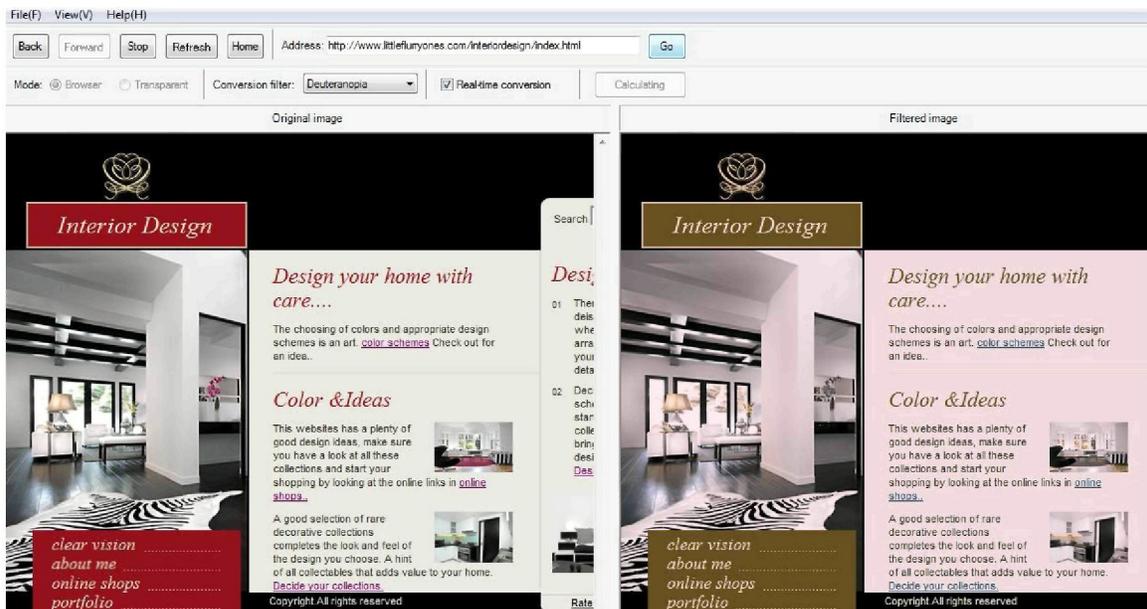
Simple | [Advanced](#)

**SEO Rating**  
**62.79**  
You scored 62.79 out of 100



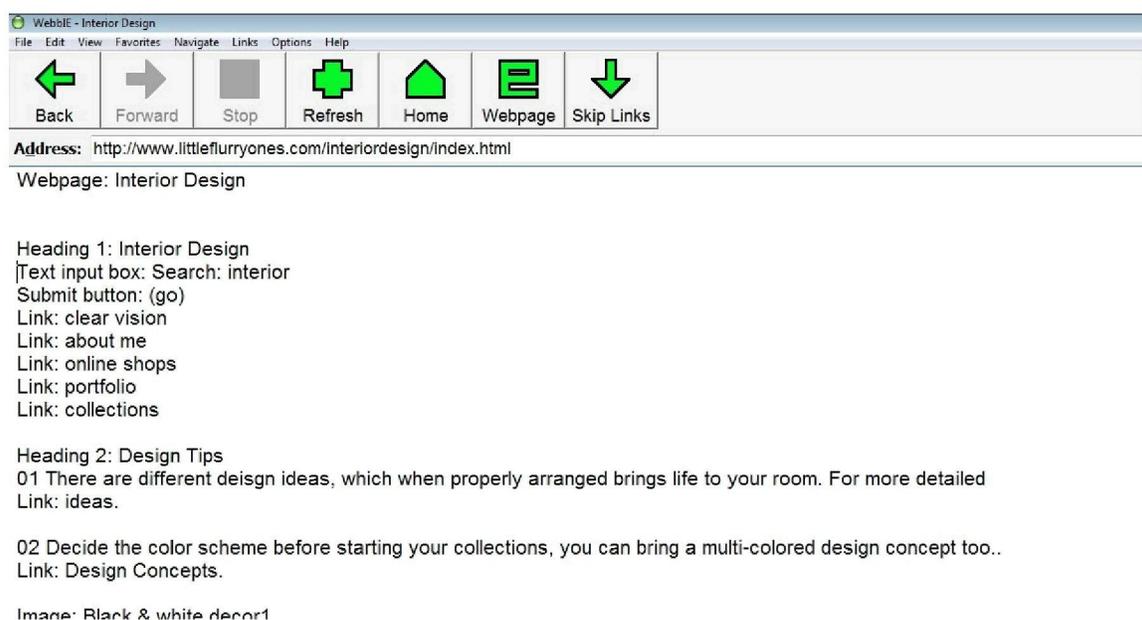
**Figure 49.** Test result of SEO validator

**Color Doctor** test the websites beforehand to make sure that it is designed to address almost all kinds of customers. The tool filters the color according to the color blindness chosen (Protanopia, Tritanopia, and Deuteranopia) and displays the screen similar to how it may look for the people with respective color blindness. Statistics show out that 1 to 20 people have some sort of vision color deficiency and for those it's hard to distinct and read image documents or web pages that do not respect the usability and accessibility standards. It is necessary to make sure that the images stand out from the texts and the fonts are readable when different color blindness are chosen.



**Figure 50.** Test result of Color Doctor chosen for Deuteranopia color blindness

**WebbIE** text-only browser is a browser that displays text only. While a user browses web pages, these applications grab all available text including alt attributes, summary tags, etc. and present it to the user in a user-customizable environment. This technology is used by people with various disabilities, from visually impairments to learning disabilities. Visually impaired users might use an application like this because of its user customization. Since text-only browsers ignore most web formatting, enlarging the fonts and/or changing background/foreground color does not have an adverse effect. A learning disabled user might use these applications along with a free screen reader to both visually and auditorily reinforce the information. Text-only browsers are also great tools for checking the text accessibility of the web page, since they will reveal exactly what content and in what order most screen readers and refreshable Braille displays will present.



**Figure 51.** Test result of WebbIE- Text only browser

## 5.1.2 Survey Questionnaires

Survey questionnaires are one of the most typical and consolidated tools to evaluate user interfaces [14]. Since they are based on a well-established usability

evaluation practice, it is easy to assess the results. Questionnaires are one of the indirect testing techniques designed to assess usability. They can give valuable feedback from the user point of view, but they must satisfy some important requirements. As a general rule, questions should be well formulated, i.e. Clear and significant for the evaluation context. Moreover results should be carefully analyzed and interpreted. A well-designed questionnaire can give good insight into the problems of the tested application, even if very detailed information is still very difficult to obtain.

There are two sets of questionnaires prepared, one to assess the websites on usability where the 50 usability design guidelines are framed into questions for complete analysis and the second to understand the emotional impact of the websites on different users. The two sets of questionnaires are framed in such a way to get the feedback for the poor websites and the good websites (the ones designed based on usability guidelines) in order to get a better visual comparison.

The first set of questionnaires consisting of 50 questions based on usability design guidelines are shown below.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. The description about the website is clear(home page) in a few seconds?				
2. The content of the website is not too lengthy				
3. The webpage is not cluttered?				
4. Is the contact information provided?				
5. How is the visual balance of the page?				
6. There are no spelling or grammatical mistakes.				
7. No advertising is squeezed in the webpages.				
8. There are no crowded windows.				
9. The webpage loads quickly.				
10. Text readability is good and good for printing.				
11. Does the website adhere to accessibility guidelines like section 508, W3C?				
12. There are anchor text on links.				
13. All the images have the ALT attribute?				
14. There are functional links on the footer?				
15. Is the website cross-browser compatible?				
16. No usage of harsh colors.				
17. The website creates a positive first impression?				
18. The layout is simple?				
19. Position of logo and titles are consistent				
20. Site maps are provided in huge websites.				
21. The navigation tabs are descriptive.				
22. Navigation elements are differentiated.				
23. Neat tabs for easy navigation				
24. More text navigation than images				
25. No horizontal scrolling.				
26. Minimal number of clicks to reach the end of the page.				
27. The heading sizes and colors are consistent - there are no more than three font sizes in the page.				

28. No broken links
29. index.html page is included
30. Meaningful link labels
31. Are the links visible?
32. Are the links differentiated (visited, hover etc.?)
33. The links open to related content.
34. There are no flashing or fancy webpages in the website.
35. No tiny /fancy unreadable fonts are used.
36. Blinking text are avoided.
37. The background is clear.
38. The white space is not completely eliminated.
39. HTML and CSS is used effectively.
40. Line spacing and padding are also concentrated.
41. The font used is of correct font size and color that matches the background.
42. Bold and italicized fonts are used when appropriate.
43. The website does not force the user for registration.
44. No pop up or drop down menus.
45. Required and optional data entry fields are distinguished.
46. Data entry fields and buttons are labeled clearly.
47. Animated GIF's, audio files, graphics are used sparingly.( used only when needed)
48. Auto playing music is avoided.
49. No jargons are used.
50. No duplication of meta tag information.( Web pages are search engine friendly).

The websites included in the survey to test the usability design are listed below:

<http://www.frnz.de/>

<http://www.dinghyinsurance.com/>

<http://www.littleflurryones.com/interiordesign/index.html>

<http://www.littleflurryones.com/>

<http://www.spafindyou.com/customer>

The questionnaires are prepared in such a way that all the above websites are evaluated for the 50 questions, i.e., all the five websites are included under each question. Placing different websites under each question provides a chance for the evaluator to move between different websites and complete each answer with better analysis. The results will be thus very useful for comparison. The survey questionnaires are prepared using the online survey tool- Survey Monkey, the generated link is embedded in index page of the website. The collected response can be viewed as a summary and can be converted to a graph. The sample page of the survey form is shown below.

Website Evaluation				
1. Website Evaluation questions conti...(1-10)				
To evaluate the given websites based on the 50 usability guidelines.				
1. The description about the website is clear(home page) in a few seconds?				
	Strongly Agree	Agree	Disagree	Strongly Disagree
http://www.frnz.de/	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.dinghyinsurance.com/	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.littleflurryones.com/interiordesign/index.html	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.littleflurryones.com/	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.spafindyou.com/customer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. The content of the website is not too lengthy				
	Strongly Agree	Agree	Strongly Disagree	Disagree
http://www.frnz.de/	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.dinghyinsurance.com/	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.littleflurryones.com/interiordesign/index.html	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.littleflurryones.com/	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
http://www.spafindyou.com/customer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The webpage is not cluttered?				

**Figure 52.** Sample page from the survey form

The second set of questionnaires are also prepared using the online survey tool-Survey Pirate to get the emotional response (even multiple responses) of different users for the listed websites based on few usability guidelines. The link generated by the tool is placed in the index page of the websites and the user responses are generated as a graph.

What emotional impact does <http://littleflurryones.com/interiordesign/index.html> create?

You can choose multiple options if desired.

- Sadness- does the color, font sizes, background makes you dull?
- Worry- are you worried about the navigation, confused of what to do next?
- Irritation- does the page layout or other things annoy you?
- Expected More-do you feel the content is less explanatory?
- Surprise-are you really surprised that the webpage is as you wanted it to be?
- Confident-do you feel that you can navigate around the pages without any confusion?
- Liking-are you completely happy about this site?
- Joy-you are happy to visit this website again?

Next

*Figure 53.* Sample page from the emotional survey form

# **Chapter 6: Analysis of Results**

## **6.1 Analysis of Automatic Evaluation Tools**

Cognitive walkthroughs are necessary to resolve obvious usability problems before conducting performance tests. The cognitive walkthrough appears to detect far more potential problems than actually exist, especially the visual position of design elements when compared with performance usability testing results. Cognitive walkthroughs may best be used to identify potential usability issues to evaluate during usability testing [9]. Several studies have shown that only about twenty-five percent of the potential problems predicted by the cognitive walk through were found to be actual problems in a performance test. About thirteen percent of actual problems in the performance test were missed altogether in the cognitive walk through. The websites designed based on usability guidelines (good websites) were subjected to automatic evaluation tools after careful manual checking to make sure there are no potential usability issues. The good websites “Passed” all the automatic evaluation tests while the poor websites “Failed” some tests. The list of automatic evaluation tools and the results for different websites included in the survey are shown in the table below.

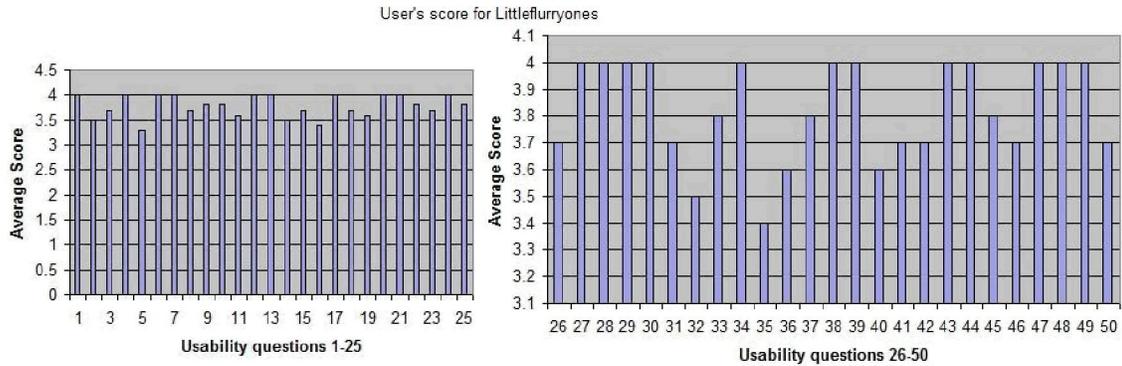
Websites tested	<a href="http://www.littl&lt;br/&gt;eflurryvones.co&lt;br/&gt;m/interiordesig&lt;br/&gt;n/index.html">http://www.littl eflurryvones.co m/interiordesig n/index.html</a>	<a href="http://www.littl&lt;br/&gt;eflurryvones.co&lt;br/&gt;m/">http://www.littl eflurryvones.co m/</a>	<a href="http://www.spaf&lt;br/&gt;indyou.com/cus&lt;br/&gt;tomer">http://www.spaf indyou.com/cus tomer</a>	<a href="http://www.din&lt;br/&gt;ghyinsurance.c&lt;br/&gt;om/">http://www.din ghyinsurance.c om/</a>	<a href="http://www.frnz&lt;br/&gt;.de/">http://www.frnz .de/</a>
Automatic test tools used					
WAVE	PASS	PASS	PASS	FAIL	PASS(frames used)
Section 508	PASS	PASS	PASS	FAIL	PASS
Browser Shots	OK	OK	OK	OK	OK
Test iPhone	PASS	PASS	PASS	PASS	PASS
FAE	PASS	PASS	PASS	PASS	PASS
Link Valet	All links are valid	All links are valid	All links are valid	Some external links does not exist	Some external links does not exist
W3C Link Checker	Valid links	Valid links	Valid links	Valid links	Some links are not valid
Etre's Accessibility Check	PASS	PASS	PASS	FAIL	FAIL
Cynthia says Hisoftware Portal	PASS	PASS	PASS	FAIL	FAIL
Achecker	PASS	PASS	PASS	FAIL	FAIL
Feng-GUI heat map	GOOD FLOW	GOOD FLOW	GOOD FLOW		CONFUSING( too many attention points)
Website Pulse	OK	OK	OK	OK	OK
WebWait	0.39s	0.34s	0.18s	1.41s	1.41s
SEO Validator	GOOD	GOOD	GOOD	GOOD	GOOD
Color Doctor	Text readable	Text readable	Text readable	Text readable	Text readable
Webble	Easy to navigate	Easy to navigate	Easy to navigate	Too confusing	Too confusing

**Table 1.** Test results of automatic evaluation tools

## 6.2 Analysis of Survey Questionnaires

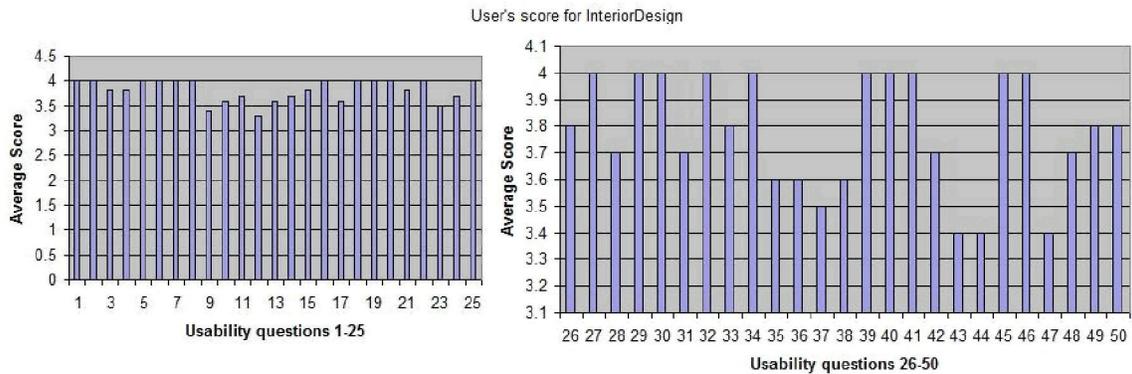
The survey questionnaires are sent to a focused group of people like Professors, Web Developers, Frequent Internet Users, Infrequent Internet Users, Senior citizens and Teenagers. The survey results were very helpful in analyzing how different users viewed the given websites and to present a visual proof that poorly designed websites greatly annoyed and frustrated the user. The emotional survey questionnaires were really helpful in understanding different user expectations and their response.

The survey result graph for the 50 usability questions is drawn for each website included on the survey. The average score for the 50 questions for the website Littleflurryones is shown below:



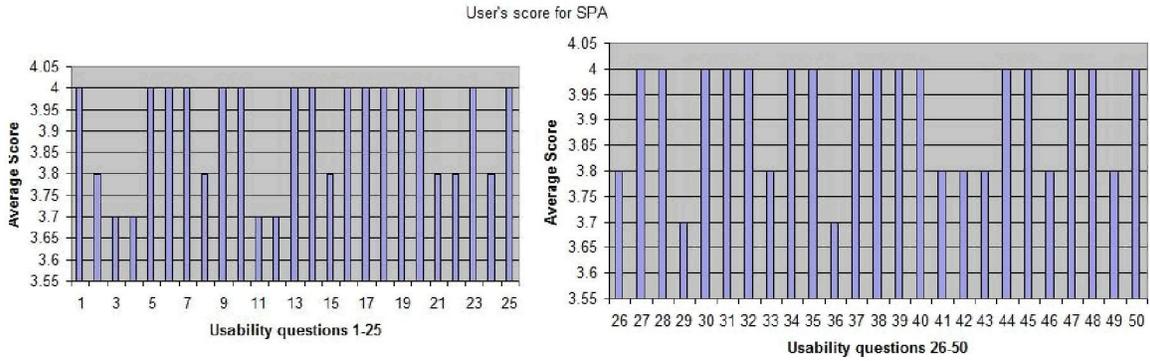
**Figure 54.** Survey result for Littleflurryones (average score of 50 usability questions)

The average score for the 50 questions for the website InteriorDesign is shown below:



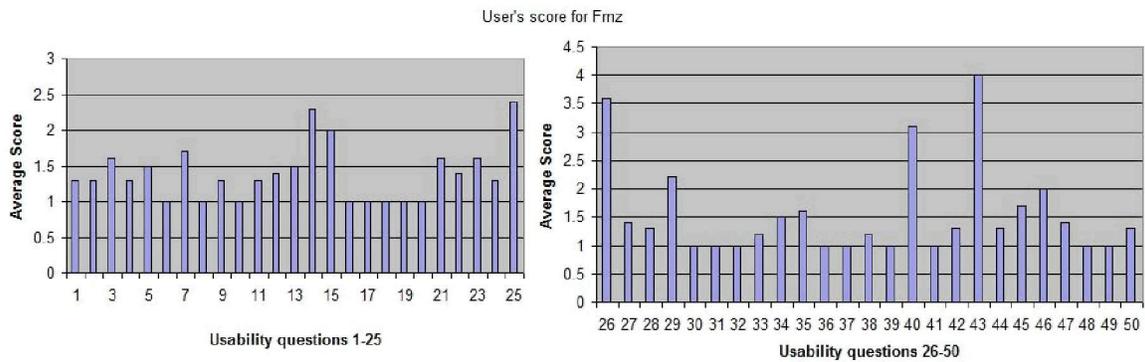
**Figure 55.** Survey result for InteriorDesign (average score of 50 usability questions)

The average score for the 50 questions for the website SPA is shown below:



**Figure 56.** Survey result for SPA (average score of 50 usability questions)

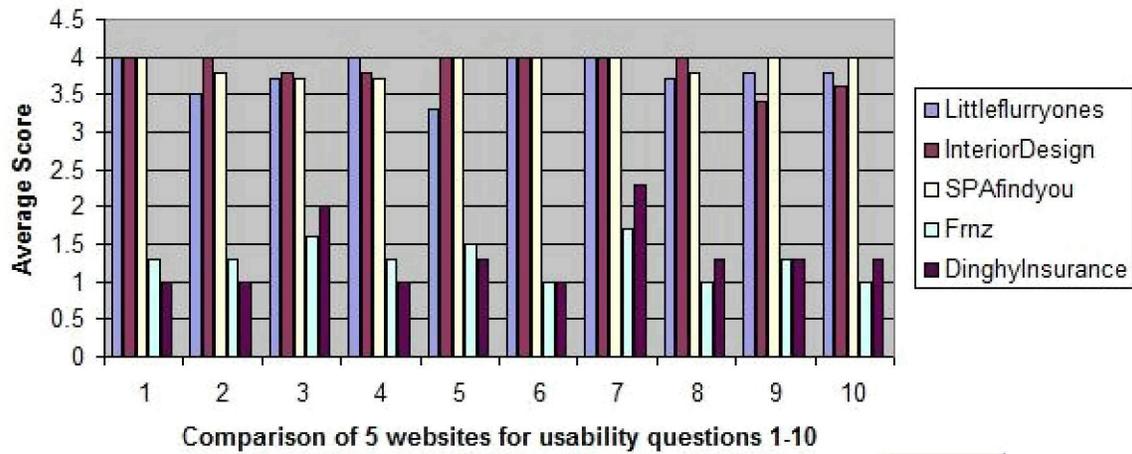
The average score for the 50 questions for the website Frnz is shown below:



**Figure 57.** Survey result for Frnz (average score of 50 usability questions)

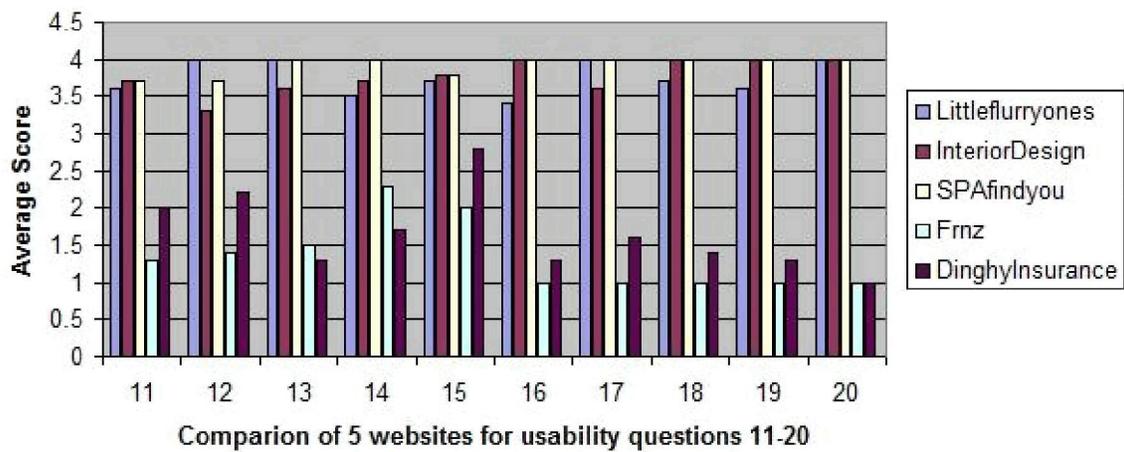
The graph is drawn for each set of ten questions for better comparison and analysis, with the average score for all the five websites.

**Survey result of 1-10 questions**



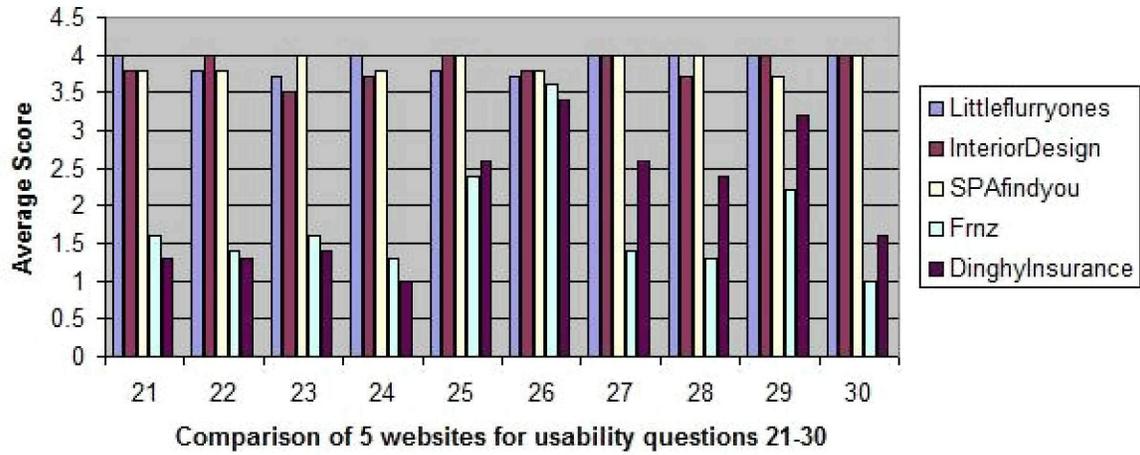
*Figure 58.* Survey result of 1-10 questions

**Survey result of 11-20**



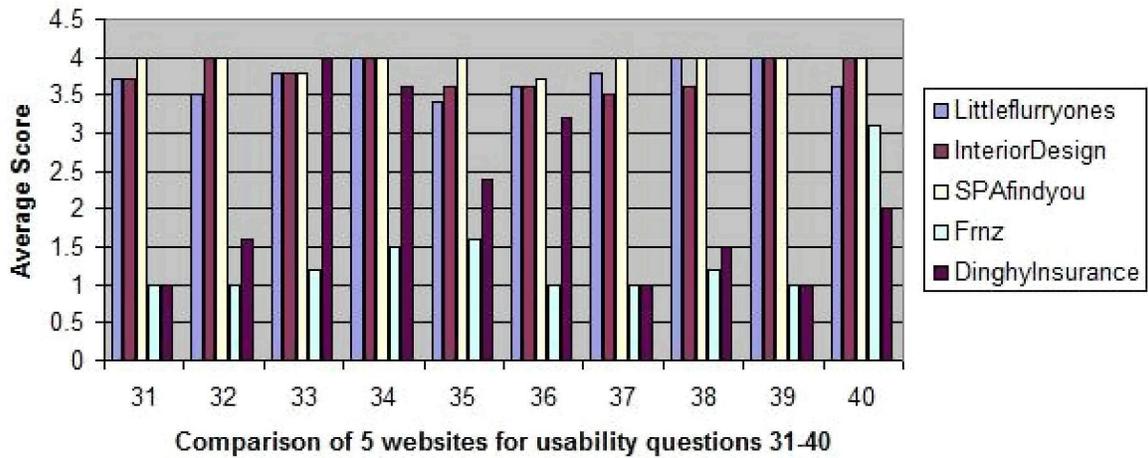
*Figure 59.* Survey result of 11-20 questions

**Survey result of 21-30 questions**



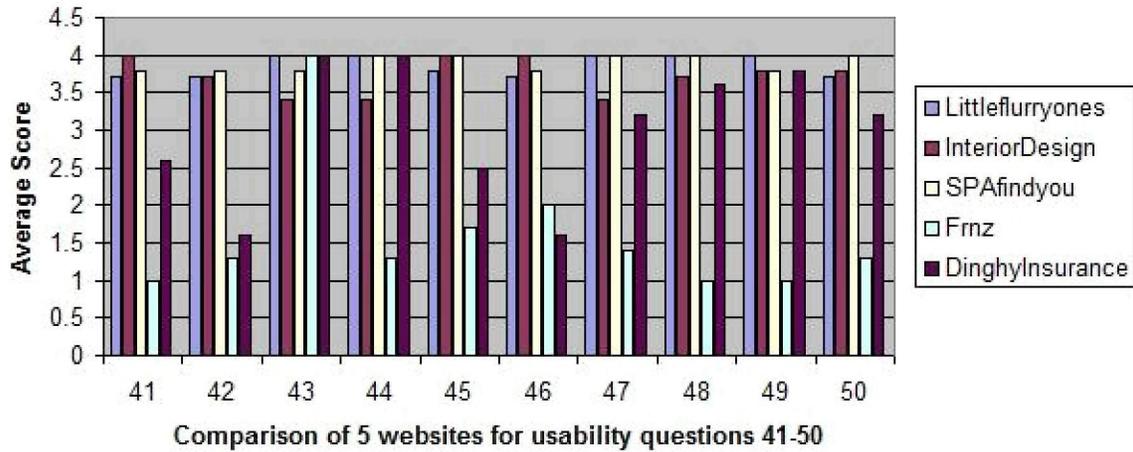
*Figure 60.* Survey result of 21-30 questions

**Survey result of 31-40 questions**



*Figure 61.* Survey result of 31-40 questions

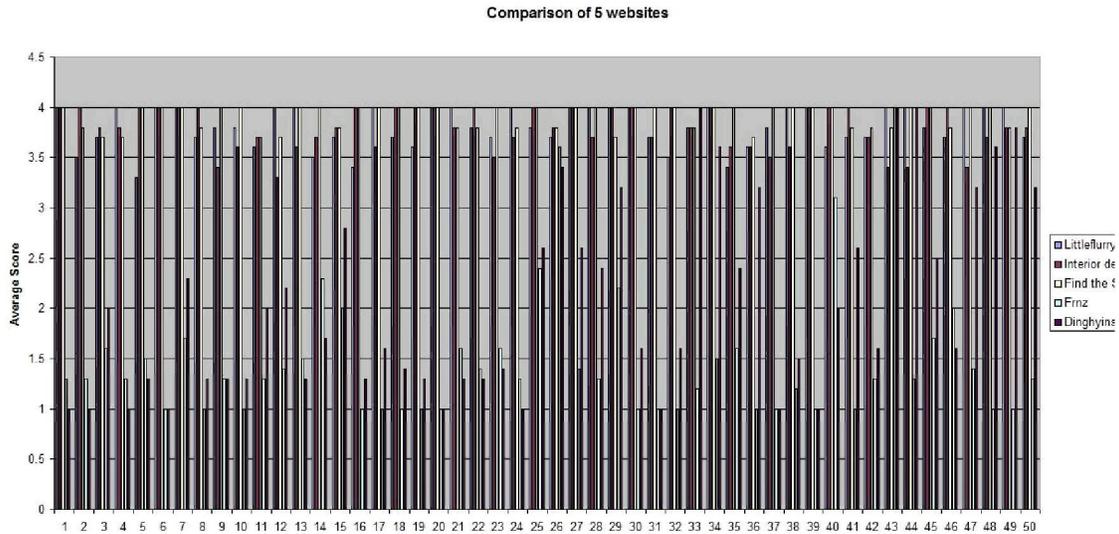
### Survey result of 41-50 questions



*Figure 62.* Survey result of 41-50 questions

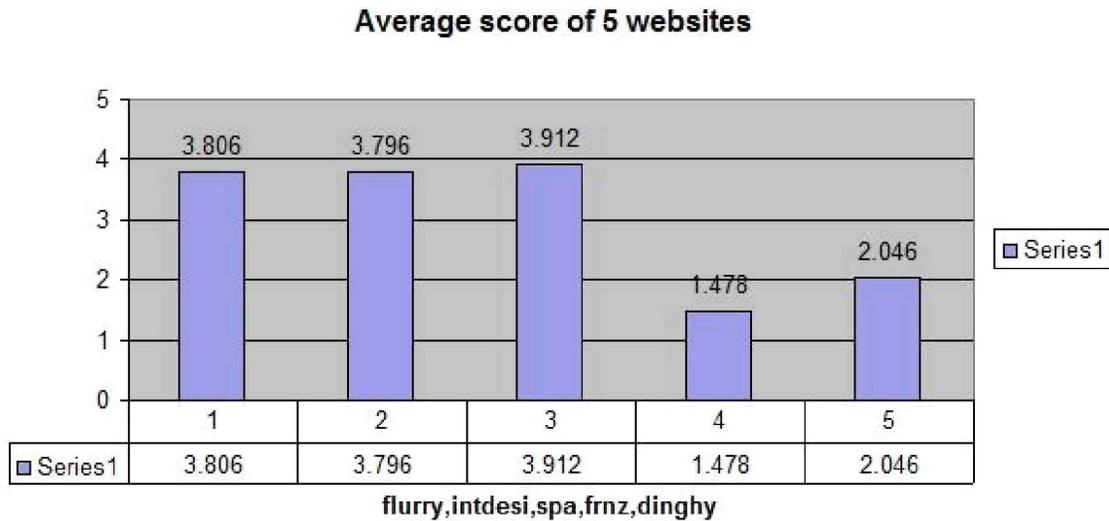
User's choice of agreements with statements regarding the usability questions range from 1= do not agree, to 4= strongly agree. The user responses with form statements are mapped in to numbers (scores) and an average score is computed for all the 50 usability questions. The different average scores were used to compare the different site rankings. The graph is plotted for the user's scores for all the five websites and for each 50 question for better visual comparison.

The following graph is drawn to show the user's response for all the 50 questions. Click the graph below to see the larger image.



**Figure 63.** Survey result of all the 50 questions

The average score of Little flurry ones is calculated as 3.806, for Interior Design it is 3.796 and for SPA find you it is 3.912 in which the SPA find you ranks the first. The average score of Frnz and Dinghy Insurance are 1.478 and 2.046 respectively. The calculated average score of the five websites are shown in the graph below. [http://www.4shared.com/photo/LAZ4iszC/survey\\_graph\\_result.html](http://www.4shared.com/photo/LAZ4iszC/survey_graph_result.html)



**Figure 64.** Average score of 5 websites

From the above graph it can be concluded that user friendly sites scored better for usability based questions and ranked higher.

The user's response of the emotional survey questionnaires was helpful in understanding their perceived expression of different websites. The results obtained gave a clear picture about the relation between the design of an interface and the user perception of this design. In particular, the study was designed to analyze the emotional response of different users and perceived usability of the given sites. The qualitative data elicited from the study identified three main factors that contributed to the perceived expression of the websites: perceived usability, design aspects and positive first impression. The results of the experiment generally confirmed the belief that a web user's initial emotional responses evoked by the aesthetic qualities of a website's homepage will be reflected on his/her subsequent approach behaviors towards the website.

The emotional response survey results of all the subjected websites are shown below.

**Q01: What emotional impact does <http://littleflurryones.com/interiordesign/index.html> create?**

You can choose multiple options if desired.

**92%**  
12 Of 13  
Respondents  
answered the  
question



A1	Sadness- does the color, font sizes, background makes you dull?	0	0 %
A2	Worry- are you worried about the navigation, confused of what to do next?	0	0 %
A3	Irritation- does the page layout or other things annoy you?	0	0 %
A4	Expected More-do you feel the content is less explanatory?	0	0 %
A5	Surprise-are you really surprised that the webpage is as you wanted it to be?	7	58.33 %
A6	Confident-do you feel that you can navigate around the pages without any confusion?	10	83.33 %
A7	Liking-are you completely happy about this site?	7	58.33 %
A8	Joy-you are happy to visit this website again?	11	91.67 %

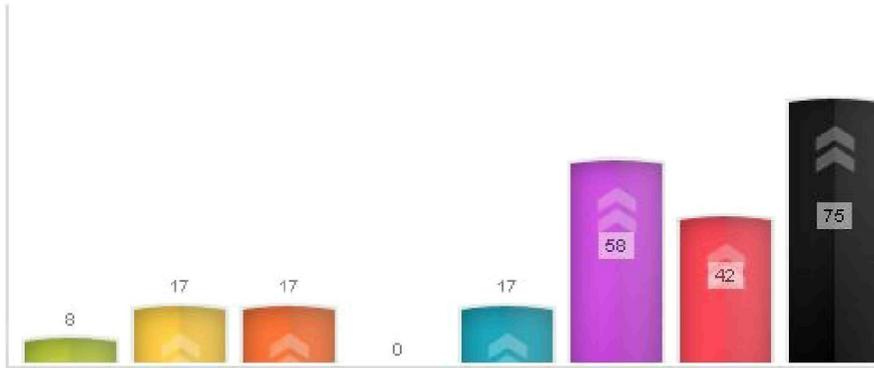
12 people have answered the question.

**Figure 65.** Emotional response survey result of Interior Design

**Q02: What emotional impact does <http://www.littleflurryones.com/> create?**

Help text

**92%**  
12 Of 13  
Respondents  
answered the  
question



A1	Sadness-does the color, font sizes, background makes you dull?	1	8.33 %
A2	Worry- are you worried about the navigation, confused of what to do next?	2	16.67 %
A3	Irritation- does the page layout or other things annoy you?	2	16.67 %
A4	Expected more-do you feel the information is less explanatory?	0	0 %
A5	Surprise-are you really surprised that the webpage is as you wanted it to be?	2	16.67 %
A6	Confidence-do you feel that you can navigate around the pages without any confusion?	7	58.33 %
A7	Liking-are you completely happy about this site?	5	41.67 %
	Joy-you are happy to visit this website again?	9	75 %

12 people have answered the question.

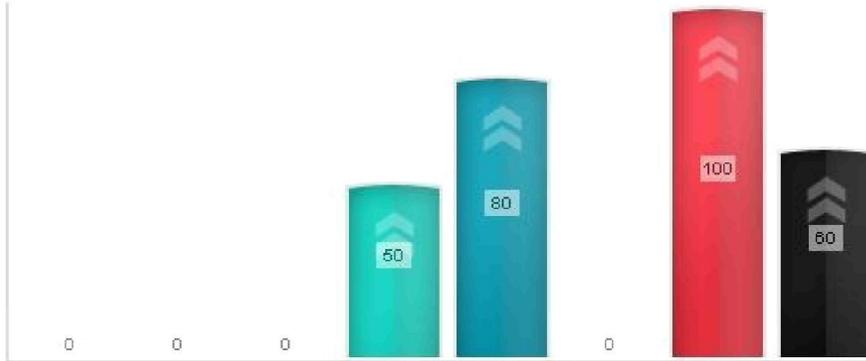
**Figure 66.** Emotional response survey result of Little flurry ones.

**Q04: What emotional impact does <http://www.spafindyou.com/customer> create?**

Help text

**77%**

10 Of 13  
Respondents  
answered the  
question



A1	Worry- are you worried about the navigation, confused of what to do next?	0	0 %
A2	Irritation- does the page layout or other things annoy you?	0	0 %
A3	Expected more-do you feel the information is less explanatory?	0	0 %
A4	Surprise-are you really surprised that the webpage is as you wanted it to be?	5	50 %
A5	Liking-are you completely happy about this site?	8	80 %
A6	Sadness-does the color, font sizes, background makes you dull?	0	0 %
A7	Confidence-do you feel that you can navigate around the pages without any confusion?	10	100 %
A8	Joy- You are happy to visit this site again	6	60 %

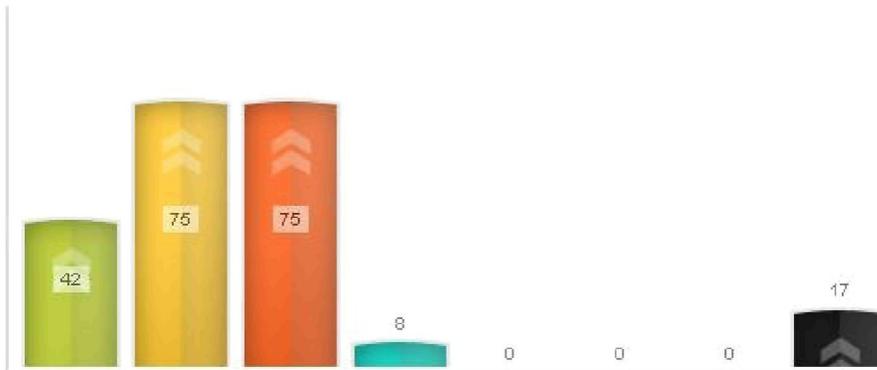
10 people have answered the question.

**Figure 67.** Emotional response survey result of SPA find you.

**Q03: What emotional impact does <http://www.frnz.de/> create?**

Choose multiple options too.

**92%**  
12 Of 13  
Respondents  
answered the  
question



Option	Description	Count	Percentage
A1	Sadness- does the color, font sizes, background makes you dull?	5	41.67 %
A2	Worry- are you worried about the navigation, confused of what to do next?	9	75 %
A3	Irritation- does the page layout or other things annoy you?	9	75 %
A4	Expected more-do you feel the content is less explanatory?	1	8.33 %
A5	Surprise-are you really surprised that the webpage is as you wanted it to be?	0	0 %
A6	Confidence-do you feel that you can navigate around the pages without any confusion?	0	0 %
A7	Liking-are you completely happy about this site?	0	0 %
Joy	Joy-you are happy to visit this website again?	2	16.67 %

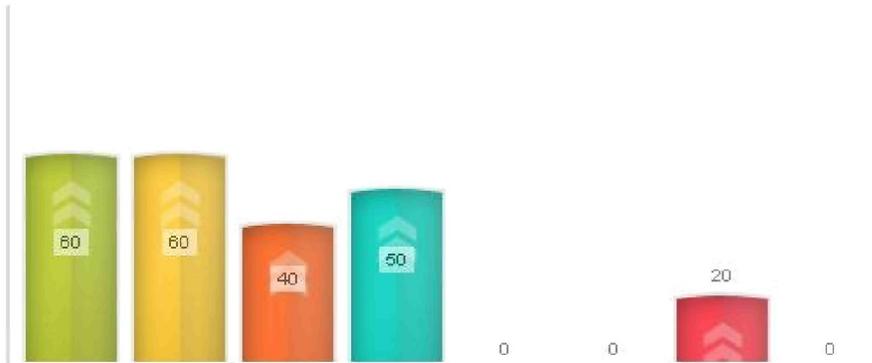
12 people have answered the question.

**Figure 68.** Emotional response survey result of Frnz.

**Q05: What emotional impact does <http://www.dinghyinsurance.com/ create?>**

Help text

**77%**  
10 Of 13  
Respondents  
answered the  
question



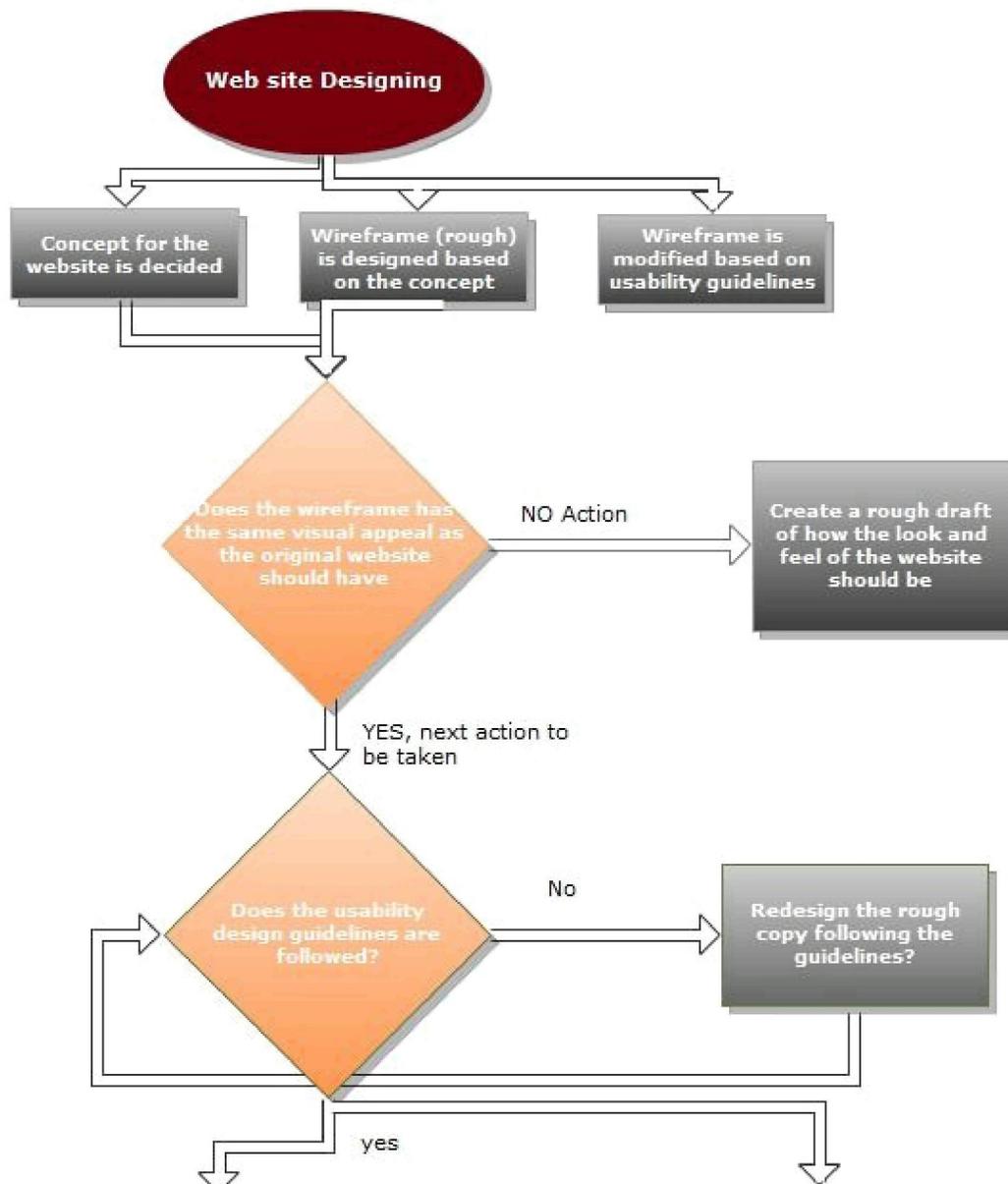
A1	Sadness-does the color, font sizes, background makes you dull?	6	60 %
A2	Worry- are you worried about the navigation, confused of what to do next?	6	60 %
A3	Irritation- does the page layout or other things annoy you?	4	40 %
A4	Expected more-do you feel the information is less explanatory?	5	50 %
A5	Surprise-are you really surprised that the webpage is as you wanted it to be?	0	0 %
A6	Confidence-do you feel that you can navigate around the pages without any confusion?	0	0 %
A7	Liking-are you completely happy about this site?	2	20 %
A8	Joy- You are happy to visit this site again	0	0 %

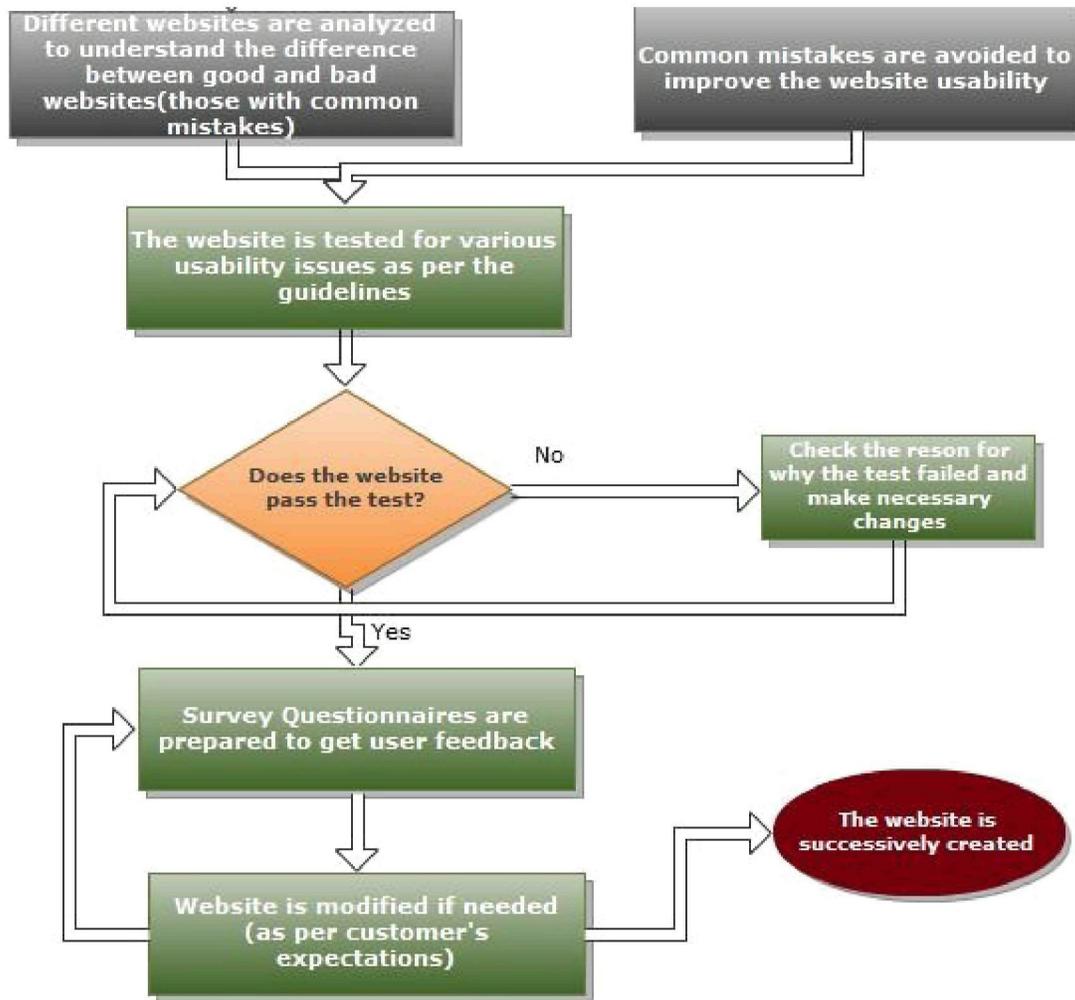
10 people have answered the question.

**Figure 69.** Emotional response survey result of Dinghy Insurance.

From the results, it is evident that initial impression formed by the visual appearance of a site, is important to attract new and novice users. Also the result proves that the aesthetic quality of a user interface, its perceived usability determines the user's emotions. A proper balance between content and color engages the user and creates a sense of order. Color plays a major role in evoking user's emotions and a strong predictor in the overall appeal of a web page. The best way to gain user's first impression is to concentrate on website's aesthetic qualities.

A roadmap is created after a detailed study and analysis to create a user friendly website. A good user friendly website has some sequence of steps to be followed. This road map can be used as a reference sheet to design a website from scratch.





**Figure 70.** A road map illustrating the sequence of steps to design a good website.

## Chapter: 7 Conclusions

The goal of this thesis paper is to show how web interface emotionally affects different users and to design few user friendly web pages based on usability design guidelines. The initial stages of this study included the analysis of poor websites that created web stress, common mistakes of web designers, creation of user friendly web pages and the usability design guidelines to be followed.

Following the usability guidelines, three websites were created. These websites were tested using automatic test tools and submitted for user feedback. Based on the usability guidelines 50 questions were prepared to collect feedback for both good and poor websites and they were included in the home page of each website. There were a set of emotional survey questions to identify how users reacted to different websites included in the study. The results were helpful in comparing the user's response to different sites and proved effectively that poorly designed websites greatly annoyed the users.

The survey results showed that most of the people gave high scores to user friendly web pages and preferred to visit them again. Therefore it is essential to design web pages that attracts different users and makes them happy when they browse around. By following few steps and keeping some important web designing points in mind it is quite easy to build user friendly pages.

- Concept for the website should be decided .
- A rough layout (wireframe is designed according to the concept) with positional elements similar to the final website is designed.
- The wireframe is modified as per the usability guidelines.
- Different websites are analyzed to understand the common mistakes usually made by the designer. ( This will help any new designer to differentiate good and bad websites).
- With rough layout as the guidance sheet, the original website is designed.

- The website is subjected to different evaluation tools to test the usability and accessibility features.
- Finally a survey is prepared with a list of usability questions and user evaluation is analyzed to find out the areas where the website lacks user expectations and modified accordingly.

The results of both the test tools and survey questionnaires proved that user friendly and emotionally satisfying user interface could be easily designed by following the usability design guidelines, so a road map is drawn which illustrates the sequence of steps to be followed to design a good web page. This road map can be used as a reference sheet, to create a web page quickly.

## **Chapter: 8 Future Work**

A focused approach in designing mobile web has become mandatory as the reach and capabilities of mobile devices has grown phenomenally. Designing a website for mobile devices like i Pad or Smart phones like i Phone is lot more challenging and interesting. To create a great mobile experience it is important to focus on content, information architecture and visual design. Mobile web thus opens a variety of avenues for future research. Designing for mobile web extends the current study by adopting the dynamic multi-page stimuli for a variety of product/industry categories. More extensive studies are needed to test the effects of different combinations of text, links, graphics and additional design factors on perceptions of mobile web page complexity. This research mainly deals with how to adapt web design features to blend with mobile usability features and better user experience which is an interesting area of future research. As mobile applications become increasingly distributed and pervasive in all aspects of human life, this stream of research is urgently needed.

# References

1. Stefan Leuthold, Javier A. Bargas-Avila, Klaus Opwis., 2007. Beyond Web Content Accessibility Guidelines: Design of enhanced text User Interfaces for Blind Internet users. University of Basel, Basel, Switzerland.
2. Karlsson M., 2007. Expressions, Emotions and Website Design. Chalmers University of Technology, Goteborg, Sweden.
3. Englefield P., Paddison C., Tibbits M., Damani I., 2005. A proposed Architecture for Integrating Accessibility test tools. IBM Systems Journal.
4. Maria De Marsico, Stefano Levialdi. 2003. Evaluating websites: Exploring User's Expectations. University of Rome, Rome, Italy.
5. van Gorp, Trevor, J. (2006). Emotion, Arousal, Attention and Flow: Chaining Emotional States to Improve Human-Computer Interaction. University of Calgary, <http://www.slideshare.net/trevor.vangorp/emotion-arousal-attention-and-flow-chaining-emotional-states-to-improve-human-computer-interaction>
6. Faiola, A., and Matei, S. A. 2005. Cultural Cognitive style and Web Design: Beyond a behavioral inquiry into computer-mediated communication. Purdue University.
7. Csikszentmihalyi, M. 1990. Beyond Boredom and Anxiety, San Francisco: Jossey-Bass. Copyrights: Journal of E-Business (International Academy of E-Business), Journal of E-Business, Vol. 1, Issue 2, December 2001. (2007).
8. MattMickiwicz.2000.DesignGuidelines,Article., <http://articles.sitepoint.com/article/design-guidelines>
9. Michael O. Leavitt, Ben Shneiderman. Research- Based Web Design and UsabilityGuidelines,Handbook., [http://www.usability.gov/guidelines/guidelines\\_book.pdf](http://www.usability.gov/guidelines/guidelines_book.pdf)
10. Novak T. Hoffman, D,Young, Y. 1998. Measuring the Flow Construct in Online Environments: a structural modeling approach. Owen Graduate School of Management, Vanderbilt University, working paper.
11. Hoffman D.L.Novak, T. 1996. Marketing in Hypermedia Computer- Mediated Environments: Conceptual Foundations. Journal of Marketing, Vol. 60 pp. 50-68.
12. Dawn Shaikh.A , Kelsi Lenz. 2001. Re-examining User Expectations of Web Objects, Research Paper.
13. Section 508, 2008. Checklist of Checkpoints for Web Content Accessibility Guidelines. <http://www.webaim.org/standards/508/checklist>

14. Roger Dooley. 2004. Neuromarketing- where Brain Science and Market meet, Article., <http://www.neurosciencemarketing.com/blog/articles/web-stress.htm>
15. Hekkert P. and van Dijk, M.B. 2001. Designing from context: Foundations and applications of the ViP approach. In P. Lloyd & H. Christiaans , Designing in Context: Proceedings of Design Thinking Research Symposium 5 (pp. 383--394). Delft, DUP Science.
16. McDonagh, D., Hekkert, P. van Erp, J., and Gyi, D. (eds.). 2003. Design and Emotion, Episode III: The Experience of Everyday Things. London, Taylor & Francis.
17. Ratner, C. 1997a. Cultural psychology and qualitative methodology: Theoretical and empirical considerations. N.Y.: Plenum.
18. Vygotsky, L. S. 1997b. Educational psychology. Boca Raton, Fla.: St. Lucie Press. (Originally written 1921-1923).
19. Davidson, R., Jackson, D., & Kalin, N. 2000. Emotion, plasticity, context, and regulation: Perspectives from affective neuroscience. *Psychological Bulletin*, 126, 890-909.
20. Heather M. Gray, et al. 2007. Dimensions of mind perception. *Science* 315, 619
21. King, Andrew B. 2003. "Chapter 2 – Flow in Web Design. <http://www.websiteoptimization.com/speed/2/>
22. Simon, H. A. 1971, "Designing Organizations for an Information-Rich World", in Martin Greenberger, *Computers, Communication, and the Public Interest*. Baltimore, MD: The Johns Hopkins Press, ISBN 0-8018-1135-X. pp. 40-41.