Enhancing Website Navigation by User Experience Design Strategies

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Today Designing efficient interfaces plays an important role in world wide web. People are highly attracted to websites that gives them more useful information at lowest time intervals. Websites always have a lack of enough strategies to keep users involved and satisfied. Now user experience design comes up to mind to solve these difficulties with new ideas and practices. The UX Design uses usability and accessibility methods to improve the interaction between users and websites. This thesis focuses on web navigation types to make them more appropriate in the way of providing useful contents.
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INTRODUCTION

Users are attracted to web navigations when they can find their needed information easily and cheaply from websites. The navigation menu is a menu that can give users profound experience from whole website. For the first time that users visit the site they know what they are looking for but they don’t know how to find them out. People have struggled to find useful information in their time limitations because of existence of Massive contents on websites. Although user experience strategies have high impact on user satisfaction but it’s just a bit of the enormous world of human computer interaction. UX helps Business companies and manufacturers to succeed with their products. most of the marketing sales are lost because users can’t find information and bigger problem is that they don’t even return to the previously experienced website. professional web applications have effective menu navigations which have unambiguous organized view to the users. technologies like css3 and javascript have been revolutionized the types and styles of navigation in recent decades. adding animation effects can increase interest and comfortability of users
As a navigation style which shows the usable partitions of web pages presents to users is vividly part of the information structure design. Combining web pages together using information categorization standards is usually routed through multiple elements on the behind of the web servers and shows information in front of the client machines. We emphasize on the website navigation disciplines to adding up all of the navigation methods to be understood by users as a human factor. Website navigation is important to the success of a visitor’s experience by the developer's website. The website’s navigation system is like a roadmap to all the different areas and information contained within the website. Using a consistent navigation scheme from page to page helps the website visitor learn developers website navigation system
navigational systems which is known as the possible sequences of web pages displayed to individuals is overaly part of the documentation of web navigation. But to get from one page to second request is usually displays the response page. We define navigation paths to design efficient structures to help users to become satisfied.

1.1 What is Web Navigation

Web navigation is the activity of seeking users to find relevant information on the web. Which is categorized as hyperlinks and hypermedia. by the searching of the objects each user can find needed information. Designing efficient web navigation is so difficult because it’s so versatile and has no distinct guidelines. Navigation could have degrees of complexity or could be multi-level architecture for logged in and logged out uses and etc. navigation design is an art and needs experience and knowledge of information architecture. Web browser is a tool for seeking information on the internet. However, because of the vast information space on the Web, people often feel entangled and disoriented when overloaded with massive amount of information, a problem often referred to as “getting lost” on internet.

1.2 Web Navigation Types

There are different types of web navigation, Web designers have to use appropriate type of web navigation according to their website actions and present them as an mixture of useful elements. Bars and tabs are the casual use of web navigation systems. Types of web navigations are the types of content, an accessibilities and also behavior of navigational links and transitions to next pages.
All of webpages have a different types of navigation, for example homepage navigation has many options which varies to the type of navigation in about page. All of these varieties make users distinguish the differences between all types of navigation. This thesis explains fundamental types of web navigation to make readers more aware of web structures that could be enhanced by user experience design strategies.

Here are the most common types of web navigation which is used frequently in most of the websites:

**Main navigation**

Which is also known as global navigation, usually this type of navigation shows the top level structure of the website or it’s a page under homepage. Existing links in main navigation is used to navigate webpages and keeping consistent behavior for themselves. Users expect to reach to exact point that they want on the website in the shortest time intervals. Generally, the main navigation supports many of activities according to information navigation which is formed by alternative navigations and searching even second time retrieval.
From the perspective of the users main navigation should give them a holistic view of the website and general response to their needs. This type of navigation should be directional to easily handle the consistency of information in large web applications. Main navigation also lets people switch between the titles and contents of website from page to page. This type of navigation is practical when users are interrupted and want to find out where they are on the website. Main navigation has frequently been in the global navigation, which consists of site slogan, logo and also utility navigation. To make the website consistent and reliable researchers have to be informed of the size of the web application, small websites could be navigated using breadcrumbs and contextual navigation. Companies are aiming to build persistent and apparent global navigations to fill their stack holder needs.

**Local navigation**

used to access the lower levels Which is also called as sub-nav or page-level-nav which is in the bottom of main pages. The word Local usually describes the other options in one level of hierarchy website. Local navigation ordinary comes to global navigation systems .and it’s a type main navigation

: this kind of navigation has some sub-directories that researchers explained here

**Inverted-L.1**

Which is used to implementing global navigation in above of the page and its used as an horizontal list in the shape of Inverted-L

**Horizontal.2**

Local navigation could be used in sub-directories of global navigation using dynamic structures

**Embeded Vertical.3**
When main navigation in Vertical menu is putted the left or right side of the page - usually shows the tree-like structure

![Diagram showing three common forms of aim and local web navigation](image)

- Most of the times changes from one page to another uses Local navigation

Another strategy is to show navigation in down of page which has links in above of the page for keyboard-based browsers so in down of navigation there is a Back option which turns users to previous page

**Contextual Navigation**

Which is also called as associative and related link. Here there are two types of Contextual Navigation:

**Embedded navigation**

Contextual navigation may have the content of itself. Like the result of contextual navigation mostly is in the shape of normal links
Related Links

Contextual navigation could be appeared at the remainder of the content. If navigation comes with content may be one relation is detached from the business view.

Contextual navigation doesn’t support some alternatives instead of that it supports searches which can suggest people to fresh information. From the business view, contextual navigation consists of many opportunities. Product pages in e-commerce for example, most of them have links for associated products and capabilities. This is one usage of contextual navigation in e-commerce.

Accessibilities

Embedded links or associative navigations should be existed while reading context. Related links are used in new websites. Which has two primary functions:

Most of the stories in the article include links that help users to use more information. As developers using the Web, it may not happen to developers how important developer vision is for sailing, not through the site, but within the current page. If developers can view the page, and so the probabilities are that without reading any words at all on the page it is pretty easy to quickly glance over it and understand the region that could be called "main content." Once developers get a line that "primary content" area developers can zoom in and read the information developers are looking for or click on the link developers are interested in.

For users who are blind, scanning "main content" is not possible. Because they cannot zero in on the main story, blind users rely on their screen reader to speak the page, link at a time, advertisement at a time, item by item until they find what may be the main content area - which was the reason they came to the page in the first place.

There are lots of people with physical disabilities that are not able to use a mouse. For those folks, navigation within the page is as challenging as for those who are blind (who also don't use a pointing device). A keyboard user may clearly see the "main content" - and a link in there she/he wants to follow. That may require extreme patience tabbing through dozens, even hundreds of links to get at the desired target. Even the details of the process are daunting as sometimes the current focus is difficult to see.

When this course was first written I spent a lot of time talking about how tables were linearized and spoken by screen readers. I talked about how developers could actually improve in-page navigation just by changing the structure of the tables - so that the main content actually come first, for example. But technology has changed and assistive
technology has improved. There are important new screen reader functions that contribute to a solution of this in-page navigation problem.

Adaptive Navigation

This type of navigation in contextual navigation which links of it comes from a process of retrieval for social filtering which is based on traditional ranking algorithm that acts according to user behavior. It’s like traditional lists. Adaptive navigation mostly is used for ecommerce websites. It’s so hard to ordinate adaptive navigation in vertical view.

Adaptability is important issue in visual interface design, which could have a mentionable impact on the usability of websites. This mechanism is related to both interactive...
documents and web applications. The process of user adaptation is a semi-automated communication between users and designers and should be determined properly.

Over the time, web applications occupy a large part in the field of mass communication. So that designers give each user a different user interface with different abilities and skills and physical location, so that it is desirable for him. So the use of the same user interface for all users is still challenging.

To solve this problem, researchers and programmers are looking for the ability to create unique user experiences for each individual type. Although very few products have such user interfaces, they have plenty of maintenance and development costs.

In this thesis, researcher will present techniques that allow developers to provide multiple user interfaces that perform better than simple ones.

The writer provided conclusions for proposed approach to reduce development and maintenance costs with maintaining applicability\(^2\).
Quick Links

Quick Links provide access to important contents and site areas that cannot be displayed in the global navigation. Sometimes like contextual navigations they are used for the entire site and are sent to pages. Here are the areas that provide the functions that are used as contextual advertising. They appear at the top or the corner of the web pages which could be visible permanently. But in other kinds of website, they’re shown as dynamically reduced forms.

Like other website components, the lists in the Quick Links are categorized in the same way and are categorized in other pages in a different way, but all of them play the same role in the navigation of the website.

These lists are very important in that they give access to deeper sections of the content of the website. Quick links often play a key role in news websites word forms. It is recommended to use two-word quick links for websites. Quick links are also defined as other ways, such as Popular resources, launch application or Essential links.
These navigation styles should be short and simple and easy to access.

Quick Links are also used as a promotional item, but by the improperly usage of them could end up with critical usability issues. Quick link colours reflects faculty or organisation brand color.

![Quick Links]

**Quick Links**

- Learn to use ARA
  - YouTube
  - ARA Demo Application
  - Automic University
  - User Guide
  - Administration Guide
- Community
  - Community
- Get Help
  - Automic Support
- Marketplace
  - Automic Marketplace
- General
  - Automic Website

- Figure 1-4 / example of quick links in website

**Footer Navigation**

Which is existed in down part of the website usually comes with the content links which doesn’t link a page to other parts of website. Here Footer Navigation doesn’t response specific user needs but it’s a legal need for site administrators. Footer navigations are mostly used in inconsistent structure. But footer navigation shouldn’t be ambiguous. For example one part or total view of site could be mentioned to related links.

The advantage of Footer navigation is that it doesn’t have an effect on potential and productivity of the webpages. But existing links in Footer could be like other navigations which are not apparent. But scrolling pages become less troublemaking for users. Web
designers can have one navigation in the bottom of the website. In the older books, it included the first words of the next page. Today, headers and footers have been displaced because of the lack of having specified standards. In some cases, it has been seen that the header components are embedded in the font such as chapter or book title or other items.

The footer is sometimes used as space for notes which is known as footnotes. These footnotes are separated from notes in the end of chapter in books. However, in desktop applications, the footer identifies the space at the bottom of a page which is visible on personal computers or etc.

Some softwares have information in their footer which includes page number and date and time. They may have logo or other types of information. In web-based applications, these duplications are applied to header. By using HTML the footer is sectioned for announcing copyright and author-related information, which is properly styled by the use of CSS web scripting language.

Utility Navigation
This type of navigation shows the tools and attributes in the website. These pages ordinarily are the parts of hierarchical websites. For example, one link for the search with help pages are not the main part of the navigation system or local navigation. Other options don’t have any relation with them like logging in website or changing font size. Web Pages with this style are not the part of hierarchical title of websites. Utility navigations are frequently smaller than primary navigations and will be shown in up and sides and down.
of webpages. Global Utility navigations are similar to main navigations most of them are viewed in global navigation but alternatives are not always apparent. For example in e-commerce websites or shopping cards utility navigations are important for business plans. Utility navigation types: Extra site navigation, Tool boxes, Linked logos, Language and .country selectors, Internet page navigations

Utility navigation consists of secondary actions and tools, such as contact, subscribe, save, sign in, share, change view, print. These activities strongly affect website visitor satisfaction, user experience, and engagement. designers should Put utilities where people expect and need them. Although the shopping cart is a core feature of e-commerce sites (developers could say that it’s the defining feature), convention calls for the shopping cart icon to be found in the utility navigation as well. And, as researchers all know, following conventions is an easy way to improve usability and increase conversion rates. Search, another core feature, is also quite often found in the main .utility area

Even though most utility navigation features are secondary in nature, they are important for people under certain circumstances. Being secondary, they can be relegated to a secondary (less prominent) visual placement as long as this is done in compliance with .ruling web conventions so that users can quickly find a desired information
Extra Site Navigation

What is important for big company I that they should have products businesses for other related websites or companies this meta-navigation permit people to switch between bought products by using one provider.

Extra site navigations ordinarily are in top right of the page, even though they are small and are showed in simple shape the links could be hard to transmit. After all they have many kinds and main purpose is to create consistent navigation mechanism in all of websites. Unfortunately these links could not always be shown in main site.

Tool Boxes
Tool boxes provide site function options. Tools are used to do existing actions in website.
tool boxes include links for contents or page navigation but most of the pages are
connected to functional pages. For these reasons transferring information in these types
of navigation could be efficient for business goals. For example toolbar could be
connected to offline bought and connection forms

In Computer Interface Design, a toolbar which is also known as ribbon is a
graphical control element on which on-screen buttons, icons, menus, or other input or
output elements are placed. Toolbars are seen in many types of software such as office
suites, graphics editors and web browsers. Toolbars are mostly distinguished from
palletes by their integration into the edges of the screen or larger windows, which results
in wasted space if too many underpopulated bars are stacked a top each other especially
horizontal bars on a landscape oriented interfaces

Linked logos

Websites mostly have a logo in top of page which is like a picture and clicking that takes
us to homepage. People may perceive this type of behavior. Titles in sides of logo could
be necessary. linking logo can take us to the first point in some situations it like undo
action with navigation process

Because home option has global navigation some of websites have mixture of both and
the logo runs at the navigation

Figure 1-7 / example of linked logo in website
Language Selectors

For websites which have Multi Language pages Language Selector lets people to switch between options. Most of the times visitors go to the Multi Language websites. Sometimes language of local site is totally different. Simple links are useful here for these features. The Universal Language Selector extension (ULS) provides a flexible way to configure and deliver language settings like interface language, fonts, and input methods (keyboard mappings). This will allow users to type text in different languages not directly supported by their keyboard, read content in a script for which fonts are not available locally, or customize the language in which menus are displayed.

![Language Selector Bar](image.png)

Country or Region Selectors

Sometimes contents could change based on country or shopping store, Country selectors let the users to choose their marketing region. selecting language and country are different activities. Country selectors are sophisticated, sometimes country selectors come with clickable world map, which people can understand the country which they want, with or without selecting acceptable language for national flags.
Internet page navigation

Which are also called jump link and Anchor Link. Some of webpages are complex and have many variety of objects and here Internal link navigation is so useful for drop down scrolling. And it includes appropriate ways for bigger websites which is an efficient decision to return to other pages.

Most of websites use multiple contents in CSS settings these internal links come with pages without loading. The word "anchor" has opposing meanings. In the context of a link from an anchor to a target, it is the starting place. In the context of the template {{anchor}}, an "anchor" is a landing place for a link to jump to.

The anchor template proceeds to automatically create some invisible coding from certain text in the "landing place", taking into account certain parameters in reference templates in general. So for developers the word "anchor" may refer to the landing place in general, to the mostly invisible code, or to the text and parameters from which the code is created.
Associative

In this type of navigation page could be related to each other according to title of them. It could be established like between page from different hierarchy of the website.

Associative navigation helps users to switch between topics easily, but it also has some embedded design troubles. Examples of associative navigation are Contextual navigation and quick links.

Utility

People may have problems with seeking needed information inside webpages. Utility navigation could help users to get advantages from horizontally integrated webpages. Site map and sitesearch are the examples of utility navigation.

Utility navigation is not just limited to specific structure.
utility navigation should provide an environment which users could do functions that they want. high level of users satisfaction could vividly impact on the duration of time and money they pay for the product. users don’t have to be confused with sophisticated structure of the website, each part of the navigation should be categorized to logical structures for building user friendly website. also visual identity of the web interface is so important

1.3 Existing Navigation Styles

This part of the thesis focuses on paging navigations and Breadcrumbs and also all types of tree navigation, sitemaps, directories, tags, clouds and A-Z Indexes and also other types of dropdown and dynamic menus. here Visualization mechanisms of webpages are about to be explained
Step navigation

This style is valuable when decisions in one step has an impact on future steps, like wizard or checkout process or for exams and online surveys, step navigation has an accessibility to different pages.

Figure 1-12 / sample of step navigation which is used as a progress tracker

Paging Navigation

Which is similar to step navigation but also includes other informations and options which mostly could be found in result page and shows the details in result searches, which are frequently found in search pages. Results usually have limitations among options that could be displayed. after reaching the closure, second part of them has to be shown. this process is called as pagination which devides a document into discrete pages, either electronic pages or printed ones. pagination is used for page numbering to indicate the proper order for pages mostly in portfolios and web search results.
Breadcrumbs Trail

Breadcrumbs or breadcrumbs trail is a graphical control element used as a navigational aid in user interfaces. It allows users to keep track of their locations within programs, documents, or websites. The term comes from the trail of bread crumbs left by Hansel and Gretel in the fairy tale of the same name. This type of navigation seems suitable for any kind of hierarchical system, and serves two purposes: first, to show developers where they are in hierarchy; and second, to allow developers to navigate to a previous point in hierarchy in a random-access fashion - in other words, developers do not have to keep hitting the back button, developers can just click on the second link and immediately go to the second location in the breadcrumb trail.

Figure 1-14 / example of breadcrumbs navigation
Path breadcrumbs

This model mostly is dynamic and each page has different breadcrumbs to which user accesses to site attribute breadcrumbs describes the page and not being a path for website or an address. They show metadata schemes which are topic hierarchy. Breadcrumbs trails increase the level of understanding of users by enhancing context ability.

Breadcrumbs or breadcrumb trails are a navigation technique used in user interfaces. Its purpose is to give users a way to keep track of their location within programs or documents. The term is taken from the trail of breadcrumbs left by Hansel and Gretel in the popular fairytale.

While most studies of breadcrumb navigation have been focused entirely on web sites, there are many similarities between navigating a website and navigating a non-trivial PC app, especially one that deals with hierarchical data - for example, HR systems, auto parts ordering systems, and software for presenting and selecting class schedules. Jakob Nielsen, a user interface expert, has an interesting blog about breadcrumbs. If developers replaced the words "web site" with "PC app" in his blog, it would still make perfect sense.

Breadcrumb navigation seemed appropriate for a large inventory system I was recently involved with, and the client liked the idea when I presented it to him. This led to the creation of XBreadCrumbs Bar, which is based on XHtml Draw.

In contrary to of people beliefs breadcrumbs is different from Hansel trail because this type of navigation shows the navigation history.

While most studies of breadcrumb navigation have been focused entirely on web sites, there are many similarities between navigating a website and navigating a non-trivial PC app, especially one that deals with hierarchical data - for example, HR systems, auto parts ordering systems, and software for presenting and selecting class schedules. Jakob Nielsen, a user interface expert, has an interesting blog about breadcrumbs. If developers replaced the words "web site" with "PC app" in his blog, it would still make perfect sense.

Breadcrumb navigation seemed appropriate for a large inventory systems and the client liked the idea when it was presented. This led to the creation of XBreadCrumbs Bar, which is based on XHtml Draw. This gives additional flexibility in the visual display of the breadcrumb trail, and also offers built-in support for both web links and APP links.
Tree navigation

Tree navigations permit users to access the hierarchical structure. This type of mechanism is frequently implemented on operating systems which move the folder of files and has the signs like – or + to navigate user through website paths. Opening and closing tree in website can make some troubles if refreshing the page occurs. If user come down and page shows the results node will be putted in the page.
The tree illustrates the structure of subpages that can be accessed through basic website navigation (main menu). Sometimes a website may have additional navigation, e.g. the second menu used to navigate a developed structure of the product offer. Then developers will need a separate tree.

On the tree, it’s good to mark additional connections between content pieces that appear on the pages in the form of ‘see also’ links. An example of such a connection can be a link on a subpage describing a product (under ‘Offer’) leading to a subpage showing examples of implementations (under ‘Realizations’).

**Site Map**

A site map (or sitemap) is a list of pages of a website. Site map is representation of the website and could be appeared in another page. Site map should be simple and easy its usually useful for main navigation category like titles in web pages sitemap could be useful but sometimes it has some levels of ambiguity. Site maps are also used for search engine optimization.

![Figure 1-17 / A sitemap of links from the English Wikipedia's main page](image)
Sitemaps may be addressed to users or to Many sites have user-visible sitemaps which present a systematic view, typically hierarchical, of the site. These are intended to help visitors find specific pages, and can also be used by crawlers. Alphabetically organized sitemaps, sometimes called site indexes, are a different approach.

For use by search engines and other crawlers, there is a structured format, the XML Sitemap, which lists the pages in a site, their relative importance, and how often they are updated. This is pointed to from the robots.txt file and is typically called sitemap.xml. The structured format is particularly important for web sites which include pages that are not accessible through links from other pages, but only through the site’s search tools or by dynamic construction of URLs in Javascript or Adobe Flash. They also act as a navigation aid by providing an overview of a site’s content at a single glance.

Directories

A web directory or link directory is an online list or catalog of websites. That is, it is a directory on the World Wide Web of (all or part of) the World Wide Web. Historically, directories typically listed entries on people or businesses, and their contact information; such directories are still in use today. A web directory includes entries about websites, including links to those websites, organized into categories and subcategories. Directories have an access to pages with the topics, in contrast of site maps, directories could have separated content and they have different indexes which lists them alphabetical. Directories are efficient when users need to connect to different types of information without hierarchical relationships.

They also help users to organize and link external websites to each other. They are helpful for organizing external websites.

Just as any other media, the World Wide Web also consists of so many different websites that it is difficult to track each one of them easily when the need arises. The website owners on the internet are allowed to submit their websites to be included in the directory of the web pages[3].

Besides a link, each entry may include the title of the website, and a description of its contents. In most web directories, the entries are about whole websites, rather than individual pages within them (called "deep links"). Websites are often limited to inclusion in only a few categories.
Tag Clouds

Tag clouds are the Latest mechanisms of navigations which can list the alphabetic links. Tag clouds are useful for dynamic contents. Most of the time tags are displayed in a large font, so Cloud expresses the importance of tags. A tag cloud (word cloud, or weighted list in visual design) is a visual representation of text data, typically used to depict keyword metadata (tags) on websites, or to visualize free form text. Tags are usually single words, and the importance of each tag is shown with font size or color. This format is useful for quickly perceiving the most prominent terms and for locating a term alphabetically to determine its relative prominence. When used as website navigation aids, the terms are hyperlinked to items associated with the tag.

A tag cloud visualization is a visual representation of text data, typically used to visualize free form text. Tags are usually single words, and the importance of each tag is shown with font size or color. The increased use of tags and tagging has led to the emergence of a number of methods for presenting these tags to users. A number of websites use lists to present tags to users of their services. However, a growing number of websites are using tag clouds to present tags to users. Tag clouds are visual presentations of a set of words, typically a set of tags, in which attributes of the text such as size, weight or colour can be used to represent features (e.g., frequency) of the associated terms. Font size and color is highly effective in tag cloud creation.
A-Z Indexes

They are suitable guides for the topics and are displayed in website. Indexes have more access to the content and are not most important part of entries. They are bottom up of website content and electronic version of back-of-the-bone indexes. For redundant continuous like Intranet site index could be useful.

In site indexes developers connect to the page that discusses about topic. Indexes could be wide and separated for each pattern. Strip in each link is efficient to jump from one page to another. User should be aware of that the body can combine the links and contents and have to be applied for references part. using A-Z indexes is so easy to involve with. Best options for searching concepts are definite. An A-Z Index offers an alphabetical list of "entry point" topics through which the user may browse and select. In an index at the back of a book or manual, the entries are followed by page numbers. On a Website, the entry points are hyperlinked to the appropriate pages, and often to named anchors within Web pages for an even greater level of detail in indexing.
In addition, there is often a second level of terms, called "sub-entries," that are listed and indented under some of the main entries. A Web A-Z index is typically a single, long HTML page, although it could be broken into separate pages for each letter of the alphabet if it were extremely long. At the top of the page, a horizontal list of the letters of the alphabet usually appears. The user makes a selection from this list, and jumps to the appropriate section of the alphabetical index. A-Z indexes are created not by machines, but by humans who take care to add index entries only to pages on which good information about the topic appears. In this way, the indexing of topic words mentioned in passing or out of context is avoided, boosting the overall relevance and quality of the index itself.

![Figure 1-20 / example of A-Z index in website](image)

Every now and then, researchers find an article or other document that says site indexes are a good thing. And every now and then researchers may come across an A-Z index on a Website. Whole-Web search engines usually produce "satisfactory" results in the quantity of pages, as users generally want "some information about" a subject, and this can typically be found on some of the numerous pages retrieved. If many good pages are missed by the search engine, the user usually does not notice or care, since enough other good pages are found. Searchers of a site may want all the information a site has on a given topic, whereas searches of the entire Web only want — and expect — some information on a topic. Searches of a site may also want to find the information more quickly, since they might be looking at a number of sites simultaneously.

A-Z has also some other superiorities than search indexes. Large number of internal links which makes A-Z indexes increase the search engine optimization rating and it also
increases the usability of the whole website. The quality of search engines are profoundly related to complexity of search strings which is entered by users because it's not under control of developers.

Actually basic search engines could be adjusted to search by meta tag, and meta tags could be independently for each web page.

Creating an A-Z index, on the other hand, is a straightforward editorial task that can be completed by a freelance indexer. Indexers can provide an accurate quote of the job before it begins, based on the average number of words per indexable page or the number of entries in the index.

To become competent at indexing really requires appropriate education. Information architects with backgrounds in library science and a good sense of labeling, however, could probably pick up indexing from reading a good book on the subject. If developers don’t want to invest the time and energy in learning indexing themselves, it’s probably best to contract a freelance indexer. Most of the professional associations of indexers listed below maintain searchable databases of freelance indexers. Limit developers search to HTML or Web indexers.

If the index is created by a contracted indexer, an agreement needs to be reached about how the index will be maintained. Either the indexer can be retained for future updates, or the indexer can provide written guidelines to the Webmaster on how to maintain the index. For example, after writing an index to a school’s Website, I identified the likely additional future pages and wrote up guidelines for the Webmaster to indicate the entries/subentries under which the new pages should likely be indexed.

**Navigation Bars**

Simplest form of navigation bars are the chains of simple hypertext links. These models sometimes are separated by vertical pipe lines. Navigation Bars mostly have a background color could have graphical pictures for their options. Benefit of using navigation bars is that they are far from content area. Instead of showing content in browsers. The navigation bar (the blue bar) is the bar at the top of every Scratch page. It is used to easily access different common pages in the Scratch website. When one scrolls down or up on the website, the navigation bar stays in place, always being quickly accessible.
**Vertical Menus**

This type of menu is more adaptable than bars and tabs, because their mechanism could be applied simply and options are more like adding tabs. Ordinarily they are used for long labels specifically if researchers its separated to multiple parts.
Dynamic Menus

Also called as pull-down and pop up navigation which gives users instant access to navigation options and also known as dynamic navigation. And researchers have to connect them. After that visitors clicked the site window menu will be opened. Benefit of using this style is that it could be simply presented on the page and its defect is that presentation is reduced in these styles. Visitors should find out more information before making decisions. Menu in the first should be apparent or in one part after mouse rollout menu should be apparent for using in other styles of website. Even with the delay of dynamic menus from vertical navigation menus could be troublesome. According to the way of implementing menus people may change the mouse movement out of the page with horizontal navigations or tabs work better they have drop down menus with accessible mouse movements.

Drop Down Menu

These types of menus use HTML structure. Choosing options takes users to another page. This type of navigation is usually good for quick links which has a jumping to another site structures. As a general rule, most Web developers, especially usability enthusiasts, say it is bad practice to use drop-down menus because they are confusing, annoying and oftentimes dysfunctional. From a design standpoint, however, drop-down menus are an excellent feature because they help clean up some busy developers. If structured correctly, drop-down menus can be a great navigation tool, while still being a usable and attractive design feature.

In this thesis researcher take a closer look at the nature of drop-down navigation menus, analyze situations in which they should or should not be used, discusses various implementations and finally showcase a couple of bad and good examples of such menus. The thesis also includes various tips and suggestions to help developers work with developers’ drop-down menus. You will often see many trends in which drop-down menus are used.
Visualizing Navigation

Under the traditional navigations and bars and menus have a category from the mechanism of information visualization. Contextual standards of information visualization are equal to using computer-supported and interaction and visual parts of abstract data for receiving user perception. Common vision in this part is representing visual and spatial information for clean and understandable datasets.

The more important things are interactive information navigations about manipulating and navigating information and not just about the type of representation. Information visualization is capable to change the view of showing information. Simple text and visual representation complete each other. Expressing thousands of alternatives as a text could not be rendered on the computer screen. Most of the patterns could be applied on graphs and charts. People can go inside of the details. Visualization mechanisms have limited usages and should be used in specific conditions. Users may don’t count them up but as a research in information visualization web applications could be distributed in more extensive regions. Visual search could help users to take a benefit from data visualization techniques.
Navigational behavior on the Web should be analyzed with different methods. Log file data are an important source of behavioral traces of navigation. In this paper, researchers first discuss existing approaches to the classification and visualization of movement sequences that are important for understanding Web navigation. We then present some tool that provides meaningful quantitative and qualitative measures from server-generated log files, as well as easy-to-follow visualizations of navigational paths of individual users. We demonstrate the usefulness of this new approach by reporting the results of two studies (with 44 students in education and vocational training), which show that navigational effectiveness is positively related to the ability to concentrate and selectively focus attention, as measured by the Test of Attention and the, a German version of the test. Finally, researchers discuss implications for further research in this area and for the continuing development of the approach presented. There are three types of information visualization:

**Star tree**

Also known as Tree, Star trees show the hierarchical connections in hub and spoke. Some of data could be explained with related region. star trees can switch between Tree-nav and Site-map.

Displaying a hyperbolic tree commonly utilizes the model of hyperbolic geometry which could be used for information seeking. Both display the entire hyperbolic plane within a unit disk, making the entire tree visible at once. The unit gives a fish-eye lens view of the plane, giving more emphasis to nodes which are in focus and displaying nodes further out of focus closer to the boundary of the disk.

Traversing the hyperbolic tree requires transformations of the space, bringing new nodes into focus and moving higher levels of the hierarchy out of view.
**Visual thesauri**

In oppose to star trees which are used to presenting value of vast information in small space visual thesaurus needs user search usually there is a limited mixture of concepts related to finding new information, implementing on art and culture which can enhance navigation systems.
The Visual Thesaurus is an interactive dictionary and thesaurus which creates word maps that blossom with meanings and branch to related words. Its innovative display encourages exploration and learning. Users can understand language in a powerful new way. Say they have a meaning in mind, like "happy." The VT helps developers find related words, from "cheerful" to "euphoric." The best part is the VT works like developer’s brain, not a paper-bound book. You'll want to explore just to see what might happen. They will discover -- and learn -- naturally and intuitively. Users could find the right word, write more descriptively, free associate and gain a more precise understanding of the specific language.

**Visual Clusters**

Advanced mechanisms for results are found in a graphical view. Results have one category with circle shaped groups. Web Pages individually have more details controls on the left side lets users find filtered and manipulated structure. In the theory it looks efficient but in not useful for hurried users. Sometimes Categorizations are so big or so small or even meaningless.
Information Architects can create maps that help developers spot visual clusters, similar to the example below. These types of maps are called point distribution maps. Point distribution maps are great for showing the how locations of developer’s data points are distributed.

1.4 **Scope**

This thesis has more emphasis on website navigation evolutions for increasing visits in websites with user experience strategies to improve the way of evaluating website navigation. this thesis at first described the holistic view and main concepts of web navigation and user experience design and propose the presented approaches, then reaching to results and scientific evidences by testing and group discussion to taking steps according to develop large web applications. here researcher also focus on human mental state and behavior and mind function to establish the best interaction between user and web application. here researcher needs to analyze some of emotions and cultures and people personalities to express more detailed answers to side issues. here researchers don’t want to explain the overall entity and standard structure of user experience design and web navigation but researchers want to propose strategies to increase the performance and capabilities of large web applications.

1.5 **Outline**

In the second chapter researchers become engaged with information architecture of Information Navigation and express structures in information seeking behaviors.
the third chapter researchers focus on user behavior and cognitive system to propose simplest methods for interacting human mind with virtual environment that the results of these information could have many impacts on creating navigation mechanism of website.

in the fourth chapter for the first researcher mentions the fundamental concepts of user experience design and explains its types and tools and also deep review the current approaches in user experience design to use them in future for developing methods and thesis ideas.

2 INFORMATION ARCHITECTURE

Today the importance of categorizing and managing information has been increased. manufactures and large companies always have a troubles with placing contents properly inside of their own websites. some of them focus on the usability of their websites. here researchers want to explain the design and structure of information navigation on system according to recently released books and articles.

It's significant to define proper information architecture for web applications, the interaction between users and information navigation systems should be organized by several rules to be implemented on websites. Information architecture has its own components: organizing systems, tagging systems, Navigation Systems and Search systems. These concepts are described in this thesis separately.
2.1 DEFINING INFORMATION ARCHITECTURE

The information navigation is designed structure from shared information in environment and as an art and science of forming information of products and experiences to support usability and findability as a mixture of organizing and labeling and search systems of the websites.

The phrase “Information” in defining Information Architecture is used as a Data and knowledge management. data has facts and figures in a relational database which have direct answers for specific questions. knowledge managers develop and process the instruments and lead people to share those informations by using information systems there is no perfect answer for proposed questions, researchers rather focus on information of shapes and their sizes.

websites and documents and software applications and images need meta data concepts that are used to explain and express the substances of objects like documents and people and processes and more.

Labeling, organizing and structuring
this is what information architecture could perform perfectly. structuring contains detecting proper levels of granularity for information structures in users websites and decides how to connect them together, organizing includes those elements which could be categorized to conceptual and definitive parts, labeling here means how to categorize and navigate links to them.

Obtaining and managing information
findability is a vital condition for usability. if users could not find the desired results causes the reduces the value of the website and User-Centered-Design is not sufficient for these kinds of problems. organizations and people are also important factors in managing information, so that information architecture should make a balance between users needs and business goals. managing efficient contents and evident policies and procedures are also highly required.
Information architecture should perform according to creativity and intuition and experience of the users. Designers should rely on their intuition.

One of the best ways to define an element is to compare it with other elements. The difference between them could be an efficient measurement of their properties. Information architecture is not graphic design or software development. Navigation bars and labels and the links are used to describe the true meaning of information navigation. These labels are related to structure and categorization of website. Creating categories and choosing labels are putted in information architecture but there should be a question that what includes navigation bars. Selecting colors and images and styles of fonts help researchers to intrude to the core of interaction design, information design and graphic design. What happens if information architect decides to have a search link in navigation bar but software developers state that increasing the capability of search is so costly and time consuming.

When usability engineers expose that testing users have many options in navigation bars and then all of these questions and problems could lead users to confusion and dissatisfaction. The primary goal of designing information architecture is to make browsing easier for every user by interactive and comfortable user interface design principles.

In earliest days of web design most of companies just had one procedure for creating websites which was called CODE HTML. Everyone who wants to build a website and people have no compassion for research and state. Here the process of information architecture is represented.
2.2 Elements

It's significant to define proper information architecture for web applications, the interaction between users and information navigation systems should be organized by several rules to be implemented on websites. Information architecture has its own components: organizing systems, tagging systems, Navigation Systems and Search systems. These concepts are described in this thesis separately.

Labeling, organizing and structuring

This is what information architecture could perform perfectly. Structuring contains detecting proper levels of granularity for information structures in users’ websites and decides how to connect them together, organizing includes those elements which could be categorized to conceptual and definitive parts, labeling here means how to categorize and navigate links to them.
Obtaining and Managing Information

Findability is a vital condition for usability. If users could not find the desired results, it reduces the value of the website and User-Centered-Design is not sufficient for these kinds of problems. Organizations and people are also important factors in managing information, so that information architecture should make a balance between users’ needs and business goals. Managing efficient contents and evident policies and procedures are also highly required.

Art and Science

Disciplines like usability engineering and ethnography help companies to analyze user’s information seeking behaviors by scientific evidences. Developers could incrementally learn the patterns to improve their web applications, but information architecture doesn’t answer to their questions because it has some levels of ambiguity and complexity.

Organization Systems

By the growth in the amount of data on the internet, organizing information has become a controversial issue which makes so much responsibility for designers and developers around the world. Categorizing systems are made of language rules and language is totally ambiguous because words have different meanings in different usages. Thus reduction of ambiguity in classification systems is highly needed in various sorts of web applications. Labeling and organization systems are adjusted by their users and are also organized by internal divisions and charts. For organizing websites, developers should work on organization schemes and criteria. Organization scheme is shared attributes of content items and conceptual connection between several items and groups.

Types of organizational systems

Here are some of the well-known organizing systems to be shown

The hierarchical model: top-down navigation

The useful information navigation system is designated by proper hierarchy of taxonomy of the hypertext world of webs. This type of navigation is like family tree hierarchy. Organization charts could have mental models of site construction.
The Database model: A Bottom-Up navigation

This type of system is mostly used for search and retrieval which is organized into fields of each table in the database. Values are being set in the fields for navigational purposes and they demonstrate the properties of each object in the database model. In relational databases, data is connected to each other by relations of tables.

Social classification factor

Users could access their desired information by the content classification of data in social media environments. Dissimilar types of labeling, tagging and indexing help them to acquire persistent results from website browsing.

Taxonomy design principles

On that point are some good rules for designing efficient web taxonomies, according to the variety of schemes, content should be categorized into proper classifications. Designers should focus on the purpose of industry and users' navigational needs to improve the usability of web applications.

Labeling systems

In website design industry labeling system refers to a representation of contents in the form of words. For instance, “about” button is a label which is practiced in most of websites to access the overall information related to a company or individual that includes awards licenses and members. Labels could simplify web pages and increase the focus of users. Labeling is an important issue for everyone who works with information. Web architects and developers create labels for websites every day without even recognizing that they are creating it. Labeling systems are used for prerecorded media like web or desktop documents, so they should be homogeneous with user understanding level. Labels are responsible for announcing users about new terms and let them find renown ones. Designing useful labels is an arduous task because of ambiguity in language affects descriptive media like websites.
Types of Labels

Labels generally have two main types: textual and iconic, textual label examples are Contextual links, Headings, and index terms.

Contextual Labels

Labels are made of hypertext media links in the document and occur in the descriptive abstraction of text. Contextual links are mostly used labels in world wide web and improve usability and consistency of websites.

Heading Labels

These type of labels is commonly used for describing a large amount of information to be followed. Heading Labels are mostly used for building classified text contents. Headings are used for separating links from sub-links which helps users to identify parent nodes and child nodes in websites.
Index Terms

These labels are shown as keywords, tags, taxonomies and etc. Indexing labels have specified properties for searching text, index terms could be used instead of search engines in websites to improve accessibility to desired information.

Navigation Systems

Web applications should always have user-friendly navigation systems to prevent users from being confused and lose their goal in surfing web pages. Designing reliable navigation labels is one of the most important challenges in user interface design which has many details to care about. Users need these components to find out where they are on the website that they are browsing by the advantages of navigational tools and strategies. For more information about navigation systems return to the first chapter of this thesis.

Search Systems

Developers are responsible to design practical search systems for displaying search results in a proper way. Web tools are used to index collection of contents and present them as a combined result. Search engines can find the full text for each document. But a search engine can also index information which is related to each document—like titles and
vocabulary terms. Algorithms process information in web searches to extract related results, and for ranking those results (figure 2-4). There are interfaces, to ones from entering queries and others for displaying results. Search zones index specific parts from rest of website by the interaction with website users could find their desired information. Search indexers hide irrelevant parts to help user find better results.

![Diagram](image)

Figure 2-4 / the process of information architecture development

research phase is in background of available elements and combination of team strategies which is used for high level of understanding from business contexts and existing content and focuses on the overall concepts. from the view of bottom up view shows the types of documents and metadata which has high level framework for information architecture and its used for implementing space for project. Design is where developers could form high level strategy to shape the information architecture. creating detailed blueprint and wireframes and metadata schema which is made by graphic designers and developers and content authors and product team. this phase usually is used in where tagging, organizing of documents, troubleshooting and developing for trainings for information architecture could be included by passing the time.

administrator is responsible to evaluate and develop the information continuously (figure 2-5).

and also tagging and daily tasks and deleting the old ones. researchers need budgets and schedules and politics force users to conduct according to the rules.

having a good research is meaning of having right question and choosing right question needs conceptual framework from the environment. here is the diagram of research project.
context

for essential reasons researches in field of business context structure could have an appropriate usage for start. this is vital to have vivid perception from ideas and concepts of environment. neglecting marketing facts is harmful as neglecting users. a perfect website that supports business goals could not be more fulfilling. the phrase “user-centered-design” relies on the structures. as valuable as “executive-centered-design”. legal issues also have an impact on all of these operations according to information architecture strategies.

researchers focus on information architecture independent from technology and researchers need system engineers and programmers made infrastructure of tools to support the thesis ideas.

most of the projects include design of existing websites to create new elements also there would be a chance to help users to achieve the needed data. but most of the the time this chance will be lost. Researchers usually understand that users waste alot of time to find their needs. developers may take an effort to learn new things from the website and understand what is valuable to keep. this is a method to choose heuristic evaluation.
2.3 SCOPE

up to now researchers concentrated on information architecture concepts to describe the structure of web design graphical models and existing strategies to access the detain process of describing project. in the real world this event is not usual researchers have to use instruments and infra structures in on shape that means researchers need researchers need help to implement strategies in reality.

contents are used as the stuff in developer’s website for managing applications and e-services and photos and audio and files for personal webpages and archived email addresses. users need to use contents before using them. findability is helpful for increasing usability and if developers want to find them should have time to learn these objects or things that separates elements from each other and how to implement metadata top-down in information architecture.

most of the projects include design of existing websites to create new elements also there would be a chance to help users to achieve the needed data.

2.4 OUTLINE

observation from information structures and as art and science of website design for navigation elements which researchers hope to get benefits from this information. this thesis is focused on the concepts of creating information navigation designing complex websites which needs expert group of graphic designers and programmers and content managers and usability engineers and other professionals. effective aggregation needs acceptance of structural development process. even for smaller projects right actions in right moments is a vital condition for success.

User Research is steps to follow how users think about the world and turn the best possible navigation structure and get enough information from customers. Researching for great Information Architecture and then how to use that information to redesign navigation, menus, content classification.
Improving information architecture is the most effective way of increasing user’s satisfaction and making successful application. Information architecture helps users to navigate companies’ sites or products, so it’s clear that it is the part of the design process.

3 HUMAN FACTOR

human factors or users play the most important rule in online services systems. in reality websites don’t have worth without estimating properties and requirements of users. the analysis of users’ needs and behaviors could have high impact on creating and operating the website. most of the users loose attraction of using websites because existing websites could not publish related information. to implementing what researchers, want on website researchers need usability estimation.

When something is released to website, users expose interest to developers works. Human mind instantly starts to process all parts of website to find desired titles. When the user starts to search on website is following an answer of his own mind, but when he is web surfing his mind is scanning the subjects and when he recognizes something related to his previous needs he will absorb that subject. Website can stop the user’s mind and make him thinking about the titles. Most of the unknown companies and organizations and technological industries use these kinds of strategies.

Human being is most often an integrated part of complex systems. In order to describe such a system with appropriate accuracy it is necessary to model the human factors with the same accuracy as the technical components. Human factors must be included and modelled with the same degree of precision as the system’s mechanical parts. A human being is perceived as a psychosomatic unit with cognitive capacities embedded in a social environment. Human behavior is structurally highly complex, As human behavior is influenced by physical, emotional cognitive and social factors, it is highly intricate. Consequently, a human being is perceived as a psychosomatic unit with cognitive capacities embedded in a social environment.

The actual importance of models that include human factors will be shown in a case study which is intended for use in real decision-making processes. considerations, emotional and
social (especially psychosocial aspects have to be taken into account simulation model before the actual implementation of the measures.

3.1 MODEL OF HUMAN BEHAVIOR

The first question, in modelling human behavior, is whether the attempt to investigate human beings scientifically and capture their nature in a model is at all possible or whether it is simply an example of human function. Human behavior is determined by a wide variety of influencing factors, which interact in complex ways. The following examples chosen at random serve to perform. The behavior of human beings is influenced by their life history and by the experiences they have had. These include early childhood experiences as well as consciously learned experiences through interactions with their environment. Every human being, to a certain extent, conforms to the norms and role expectations which society imposes on them. These demands often conflict with their individual wishes, plans and ambitions. Users are often not conscious of their own actions. Again and again they act or react in ways which surprise them or which they did not expect of themselves. In conflict situations human beings are torn between different motives that vary and are often in conflict, with each other.

Models of evaluation screening programs for the early detection of diseases must include factors related to the user’s compliance cognitive and social influences.

Recently the importance of emotional intelligence has been realized. It is obvious that emotional control and social competence are more decisive than pure intelligence in determining success in coping with difficult problems, which embrace human beings in various settings. The major model describes the process of emotional control, its dependencies on other factors and its consequences on behavior and decision-making. The aim of the model is to investigate strategies for the soldiers under varying circumstances. It is obvious that in a situation like this, aside from rational and cognitive properties.

Human behavior is very complex and multilayered approach. These layers are first studied in isolation and then their interaction and their interplay are investigating. To these ends,
it is hoped researchers can approximate a deeper understanding and comprehension of human behavior. As soon as one attempts to model real human behavior it is essential to have a reference model that permits the possibility of this interaction and this interplay. Engineering science with their architectural models and theory with its virtual realities do not need to take this possibility into account. A reference model that presumes to model human beings as a whole must provide an architecture that makes it possible, in principle, to model all forms of behavior control. If human beings with their diverse modes of behavior are to be represented in the model, a fundamental concept is at first required. The present study assumes that the model of a human being should have the structure of a system.

A person’s knowledge level may be increased by the acquisition of information. As a result the person is now able to visit a restaurant, the location of which he has just found out. He knows the place coordinates. A person’s social status may be increased by a promotion as input. He may be promoted from the position of subject teacher to that of head of department. This new state as head of department leads him to take new actions that have now become possible. He could for example rent a new and better flat. These examples may appear somewhat artificial and even silly in their simplicity as they certainly do not do justice to the complexity of human behaviour. However, their function here is simply and solely to illustrate the basic underlying principle. A further objection to the concept of producing a model of the human being on a system-theoretical basis has been raised by representatives of the human sciences. They consider a terminology which talks of internal state variables being modified by external inputs which lead to actions as output as mechanistic, technocratic, and therefore inappropriate. Such terms, they argue may be appropriate for machines, robots and even for trained rats but not for human beings. It should be made clear at this point that the present research program does not accept this objection. Thanks to evolution human beings have developed evermore complex and more efficient forms of behavior regulation. It is not immediately clear why a descriptive procedure appropriate for the rest of the natural world should not apply to the human being. There is no insurmountable barriers between human beings and the rest of the natural world, from which the human being originated and as a part of which he may be seen. The present research program is based on naturalistic principle.

The behavior of a user can be described using the terminology of system theory.
The transfer function $F$ indicates the way in which the current state $z(t_n)$ at time $t_n$ is transformed into the subsequent state $z(t_{n+1})$ as a result of the input $x(t_n)$. Therefore, researchers have:

$$z(t_{n+1}) = F(t_n, z(t_n), x(t_n)) \quad (eq. \, 3.1)$$

Usually, the state variables $z$ is not directly related to observable behavior. Other variables, known as dependent variables, because they depend on the state variables, are ultimately responsible for a user’s behavior. The relationship between a state variable $z$ and a dependent variable $w$ can be described by an algebraic function $H$. Therefore:

$$w(t_{n+1}) = H(z(t_{n+1})) \quad (eq. \, 3.2)$$

The output function $G$ determines the manner in which the new internal state of the user, described by the state variables $z(t_{n+1})$ and the dependent variables $w(t_{n+1})$, is transformed into an externally observable output $y(t_{n+1})$.

$$y(t_{n+1}) = G(t_{n+1}, z(t_{n+1}), w(t_{n+1}), x(t_{n+1})) \quad (eq. \, 3.3)$$

The basic assumption made in model is that a user’s personality depends on the form of the functions $F$ and $H$.

The transfer function $F$ changes the internal state variables of an user, either as a result of experiencing an input from the outside world, or of its own accord. The state variable $z$ could be Anger, for instance. This state variable might be changed by an external input $x$, when the user experiences a personal failure.

$$Anger(t_{n+1}) = F(Anger(t_n), Experienced\_failure(t_n)) \quad (eq. \, 3.4)$$

Another example of change in a state variable would be Energy demand. This state variable increases either continuously of its own accord, or changes according to the kind of action the user performs.
Energy(t_{n+1}) = F(Energy(t_n), Action\_performed(t_n)) \ (eq. 3.5)

The state variable Energy does not directly influence the user’s behavior. The function H, which relates Energy to the drive Hunger, acts as a motive. This means, that the state variable Energy is converted into the dependent variable Hunger.

Hunger(t_{n+1}) = H(Energy(t_{n+1})) \ (eq. 3.6)

In both examples the user’s behavior depends on the form of the two functions F and H, and in particular on the constants contained within these functions.

As a reference model, model offers a pattern or framework containing empty spaces which have to be filled in order to adapt the general reference model to a specific, real task or an actual problem. The specific state variables and the functions F, H and G are freely definable. By assigning values to the constants in the functions F and H, users can be given individual personalities, which determine how their inner states change. The output function G depends on these internal state variables and describes how the users behave.

It is important to emphasize that the model is almost entirely theory-independent. It is the task of a theory to determine the mathematical form of the functions F and H, and which variables should appear as arguments. All possible functions F or H proposed by a particular theory can be used in model and their consequences investigated.

Usually, the state variables z is not directly related to observable behavior. Other variables, known as dependent variables, because they depend on the state variables, are ultimately responsible for a user’s behavior. The relationship between a state variable z and a dependent variable w can be described by an algebraic function H. Therefore, researchers have:

\[ w(t_{n+1}) = H(z(t_{n+1})) \ (eq. 3.7) \]

As the model which has been shown, users actions and behavior could be estimated through the psychological information processing.
3.2 Mental Model

A mental model is an explanation of someone's thought process about how something works in the real world. It is a representation of the surrounding world, the relationships between its various parts and a person's intuitive perception about his or her own acts and their consequences. Mental models can help shape behavior and set an approach to solving problems (similar to a personal algorithm) and doing tasks. A mental model is a kind of internal symbol or representation of external reality, hypothesized to play a major role in cognition, reasoning and decision-making. The slower processing of ambiguous sentences is one area where mental model research is relevant to interaction design, as interaction designers are, among other things, interested in measures of learnability and ease of use. In this respect the notion of mental models has applicability and explanatory power.

Another area of relevance are discussions of 'system causality conveyance'. The use of mental models in this sense was popularized in the HCI and interaction design community by Donald Norman in his book "The Design of Everyday Things" (Norman 1988). In his book, he used mental models to describe how a system is designed and implemented on the basis of the designer's mental model. Similar to a reader of a passage of text, the user develops a mental model of how he/she thinks the system works through interaction of the system. This model is used to reason about the system, to anticipate system behavior and to explain why the system reacts as it does. In other words, the designer reifies (materializes) his mental model of a given design, e.g. a computer system, which becomes the only means of conveying his mental model to the user.
Norman also speaks of conceptual models. In the article "Some Observations on Mental Models" Norman (1983) distinguishes between mental models and conceptual models: "Conceptual models are devised as tools for the understanding or teaching of physical systems. Mental models are what people really have in their heads and what guides their use of things." In other words, the designer designs a conceptual model into the system in order for it to appear graspable and coherent to the user. If he/she manages to get the conceptual model right, the correct mental model (in the mind of the user) will follow. At least in theory.

Norman's account is of course an over-simplification, but it captures some central dilemmas of interaction design by using mental models as a vehicle for explanation and illustration.

Principles of Mental Models
Mental models are based on a small set of fundamental assumptions (axioms), which distinguish them from other proposed representations in the psychology of reasoning. Each mental model represents a possibility. A mental model represents one possibility, capturing what is common to all the different ways in which the possibility may occur. They typically represent only those situations that are possible, and each model of a possibility represents only what is true in that possibility according to the proposition.

**Reasoning using Mental Model**

People infer that a conclusion is valid if it holds in all the possibilities. Procedures for reasoning with mental models rely on counter-examples to refute invalid inferences; they establish validity by ensuring that a conclusion holds over all the models of the premises. Reasons focus on a subset of the possible models of multiple-model problems, often just a single model. The ease with which reasons can make deductions is affected by many factors, including age and working memory.

**Single and double-loop learning**

After analyzing the basic characteristics, it is necessary to bring the process of changing the mental models, or the process of learning. Learning is a back-loop process, and feedback loops can be illustrated as: single-loop learning or double-loop learning.

**Single-loop learning**

Mental models affect the way people work with the information and determine the final decision. The decision itself changes, but the mental models remain the same. It is the predominant method of learning, because it is very convenient. One established mental model is fixed, so the next decision is very fast.
Double-loop learning

Double-loop learning (see diagram below) is used when it is necessary to change the mental model on which a decision depends. Unlike single loops, this model includes a shift in understanding, from simple and static to broader and more dynamic, such as taking into account the changes in the surroundings and the need for expression changes in mental models.
human is one of the most important actuator which has an impact on the way of choosing appropriate navigation for website.

user behavior is collection of conservative physical functions and emotions of human which is unique for any individual, in the passage of time could be changed. user behavior in reality is combination of thoughts and emotions and beliefs and moralities of that any individual could express. here researchers revise the meaningful interaction between human and the website. user behavior changes in passage of time. user behavior in area of behavior sciences refers to cyber psychology in reality it is equal to human computer interaction in the area of computer science research there is always effort to build comfortable and efficient relation between human and computer devices. here researchers don't get involved at the deepest levels of the concepts and just review overlay on related concepts in our research area. the basis of is establishing relations is according to human could have a comfortable relation with computer systems and control and perceive it. developing of GUI have a high impact on improvement of website usability that what are the effects on society and cultural values needs a description ability of learnability and efficiency are more important things. Extra issues are about invent of mobile devices. even non habit websites which include more interaction state have the ability of reforming existing mobile phones. for example, mobile banking. if users could not imagine the life without existence of company products the marketing system will win. if user take an unconscious decision habit becomes more powerful. usually returns to the website like a routine habit.

**Measuring habit**

evaluating efficiency of developer’s design in creating habits could be followed by marketing managers. companies should find out the times which users are in their websites. this question helps researchers to detect what do researchers expect before
releasing the product. It’s easier to do something if developers product still exists. by effort of calculation what do researchers expect. developers also need to record the time of using products. how long in day of the week they can use their website? what they can do? how long do they stay? when do they visit the website? these questions help developers to become sure to produce that product something according to developer’s product entity by the effort of calculating the things developers expect to have. a rational expectation to use the product. try to be realistic. understanding user behavior for assurance of that developers can persuade users to do something that they want is important for developers marketing. so when developers could not identify user habits how do developers want to change their behavior? behavior of the individuals is not a static element, they tend to be strong or weak rotes. the repetition of a habit becomes a stronger habit. remember that developers need to detect user’s behavior, when developers design the product and then produce it developers can identify the impact of developer’s product on user behavior, every habit that users express have properties to design user experience interfaces. here researchers do not explain these properties and believe that the explanations that researchers use for this thing is has more combinations. the important thing is that researchers need to develop customer’s behavior according to related products.

3.4 Theory of Human Mind

focusing on the behavior

remembering to focus on user behavior that makes a habit for types of services that developers provide and find out what they do and are they really buying a product that developers produce or not. overall scale of use behavior is not predictable this is what they have to do right.
consciousness perception reasoning and judgment. In reality there is no exact definition for “Mind”.

Human behavior has profound relation with unconscious thinking but more predictable than what is imaginable. Understanding the human cognition and actions helps define users more. With their levels of knowledge about human capabilities and limitations researchers can use usability to identify user’s argumentations.

**Attention**

Attention is known as behavioral and cognitive process of selectively focusing on a discrete aspect of information, whether deemed subjective or objective, while ignoring other perceivable information. It is the taking possession by the mind in clear and vivid form of one out of what seem several simultaneous objects or trains of thought. Focalization, concentration of consciousness is of its essence. Attention has also been referred to as the allocation of limited processing resources.

As a description of Attention, the striking way of other elements it becomes drawn to human mind. The voluntary control is maintained by sensory selection of potential action for most emphasized human behavioral experience and response. Elaborated prospect of design.

Top down voluntary behavior with bottom up automatic processes is visualized to use for research projects. Illusion is raised out of brain systems interaction and reflections. Our finding suggests that cingulate activates due to special process of target rather than sequential classification as a result of human idea to be part of the brain cognitive control system. Subcortical areas of brain show the tasks performance by reflective motor responses. Anterior cingulate the supplementary motor area of the brain.

Attention is both high-level and low-level property of vision, the low-level mechanisms help researcher to find what is more available for attention. This type of attention is the major cause of problems for translating visualized information. The high-level of attention is related to problem solving abilities.

Focusing elements on the attention of users and that how to attract user’s attention.
Cognitive Load

in cognitive psychology, cognitive load refers to the total amount of mental effort being used in working memory. cognitive load theory was developed out of the study of problem solving. the cognitive load is differentiated to three major types: intrinsic, extraneous, and germane

Cognitive Load Types

Intrinsic cognitive load is connected with special topic. extraneous cognitive load refers to method of presenting information to users. and the third one, the germane, is related to building permanent knowledge storing or the schema of the information.

some researchers tried to find a way to measure amount of mental effort in cognitive load. this measurement is called Task-invoked pupillary response and its related to working memory. this term is highly mentioned the field of human computer interaction and also for decision support systems. complexity in cognitive load could negatively effect on task performance and confuses the user for task completion and it could be important to emphasize on that experience of cognitive load is not the same for every individual. Students, children and other people have their own different experiences and different among of cognitive load.

Stress Effects and Interruptions

interruptions in doing task is inevitable, but the matter is their effect on productivity which is mostly caused by stress. Website users could reduce levels of interruption by doing some methods. the World Health Organization reported that the fast pace of digital world is the important cause of stress for people. by the statistics of social researchers more than seventy percent of workforces experienced at least moderate level of stress and thirty percent of them diagnosed with the extreme stress levels [6].

although stress is normal response for some external annoying factors such as stress in presentation but it could damage individual’s health and company investments and it could lead to severe depression and anxiety. this process should be stopped by the usage of psychiatric methods. interruptions could be easily controlled by the limiting how much people interrupt user’s tasks. the results of researchers prove that interruptions could
make works to be done faster. as the Parkinson’s law “work expands so as to fill the time available for its completion”. when people become constantly interrupted they do their work faster to amend the wasted time. the times near deadlines make people to be create and complete the task as fast as possible. The person who has to work harder increases his productivity to do the task sharply. the researchers implied that the higher workload causes more stress, fatigue, time pressure and as a result, more effort. after interruptions higher levels of stress is observable. even small changes in behavior could effect on the overall performance. for this, people need to have rules for their tasks. individual differences is important issue for managing interruptions. personality is measurement for being interested to specific experience and need of personal structure predicts disruption costs of each engagement. implication of plans could support interrupted tasks. HCI research is highly focused on identifying interruptions and their affects on task performance.

Figure 3-4 / The time course of an interruption

**Multitasking of Users**

Multitasking involves engaging in two tasks simultaneously. But here’s the catch. It’s only possible if two conditions are met, at least one of the tasks is so well learned as to be automatic, meaning no focus or thought is necessary to engage in the task and they involve different types of brain processing. For example, users can read effectively while listening to classical music because reading comprehension and processing instrumental music engage different parts of the brain. However, user’s ability to retain information while reading and listening to music with lyrics declines significantly because both tasks activate the language center of the brain. So this issue inferences that playing of sound in websites have inversion effect on focus of users.

**Serial Tasking**
You and every other so-called multitasker are actually serial tasking. Rather than engaging in simultaneous tasks, users are in fact shifting from one task to another to another in rapid succession. For example, developers switch from user’s phone conversation to a document on developer’s computer screen to an email and back again in the belief that users are doing them simultaneously. But they are not.

Psychologists who study what happens to cognition (mental processes) when people try to perform more than one task at a time have found that the mind and brain were not designed for heavy-duty multitasking. Psychologists tend to liken the job to choreography or air-traffic control, noting that in these operations, as in others, mental overload can result in catastrophe. So user experience strategies should help users to avoid multitasking during surfing the web.

**Intelligence**

The process steps could behave simply misleading. Because attention happens instead of subjects for reprogramming the organization of these steps for carrying number of different instructions for the same neural connection spot. The role of attention prove that enhancements are compared to whole information processing. Increasing the activity of neurons directly affects faster attentional calculations. As the releases of attention improves the speed of productivity in former computations. In the scientific fields like mental arithmetic, visual imagery and other forms of neuroimaging support many same principles like outlined fields in human mind word processing.

Cognitive ability of human is categorized in two types: fluid and crystallized Intellectual abilities. Fluid intelligence is defined as various kinds of reasoning like casual and deductive inferences. In contradiction, crystallized intelligence is defined for measuring word understanding and general knowledge and its reflected to the forms of preprocessed information in the past. These two types of intellectual ability are also separated by the human age classifications. By the incensement of human age crystalized ability is consistent but fluid ability increases by passing the time.

Cognitive function has its own effect on characteristics of information processing in each individual. Different factors are evaluated in recent decades that shows the human mental capabilities like memory, attention or processing speed.
User intelligence does not effect on his attentional performance but attention could have influence on intelligence, by the more clear description intelligence as a main intellectual ability is divided to parts like attention. intelligence could be by some primary factors such as cognitive speed, attention or working memory.

**Reaction of Users to Data Redundancy**

In computer main memory, auxiliary storage and computer buses, data redundancy is the existence of data that is additional to the actual data and permits correction of errors in stored or transmitted data. The additional data can simply be a complete copy of the actual data, or only select pieces of data that allow detection of errors and reconstruction of lost or damaged data up to a certain level[7].

**User Visual Spatial Perception**

by analyzing the essential structure of eye research could describe the physical mechanism of visual perception. The received information should be processed by spatial sensors which allows users to understand coherent scenes and distinguish colors and shapes. Some attributes in visual processing is related to the size, depth, brightness and color of the shape and environment which could be useful for efficient visual computer based interfaces. For describing scene by size and distance visual systems could easily analyze the images to identify similar objects inattentive to the fact that could be appeared in different size and distance.

Actually, the given information could be useful for measuring distances. But the problem is that how eye is capable to recognize size and distance. The answer is described by the importance of the reflected light emits on the retina in user eye. The size of images is calculated as the visual angles.

Drawing a line from the top of object to the core part of the eye and second line to the bottom is same distance but visual angle is located between these two lines.
If two objects are at the same distance, the larger one will have the larger visual angle. And also if two objects of the same size are placed at different distances from an eye, one principled approach for human computer interaction design system design, will be important in later which are at the same distance from the eye, one approach is for interactive system design. Before the advent of word processors authors wouldn’t have considered the use of a contracting and expanding facilities to experience easily and quickly with the structure of paper while typing. Software life cycle does not support the user’s perspective of the interactive system. It’s to difficult for cognitive psychology professional to participate cognitive interactions. That a abstract design would be needed for user notation of design which doesn’t reflect the desired information for user.

The assessing timing for behavior of an abstract design that does not explicitly mention the timing characteristics of operation to be called for relative orders. Though no structure development eliminates the gap but they should validate requirements useful for assistance. The whole approach of the interaction systems is described as the part of the user centric design. No structured development process by entirely eliminate the formality as a particular notation used for expert assistance. If a task is relatively simple for general mental ability appears to correlate by the chronometric indices which a task is complex intelligence correlates with accuracy[8].

Visual Spatial perception provides researchers with information about our environment. The way a child perceives space and their position or orientation within that space can affect their gross motor skills and classroom performance. It is the ability to distinguish differences among similar objects or forms. This skill helps children in understanding relationships and recognizing underlying concepts. This area is closely related to the problem solving and conceptual skills required for higher level science and math.

**User Cognition**

Spatial cognition concerns the study of knowledge and beliefs about spatial properties of objects and events in the world. Cognition is about knowledge: its acquisition, storage and retrieval, manipulation, and use by humans, nonhuman animals, and intelligent machines.
Broadly construed, cognitive systems include sensation and perception, thinking, imagery, memory, learning, language, reasoning, and problem-solving. In humans, cognitive structures and processes are part of the mind, which emerges from a brain and nervous system inside of a body that exists in a social and physical world. Spatial properties include location, size, distance, direction, separation and connection, shape, pattern, and movement.

Designing and implementing multimodal applications that take advantage of several recognitions based interaction techniques (e.g. speech and gesture recognition) is a difficult task. The goal of our research is to explore how simple modelling techniques and tools can be used to support the designers and developers of multimodal systems. In this paper, researchers discuss the use of finite state machines (FSMs) for the design and prototyping of multimodal commands. In particular, researchers show that FSMs can help designers in reasoning about synchronization patterns problems. Finally, researchers describe an implementation of our FSM-based approach, in a toolkit whose aim is to facilitate the iterative process of designing, prototyping and testing multimodality.

**Multimodal Interaction**

Multimodal interaction refers to interaction with the virtual and physical environment through natural modes of communication such as speech, body gestures, handwriting, graphics or gaze. Recent developments in recognition-based interaction technologies (e.g. speech and gesture recognition) have opened a myriad of new possibilities for the design and implementation of multimodal systems. However, our lack of understanding of how these new modes of interaction can be best combined in the user interface often leads to interface designs with poor usability.

In order to help designers, some attempts have been made to elicit relationships between different interaction techniques. For example, there are some frameworks for reasoning about multimodal interaction from both the user and the system perspectives. But,
however useful this framework may be, it does not offer rapid and practical solutions to designers. Moreover, multimodal systems must be equipped with adequate web application architectures to combine the different modalities. Designing and implementing multimodal systems is still a difficult task.

to explore how simple modelling techniques and tools can be used to support the designers and developers of multimodal user interfaces. As a starting point, researchers have implemented a toolkit whose aim is to facilitate the design and prototyping of simple multimodal commands. According to our definition, a multimodal command is a combination of several user inputs, used to activate a particular function of an application. The user inputs that enter in the expression of a multimodal command may belong to different modalities (e.g. speech and gesture). In this thesis, researchers show that usability toolkits constitute a good framework for describing multimodal commands and for combining sets of user inputs of different modalities. In particular, researchers show that FSMs can help designers in reasoning about synchronization patterns problems\[9\].

**Spatial perception**

Spatial perception is the ability to be aware of developer’s relationships with the environment around users (exteroceptive processes) and with user’s self (interceptive processes). Spatial awareness is made up of two processes, the exteroceptives, which create representations about human space through feelings, and interoceptive processes, which create representations about our body, like its position or orientation. Space is what surrounds users: objects, elements, people, etc. Space also makes up part of our thinking, as it is where researchers join all of our experiences\[10\].

**Hue Factor**
Color selection in data visualization is not merely an aesthetic choice, it is a crucial tool to convey quantitative information. Properly selected colors convey the underlying data accurately, in contrast to many color schemes commonly used in visualization that distort relationships between data values. Judicious use of color also allows multiple datasets to be layered together, which helps to create graphics that tell stories of cause and effect.

In the eye, cells called cones are responsible for our ability to discriminate colors. There are three varieties of cones, sensitive to short, medium, and long wavelengths. Color is determined by the relative number of photons detected by each type of cone. Because of this, two combined lights with different wavelengths are indistinguishable from a single color. The response is not linear across the spectrum: some colors (green and red in particular) extend over a broad range of wavelengths, while others (yellow and blue) occupy narrow bands.

RGB Color Televisions and computer screens generate a spectrum of colors by combining pixels of separate primary colors that roughly correspond to the three types of cones—red, green, and blue. The wavelengths of the three primaries do not exactly match the peak wavelengths of cones in the eye, and emit at narrow wavelengths vs. the broad response of cones. Combined, these effects result in a gamut of colors on a display that is smaller than the full range of colors humans can distinguish. Furthermore, pure red, green, and blue are not equal in brightness, and changes in their intensities can result in nonlinear changes in perceived color.

Color and Data Display Color is one of the most effective ways to encode two-dimensional data. Differences in color can distinguish different categories (for example cropland, forest, or urban areas in a land cover map) or indicate quantity (percent forest cover or population). Color schemes for these two types of maps are described as qualitative and sequential.

Divergent Schemes A subset of sequential color schemes, used for data that depart from an average or neutral quantity (temperature anomaly, electric charge, or pH), is called a divergent scheme. Furthermore, pure red, green, and blue are not equal in brightness, and changes in their intensities can result in nonlinear changes in perceived color.11

People naturally interact with the world multimodality, through both parallel and sequential use of multiple perceptual modalities. Multimodal human–computer
interaction has sought for decades to endow computers with similar capabilities, in order to provide more natural, powerful, and compelling interactive experiences. With the rapid advance in non-desktop computing generated by powerful mobile devices and affordable sensors in recent years, multimodal research that leverages speech, touch, vision, and gesture is on the rise[12].

Memory for Visual Information

human memory for visual information often seems much better than our memory for verbal information. Shepard performed one of the early experiments comparing memory for pictures with memory for verbal material. In the picture-memory task, participants first studied a set of magazine pictures one at a time, then were presented with pairs of pictures consisting of one picture they had studied and one they had not, and then had to indicate which picture had been studied.

Figure 3-5 / hypothetical memory structure [12]
Schemas are abstractions from specific instances that can be used to make inferences about instances of the concepts they represent. If researchers know something is a house, researchers can use the schema to infer that it is probably made of wood, brick, or stone and that it has walls, windows, and ceilings. The inferential processes for schemas must also be able to deal with exceptions: We can understand that a house without a roof is still a house. Finally, it is necessary to understand the constraints between the slots of a schema. If researchers hear of a house that is underground, for example, researchers can infer that it will not have windows. Psychological Reality of Schemas The fact that schemas have default values for certain slots or attributes provides schemas with a useful inferential mechanism.

**Visual Sensory Memory**

Many studies of visual sensory memory have used a procedure in which participants are presented with a visual array of items, such as the letters shown in Figure 6.2, for a brief period of time (e.g., 50 ms). When asked to recall the items, participants are able to report three, four, five, or at most six items. One might think that only this much material can be held in visual memory—yet participants report that they were aware of more items but the items faded away before they could attend to them and report them.

**Auditory Sensory Memory**

Speech comes in over time, which means that auditory information must be held long enough to determine the meaning of what is being said. The existence
of an auditory sensory store (sometimes called echoic memory) has been demonstrated behaviorally by experiments showing that people can report an auditory stimulus with considerable accuracy if probed for it soon after onset \[13\]
similar to Sperling’s experiments demonstrating visual sensory memory. One of the more interesting measures of auditory sensory memory involves measure called the mismatch negativity.

**Theory of Short-Term Memory**

A very important event in the history of cognitive psychology was the development of a theory of short-term memory. It clearly illustrated the power of the new cognitive methodology to account for a great deal of data in a way that had not been possible with previous behaviorist theories. Researchers had anticipated the theory of short-term memory, and gave an influential formulation of the theory. However, it was giving the theory has proven from early 1960 most systematic development. As researchers have just seen, information coming in from the environment tends to be held in transient sensory stores from which it is lost unless attended to. The theory of short-term memory proposed that attended information went into an intermediate short-term memory system where it had to be rehearsed before it could go into a relatively permanent long-term memory.

![Diagram of information processing units](image)

**Figure 3-6 / interrelation between information processing units**

the phonological loop consists of multiple components, including an articulatory
loop and a phonological store. The articulatory loop functions as an “inner voice” that rehearses verbal information, as when researchers’ told a phone number and researchers rehearse it over and over again while trying to dial it.

**Memory capacity**

Storage is the more or less passive process of retaining information in the brain, whether in the sensory memory, the short-term memory or the more permanent long-term memory. Each of these different stages of human memory function as a sort of filter that helps to protect us from the flood of information that confronts us on a daily basis, avoiding an overload of information and helping to keep us sane. The more the information is repeated or used, the more likely it is to be retained in long-term memory (which is why, for example, studying helps people to perform better on tests). This process of consolidation, the stabilizing of a memory trace after its initial acquisition, is treated in more detail in a separate section.

Long term memories are stored throughout the brain as groups of neurons that are primed to fire together in the same pattern that created the original experience, and each component of a memory is stored in the brain area that initiated it (e.g. groups of neurons in the visual cortex store a sight, neurons in the amygdala store the associated emotion, etc). Indeed, it seems that they may even be encoded redundantly, several times, in various parts of the cortex, so that, if one engram (or memory trace) is wiped out, there are duplicates, or alternative pathways, elsewhere, through which the memory may still be retrieved[13].
Heuristics serve this function. A heuristic is an informal “rule of thumb” method of problem solving that does not guarantee a solution but is faster and easier to use than a systematic search. Imagine that developers have misplaced researcher’s keys somewhere in developers apartment. Users could engage in a systematic search and look everywhere for the keys: in each room, under the bed, on the shelves, behind the drawers, and so on. Alternatively, developers could look first in those places where developers usually put the keys down: in a desk drawer, on a tabletop near the door, or some other likely location. This heuristic would usually enable developers to locate the keys more quickly and with less effort\textsuperscript{[14]}. 

\*Figure 3-7 / Information processing models of selective attention. The solid arrows indicate information from the attended message.*
Gender Differences in Cognition

Married couples may sometimes be aware of the existence of cognitive differences between the sexes. Perhaps one partner gets lost, while the other is forgetful. Research has shown that, in the human species, there are small but consistent cognitive differences between males and females. Memory for object location is imperative to the task of gathering, as one would need to recall the locations of perhaps widely disseminated food sources. A second theory that accounts for the differences between men and women with respect to spatial and verbal abilities has been advanced. According to this hypothesis spatial ability became enhanced in males not as a result of hunting activity, but as a result of longstanding mate-seeking practices. The males of polygynous animal species must travel comparatively greater distances to meet up with and mate with females.

Language and Cognitive Science

The Linguistic Approach: The Importance of Language

Linguistics is the study of language. There are many different kinds of linguistics studies—each with its own theoretical perspectives and methodologies. Some of these adopt a neuroscience approach and use the case study method; the researchers study the language-related deficits of patients who have suffered brain damage. Others implement various network models of how language information is represented and processed. Some linguists take on a developmental orientation: they examine how language ability grows and changes with time during the development of the individual. Still others who study linguistics are philosophers who ask questions about the nature of language and of the relationship between language and thought.\textsuperscript{[14]}
Programming is more than the means of actualizing interactivity design; it is intimately associated with the concepts of interactivity. You can’t dismiss it as a minor factor best delegated to junior employees. The ideas of programming closely parallel the ideas of interactivity. Divorcing interactivity design from programming is an unnatural act.

Choosing between possibilities

Integrating Techniques into the Problem-Solving Process

The problem-solving techniques discussed above are most powerful when combined to activate both the logical/rational and intuitive/creative parts of the brain. The techniques will be presented within the context of a group problem-solving situation but are equally applicable to an individual situation. The terms in parentheses refer to personality dimensions to which the technique would appeal. The goal of the Input phase is to gain a clearer understanding of the problem or situation. The first step is to identify the problem(s) and state clearly and concisely. Identifying the problem means describing as precisely as possible the gap between one's perception of present circumstances and what one would like to happen. Problem identification is vital to communicate to one's self and others the focus of the problem-solving/decision-making process. represents the major difficulty in problem identification as it leads to artificially restricting the search for alternatives. Brainstorming is an excellent technique to begin the problem-solving process. Individually, participants quickly write possible solutions. The second step of the Input phase is to state the criteria that will be used to evaluate possible alternatives to the problem as well as the effectiveness of selected solutions. During this step it is important to state any identified boundaries of acceptable alternatives, important values or feelings to be considered, or results that should be avoided. In addition, criteria should be categorized as either essential for a successful solution or merely desired.

Emotion Driven Behavior
The specialty practice of cognitive and behavioral psychology is unified in theme but composed of somewhat different theoretical emphases. The different theoretical emphases make the specialty rich with theoretical diversity and allow for the synergy of different theories into practice. At its unified core, cognitive and behavioral psychology is distinguished by the use of principles of human learning and development and theories of cognitive processing in promoting meaningful change. Specialty practitioners focus on the identification of maladaptive behaviors and cognitions and seek to ameliorate presenting problems through behavioral and cognitive interventions. Cognitive and behavioral psychology is a practice specialty only, rather than an academic field such as cognitive psychology. However, certain concepts in cognitive psychology (e.g., implicit learning and tacit knowledge structures; have been used in cognitive and behavioral psychological practice. Although there are considerable differences between the specific treatment methods used by practitioners adhering to a strict theoretical orientation, the cognitive and behavioral theoretical orientations have historically grown closer since the days of radical behaviorism.\textsuperscript{[15]}

**Pleasurable and Desirable Experiences**

cognitive psychology and decision making according to limitations that causes people to release their strategies. Most important part of human thought is decision making and judgment. that helps to decrease complexity and ambiguity. in most conditions if human makes a wrong decision that’s called cognitive biases which is a mental error that is a simple performance strategy for processing and cognition. cognitive bias is somehow persistent.

in one website the part of selling previous version of website is in the left sidebar but looking on footer page to sidebar of left side in page. cognitive biases like optical illusion could even accrue in complete consciousness of user. this category of issues are related to intelligence and evidential evaluations and understanding cause and effect relationship and probability estimation needs. one of the bias properties are tendency to choosing common descriptions for elements. coherence relies on the discipline so people ordinate their evidences in patterns in order to the relations. If none of them have a clear pattern, this would be a first thought. researchers have the capability of profound perception about occurring events that researchers have to reason or goal for them. people usually look for patterns to become able to describe it in a boundaries and showing events randomly but it’s not our condition. events are randomly look like patterns.
The effect increases the desire of seeking more stimulation in the environment. Usability engineers predict that induced pleasure from an initial Internet encounter will lead to increased approach behaviors in subsequent browsing/shopping behavior. being more willing to explore further (i.e., browse more sites, explore a broader range of product categories) which implies more opportunity for unplanned purchases; being more willing to provide feedback or participate in product promotions or other demonstrations. This is consistent with the view that increased environmental stimulation is distracting and uses up attentional capacity available for the task at hand. In the Internet environment, we suggest that the specific characteristics of products, or the information load of the initial Internet experience, can also influence the experienced level of stimulation.

Emotion and website design

This chapter is about hedonic or affective elements of website design and the potential of such design to elicit emotion in users. In an online environment hedonic elements of website design include color, images, shapes, and use of photographs, among other characteristics, which are expected to provide the user with emotional appeal, a sense of the aesthetic, or a positive impression resulting from the overall graphical look of a website. While it is well known that emotion is important to the interpretation of experience, it is only in recent years that research has begun to transcend utilitarian aspects of website design to consider empirically affective elements of design. Therefore, not only is it important that websites are useful and easy to use, but also that they entice the user to experience emotions such as enjoyment, involvement, trust, or satisfaction.

Beyond Cognitive-based Paradigms

Despite the pervasiveness of emotional reaction in the human psyche, only within the last decade have calls been made for a break with conventional cognition-driven paradigms of studying user reactions to technology. In their place is an expanded focus that includes not only utilitarian outcomes such as usefulness or ease of use, but also the role of affect and emotion in the examination of information and communication technology systems.

Affect is a critical factor in human decisions and behaviors within many social contexts. In the information and communication technology.
This is important argue that the role of emotions in online shopping is even more important than in traditional marketing contexts because the consumer is disengaged from human interaction. To this end, user emotional responses have been measured with respect to “design factors” such as shapes, textures, color visual characteristics of web or web page aesthetics. Additional topics covered are affective user interfaces, hedonic quality.

3.5 User Research

complicated and every type of informational need. Users informational needs could be varied different behaviors. Information architecture needs could make users express users needs and behaviors and should have a responsive structure. Here to recognize, satisfy users, no important goal more than information architecture design to there is needs.

Look up staff member have to developers site is staff directory developers for example if information needs in the description of users website, this model could that is usual for these kinds of face researchers founded information. When users developers describe information, will understand developers requirements users run the search and site helps developers runs information with names. From another side if architecture site visitors could need these investors find information for investments. Developers information according to searching needs from other concepts. They may find information has three types like navigational categories. Following things that related examples of information navigation behaviors and are not behaviors. These needs are surprising.

Understand is different behavior from which developers searching what data users put in developers where to know developers valuable subjects that helps their priority in developers effort according to money, time and resources boundaries to design take an structure.

Simple Informational Model

shows what happens when users are looking for here there is a different models that users and their behavior is questionable about types of information. Creating models of want to ask how much information is sufficient and how researchers information that information architecture user could interact with.
relationship between user and information this procedure shows the steps of ask a question and second search or browsing starts architecture at the first step user receives the answer this is a simple view of rational and ideal and at the end user mechanism users usually have an access to only some portion of their predictable which causes apparent frustration in the process of finding information people needs changes the results they are looking for could find that

don’t rely on this simple model because it lacks interaction details also researchers users and information architecture information needs are proposed by devices between information on like keyboard and mouse this also includes ignorant users who has few opportunities become lost to perceive things finally by simplifying this model most of that happens to users by information architecture

when the user follows a website for advising of a product in reality he is searching ideas defined for him and helps him to make decision the answer is that and concepts that is ambiguity happens when users are following more than one answer or are the developers following that how financial plans will help are developers following a place called when users is following useful issues the trap exists an action which is is sure about what is he looking exploratory seeking is performing in this case user is not example user could follow human resource to learn about retirement program for for searching this process could make a list about information and then about IRA and again to find simple answer
is no expectation from open-ended. there Exploratory seeking is also known as doesn’t know how to search his own answer. user reviewing a correct answer. even user correct answer and use them as a spring board for future becomes happy to find proper always possible to identify when exploratory searching is finished. By searches. its not both following gap the notations are used to describe the essential requirements of the system and user for their intercommunications

is doing an exhaustive research. user is following when users want all of existed answers results should be categorized by using all existing types. for every needed concepts. the who wants to follow study plan is mostly advising his friend to search example a person results how website users are trying to find relevant answers. searching and multiple questioning methods for primitive conditions

here there is ordinary issues for navigation behavior. integration and iteration for questioning about on issue. different elements in searching and browsing and information navigation in complicated models are to be shown
there are many definitions for designing user experience which in many situations website design has some troubles that comes to these alternatives. User Experience Design (UXD, UED), Interaction Design (IxD), User Interface (UI) Design and other web/application design professionals use the term User Experience Design to refer to the judicious application of certain user-centered design practices, a highly contextual design mentality, and use of certain methods and techniques that are applied through process management to produce cohesive, predictable, and desirable effects in a specific person, or persona. \[^{[16]}\] archetype comprised of target audience habits and characteristics.

4.1 What is User Experience

User experience design is creating and synchronizing the elements which affects users experiences within a product of one company. these elements are what users could touch like tangible products and packages. commercial products and smell like bread of \(^\) sandwhich these include issues that users can connect with in ways that are physical like digital interfaces (websites and mobile applications) and also people (sellers and relatives). one of most interesting developments in past moments is the capability of merging .related elements with these issues which lead us to one mergeable experience.

one of the most interesting developments in last years is the capability of merging these effective elements to one valuable mergeable experience. here researchers focus on .related attributes to user experience.

tangible experiences are like learning class lessons which increases by digital softwares. even though experiences which are spoken for individuals are like buying a new car which is highly developed by social transactions. variety of user experience is high and it's also increasing.researchers mostly concentrate on the procedure of this issue on websites and .transactional media, especially user experience.

for being successful in these products for business goals for projects of users according to product evaluations and imitations that are effective for products such as technical .boundaries and project constraints and time limitations.
HCI is represented by the text fits with some other parts of computer science. Moreover, human–computer interaction as presented is a challenge problem for advancing theory in cognitive science, design, business, or social-technical systems. Given where the field was just a few short years ago, the creation of this text is a monumental achievement. The way is open to reap the glorious rewards of interactive systems through a markedly less difficult endeavor, both for designer and for user[17].

4.2 **UX Design Tools**

UX strategies lies somewhere the intersection of ux design and business plans, but the lines don't exist in a vacuum. instead there is’t in an elaborative anatomical structure with a lot of dots to correct this is why there are so many different interpretation floating around ux .strategy

interface designers could use many kinds of desktop and web applications to enhance their .prototyping capabilities and use them for efficient product design

There are anornous UX tools. For UX design and wireframming tools for making design process easier are .Adobe XD, Sketch app, A/B testing and Gurilatesting

4.3 **UX Strategies**

this is a type of strategy which leads developers t developers development of product which is not in decrease. even if th value of the ux is significant developers have reason to provide the equal weights of : experience strategy= business strategy+UX strategy
the mental model helps developers to visualize current strategy with other ux strategies and the direction of diagram that can support developers strategies.

when researchers upload a website many of online advertisements are using social networks to store and present financial informations which helps users receive their needed services. in many of these approaches only a few of traffic in the main page of website. sometimes user registers the services. sometimes they return but during 18 months no one has a solution in websites.

The software engineering teams know that their efforts may not always work and they proved it. million dollars has has been suspended for a product which is not for user. investors and their partners become angry because of this issue. their products found the media which was useful but authlets didn’t perform some of the functions, an now they moult their properties and performances in their own interface to help users make best decisions. this could be user experience that shows use why they will come to us. like of the product manufacturers they asked before look and feel the website as soon as possible. finding a product for solving ambiguity should be evaluated. ux strategy has four main rules: like entering a variable from user interface before enhanced idea for improvements.

first rule: business strategy is a high level prospective of company.
	his is why the company exists. this ensures the progress is time consuming. this foundation is competitive and requral of products. from this book researchers use productsto open the doors digital products and services. business strategy is what product managers us to develop to achieve their goals. benefits of competition long time entity of industry. they can estimate users with highest prices as an customer it shows us a model that researchers need for our products for digital device differences. the most important part of user experience strategy is content strategy which is so useful for managing contents in web applications. Content strategy has three main parts:

Discovering: (Ideas, Evaluation, Research)

Web content should resilience and adaptable to voice, tone and brand of industry. So researchers should always find better way to improve content accessibility for users and maintain originality of web structure.

Design: (Interactions, Visualization, Aesthetics)
The component design is desired for establishing a meaningful interaction between users and computer which is defined as Human Centered Design that is partially described in this thesis.

**Development: (Build, Test, Refining)**

For accomplishing the process of user experience design web developers and programmers have to construct profitable environment that users want to engage with and follow the user behavior to improve bug fixes and usability of web application.

## 5 Enhancing Web Navigation Structure

Beautiful web design without efficient navigation structure is similar to great palace strong foundation and it doesn’t lead users to the location that they want to reach on website. Using proper navigation structure is highly important and they are some strategies to improve it which is mentioned in this chapter of thesis.

### 5.1 Simplicity

Here the researcher proposes rules of website to improve the usability of the product presentation to develop the website and become properly navigated to correct path. Navigation labels should be reduced to the simplest form of use and drop down menus become simple to least items. Some websites have just four high level navigation labels
to be ensured about how users simply access to required information. recommended number for navigation labels is under five items, as possible. websites should not look complicated. website navigation labels only have to be helpful for users to find where they have to go or find what they really need. if they have to think hard to find their desired subjects on website, they will never become interested to visit that website again! users need to findout how website works at first look without learning anything. Appearance of website is important but most of users don’t follow website to evaluate website view, they visit websites to complete some actions or find specific information. appending extra features to websites makes it hard for users to complete their activity

5.1.1 Current Approach

At first look usability an simple ux structure is so important. which is emphasized in this thesis. colors and graphics should not grap extra attention from users, using more than five range color is not recommended. Type Faces should be clear and unambiguous, three models is adequate for webpages

Simplicity is important factor in designing web applications, it’s a design philosophy that makes users more convinient to access their desired information on website. At first simple design is harder than sophisticated design but after the first design it could be so easy to view and edit. Most of people get frustrated by complex design structures and also many of products are highly desirable by people just because of their simple user interface

Maximizing the clarity of web content helps companies to manage their products. Using automation also could increase mental satisfaction of users. It reduces the redundancy in users’ tasks and could be beneficial for design process
5.1.2 Proposed Idea of Researcher

1- not to use complicated and movable images

the opposite of what managers and some web designers think using sophisticated and movable images could worsen the quality of web application and reduce the mental satisfaction of users toward web content. Complicated content and images reduces the clarity of content and causes confusion of users which degredate the rank of webpage.

2- not to put advertise and commercials in main pages

website advertisements are highly annoying and protruding and people hate to see them on websites. Web ads like pop-ups interrupt the web browsing experience, Autoplaying videos are abhorrent and extremely dissatisfy the users of web applications. But users protest against embarrassing ads and not all of them, those which are unrelated to their information needs and interests. Many of people say that some commercials not only are intrusive but also mislead them to the places that they don’t like.

3- not to use sophisticated CSS and jQuery animations
there are two important issues with complex CSS and jQuery animations. The first one is that overusing complex animations could agitate and mislead user of website and the second one is that they overuse the memory and processor without substantial reasons.

4- **deleting unessential details in adaptive web design**

Cognitive fluency and information processing are important things in web design. Simple visual design is the most beautiful type of website. People prefer to watch websites that they know the place of information they need. with high level of mental fluency visitors don’t need to use so much mental effort for scrutinizing and could concentrate on what they really want.[17]

5- **not using gif images**

GIF and movable images are always popular but for websites there are exposed and not useful. Gif images are still used today because of their compression level and lets people download large images fast and easy. It also allows multiple images to be designed and has transparency attribute to crop the background from entire picture which is appropriate for designing logos and icons for websites.

Today PNG images are used instead of gif images because of their transparency and efficient compression also JPEG Images are now better than gif pictures. Gif images also has color range problem it just supports (8 bit) 256 colors, but other image types like PNG could handle up to (24 bit) 16.9 million colors with extra bits for transparency.

Low size images are the only reason that the gif is still popular today, they are used in weblogs and advertisements but they highly damage the webpage usability.

There are some good alternatives for inefficient gifs like HTML5 videos and CSS3 animations which helps website to have higher usability rank. You can see the examples in W3Schools website.

```html
<video width="320" height="240" controls>
  <source src="movie.mp4" type="video/mp4">
  <source src="movie.ogg" type="video/ogg">
</video>
```
Test

According to the examination which is taken from Artificial Intelligence class in 12/march/2017 – 9:00 AM / 10:00 AM, the dataset is gathered in Ayandegan Institute of higher education. The class has been supervised by Mr. H.Roshan. two websites have been shown to students.

User Goals

According to the research simplicity factors users are ordered to find test button in two websites which the website 1 is the simple model of webpage and the second one is complicated one.

Tasks

Students have to open the website 1 and have recorded time span to find Test on the website. When they find and clicked on the test< report them to the examiner and time duration become written by the researcher (table 1).

Results

<table>
<thead>
<tr>
<th></th>
<th>website1 variation</th>
<th>website2 variation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User</td>
<td>&quot;4.7&quot;</td>
<td>1.1</td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>User 2</td>
<td>&quot;8.83&quot;</td>
<td>26.83</td>
</tr>
<tr>
<td>User 3</td>
<td>&quot;4.20&quot;</td>
<td>0.3</td>
</tr>
<tr>
<td>User 4</td>
<td>&quot;7.55&quot;</td>
<td>3.9</td>
</tr>
<tr>
<td>User 5</td>
<td>&quot;3.33&quot;</td>
<td>0.32</td>
</tr>
<tr>
<td>User 6</td>
<td>&quot;1.24&quot;</td>
<td>5.8</td>
</tr>
<tr>
<td>User 7</td>
<td>&quot;2.48&quot;</td>
<td>1.36</td>
</tr>
<tr>
<td>User 8</td>
<td>&quot;1.30&quot;</td>
<td>5.52</td>
</tr>
<tr>
<td>User 9</td>
<td>&quot;1.32&quot;</td>
<td>5.42</td>
</tr>
<tr>
<td>User 10</td>
<td>&quot;1.62&quot;</td>
<td>4.12</td>
</tr>
</tbody>
</table>

Table 5.1 simplicity factor test results

**Estimation**

\[
\Sigma(\text{Website A}) = 36.57 \\
\text{Mid (Website A)} = 3.65 \\
\sigma(A) = 7.39
\]

\[
\Sigma(\text{Website B}) = 17.23 \\
\text{Mid (Website B)} = 1.73 \\
\sigma(B) = 3.08
\]

\[\sigma(A) > \sigma(B)\]
Conclusion

by the estimation of standard deviation of both size and their comparison the results show that the rate of content accessibility of Website B is lower than Website A, which represents that Website B has better accessibility for user interaction.

5.2 Label Ambiguity Reduction

labeling is a form of presenting information, as discussed previously to represent the concepts and usages of information navigation in websites. for example ContactUs is a bar which prepares numerous contents and usually includes Contact Name and Add and Telephone and email information, designers could not present all of these information quickly and efficiently and also may annoy users with huge among of information that they don’t need. instead of that labels like Contact US behaves like shortcut and shows correct relation without previewing those terms. so the key goal of label is relating information properly which means that without assuming user perceptual space lately merging labeling structures with other systems was discussed. labels are most clear methods for presenting navigational infrastructures. as an example a website could contain variable groups of labels and each group shows its own information navigation. style. examples include labels that are connected to websites prerecorded communications like web print radio or TV are real-time interactions and are crucial part of website unfortunately websites don’t have quick feedback. here there are some exceptions for website owners and content writers according to their response. for decreasing information architecture make their maximum effort toward preview language in subject of users websites and reflecting to content announcing and describing. labels should inform users to learn new concepts and understand similar subjects
5.2.1 Current Approach

1- focus on mostly used labels

webpage navigation should mostly emphasize on the most important users tasks, websites should only keep the important labels and links and omit the rest of unnesesarly options which could annoy and distract users. Website analytics could help designers to find out the most important labels according to users tasks

2- Consistent labeling style

Websites should have appropriate and harmonic labels, inconsistency label design could make difficulties for users to find their needed information from websites.

3- Semantic Consistency

Choosing inconsistent labels for tasks could vividly reduce website usability and interactivity, some labels could have ambiguous titles and provide different results these problems could result in permanent usability failure.

4- Keeping pariority of labels

Some items like Home or About button have high parioty in sort of webpage items, choosing abnormal placement for options could make inconviniece for users. people expect to find the important options in the main areas of the website.

5- Properly informing the function f website

some websites have labels and titles which doesn’t cheerfully propose thethe usage of their website. For example websites which have sophisticated titles and contents get low scores in usability tests.
5.2.2 Proposed Idea of Researcher

1- **using one activity toward multiple choices**

Using numerous activities in web page could confuse users and inhibit them to easily access to their desired information.

2- **changing interface color according to user age, location, and time**

This option could develop the useful interaction between user and website, for example showing dark colors in night, change theme by different locations and showing content which is useful according to user age could be amazing for website users.

**not using top down navigation menus**

There are some distinct reasons to not use them in web applications. Firstly, it’s hard to keep them from disappearing and force users to follow narrow inviable pathway to keep the menu visible. Secondly, drop down menus are hard to use in mobile and small scaled screens and also not compatible with their touchscreens and by the growth of using internet in mobile devices this problem has become more disturbing. Finally, they could not be easily filtered with page and sometimes it could distort the view of websites. It’s better to use mega menus or other types of useful navigation style.
putting breadcrumbs in the footer of the page  -4

Efficient using of breadcrumbs enhance website usability. Breadcrumbs should be positioned in footer of webpage because other places are used for primary elements like left/right navigation bar and main menu

5- users become bored and confused by complicated categories
.developers have to show information architecture as simple as possible

Test
The experiment is taken from machine language class in 13/Dec/2017 – 9:30 / 10:05 AM. The data is taken in Ayandegan University, the class has supervised by Mr. H.Roshan. by the test two websites have been shown to students.

User Goals
By the experiment needed data students have to find the option (Good) in web content of two websites (Dark & Light)

Tasks
Students have to open the Dark website which is designed with dark colors and Light website which is consisted of light colors. Then they have to find and click on the button
which id named as <Good> and then report it to the test takers time duration becomewritten by the researcher (table 5.2)

Results

<table>
<thead>
<tr>
<th></th>
<th>Light</th>
<th>variation</th>
<th>Dark</th>
<th>variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>user 1</td>
<td>&quot;12.68&quot;</td>
<td>63.52</td>
<td>&quot;1.30&quot;</td>
<td>0.15</td>
</tr>
<tr>
<td>user 2</td>
<td>&quot;9.37&quot;</td>
<td>21.71</td>
<td>&quot;1.72&quot;</td>
<td>0.08</td>
</tr>
<tr>
<td>user 3</td>
<td>&quot;0.38&quot;</td>
<td>18.74</td>
<td>&quot;1.60&quot;</td>
<td>0.95</td>
</tr>
<tr>
<td>user 4</td>
<td>&quot;8.05&quot;</td>
<td>11.15</td>
<td>&quot;0.88&quot;</td>
<td>1.78</td>
</tr>
<tr>
<td>user 5</td>
<td>&quot;0.25&quot;</td>
<td>19.89</td>
<td>&quot;6.41&quot;</td>
<td>0.51</td>
</tr>
<tr>
<td>user 6</td>
<td>&quot;5.27&quot;</td>
<td>0.31</td>
<td>&quot;0.81&quot;</td>
<td>3.13</td>
</tr>
<tr>
<td>user 7</td>
<td>&quot;2.74&quot;</td>
<td>3.88</td>
<td>&quot;0.74&quot;</td>
<td>1.78</td>
</tr>
<tr>
<td>user 8</td>
<td>&quot;6.57&quot;</td>
<td>3.45</td>
<td>&quot;0.8&quot;</td>
<td>2.44</td>
</tr>
<tr>
<td>user 9</td>
<td>&quot;0.37&quot;</td>
<td>18.83</td>
<td>0.88</td>
<td>0.81</td>
</tr>
<tr>
<td>user 10</td>
<td>&quot;1.44&quot;</td>
<td>10.69</td>
<td>&quot;1.81&quot;</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Table 5.2 / label ambiguity factor test results

Estimation

\[ \Sigma (\text{Light}) = 47.12 \]
\[ \text{Mid (Light)} = 4.71 \]
\[ \sigma = 4.14 \]

\[ \Sigma(\text{Dark}) = 16.95 \]
\[ \text{Mid (Dark)} = 1.69 \]
\[ \sigma = 1.22 \]

\[ \sigma(A) > \sigma(B) \]

**Conclusion**

According to results Light website is more usable due to better labeling style and consistency. Light colors are more useful for designing efficient websites.

5.3 **INTERACTIVITY**

by implementing UX and usability methods for users (after all designer doesn’t do anything for them. so while testing proper option for developing websites changes will be applied

users perception is related to their capabilities to order information. where they live or what they do the answers are joined to system states that presents the social and political hierarchies

websites present information structures that let people find correct answers in them. multiple systems could solve these kinds of problems practically

5.3.1 **Current Approach**
Not all design changes have an obvious impact on user behavior. Some design changes are much more subtle, and their impact on user behavior is less clear. Small trends, given enough users, can have huge implications for a large population of users. The subtle changes may involve different aspects of the visual design, such as font choice and size, placement, visual contrast, color, and image choice. Non-visual design elements, such as subtle changes to content or terminology, can also have an impact on the user experience.

5.3.2 Proposed Idea of Researcher

1. using appropriate language which should not be too simple or too complicated to understand
2. creating bold and clear titles
3. checking all of the links working properly
4. properly using call to actions
5. Not using popups
6. build subscription option for users
7. add social share buttons to attract users

5.4 EFFICIENT CATEGORIZATION

In recent years there was high focus on information categorization, this challenge is not so new. people have so many problems with information structures, In reality all users become librarian that are unconcentrated by internet world. so many times before. response for labeling organizing and providing were available for librarians

internet is responsible to categorize information properly for user access. how many websites are available in present time? how many weblogs let internet users to produce contents how many websites make users bored and desatisfied with their uncategorized contents.these types of questions should not be taken for granted.web developers
should be aware of how they categorize and organize information according to users’ specific needs.

5.4.1 Current Approach

1- in all web browsers include earlier ones and mobile devices inactive javascript codes

2- categorizing website information rationally

seperate unrelated information by distinct categories and gather similar information in one place of website

5.4.2 Proposed Idea of Researcher

1- all of items and services should never be listrd in one page

2- main menu should describe the function of website and show what users could access
5.5 ACCESSIBILITIES

In user experience design accessibility mostly points designing practical interfaces for people with mental or physical disabilities. Researchers utilize their experiments to evaluate accessibility rates for each kind of disabled user and results could help designers to improve their interactive applications for particular users.

Accessibility is a crucial part of web development to increase usability of websites. Internet today is used by anyone and people with physical or mental disability are not exception. But the problem is that websites are not enough easy to navigate by disabled people. Some organizations like WAI are set up to increase accessibility of websites. WAI educates disabled people to easily use websites.

5.5.1 Current Approach

Designers use assistive technologies helping disabled people to gain needed information. There are some universal principles of design for various complicated web interfaces. WAI educates disabled people.

5.5.2 Proposed Idea of Researcher

1. **Activate subtitles for people with disabilities**

2. **Use specific button for who suffers from disabilities and options to adjust colors off**
   - website for color blind people

3. **Use of symbols and large print for disabled people**
4. **use tab indexes to help people access their desired information checkboxes and radio buttons busing keyboard**

5. **use of alt attribute properly** Alt attributes are commonly used for assistive technology and instead of loaded images this option is also used when image could not be shown

6. **using access keys in website**
   - this option could improve navigation of website but people don’t use it because they are not aware of it. Access keys are easy to use in websites and they are added to navigation tags
   - For example

   ```html
   <a href="index.html" accesskey="1">Home</a>
   ```

**Test**

This test is taken from data structure class in 25/APR/2018 – 12:00 / 12:30 in ayandegan university, website A and website B are shown to students.

**User Goals**

According to the goa; students have to select goal option in websites by only using keyboar keys. (Shift, Alt + shift)

**Tasks**

Students have to open the website which is designed with accessibility feathures (Website A) and without accesibility features (Website B) they have to find and clickon the button which is captioned as (good) and then report it to the test takers and time duration is recorded by the researcher
## Results

<table>
<thead>
<tr>
<th></th>
<th>Website A</th>
<th>variation</th>
<th>Website B</th>
<th>variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>user 1</td>
<td>&quot;2.59&quot;</td>
<td>4.03</td>
<td>&quot;3.42&quot;</td>
<td>4.13</td>
</tr>
<tr>
<td>user 2</td>
<td>&quot;8.86&quot;</td>
<td>1.21</td>
<td>&quot;5.31&quot;</td>
<td>7.02</td>
</tr>
<tr>
<td>user 3</td>
<td>&quot;18.96&quot;</td>
<td>11.2</td>
<td>&quot;1.24&quot;</td>
<td>1.57</td>
</tr>
<tr>
<td>user 4</td>
<td>&quot;1.95&quot;</td>
<td>5.8</td>
<td>&quot;0.68&quot;</td>
<td>3.61</td>
</tr>
<tr>
<td>user 5</td>
<td>&quot;5.75&quot;</td>
<td>7.3</td>
<td>&quot;4.96&quot;</td>
<td>6.71</td>
</tr>
<tr>
<td>user 6</td>
<td>&quot;21.17&quot;</td>
<td>9.33</td>
<td>&quot;8.39&quot;</td>
<td>5.7</td>
</tr>
<tr>
<td>user 7</td>
<td>&quot;6.39&quot;</td>
<td>1.04</td>
<td>&quot;1.94&quot;</td>
<td>2.71</td>
</tr>
<tr>
<td>user 8</td>
<td>&quot;4.12&quot;</td>
<td>8.21</td>
<td>&quot;3.93&quot;</td>
<td>1.03</td>
</tr>
<tr>
<td>user 9</td>
<td>&quot;10.24&quot;</td>
<td>3.05</td>
<td>&quot;5.02&quot;</td>
<td>7.14</td>
</tr>
<tr>
<td>user 10</td>
<td>&quot;3.12&quot;</td>
<td>9.04</td>
<td>&quot;2.42&quot;</td>
<td>9.26</td>
</tr>
</tbody>
</table>

Table 5.3 / label ambiguity factor test results

### Estimation

\[ \Sigma \text{(Light)} = 32.51 \]

\[ \text{Mid (Light)} = 3.25 \]
\[ \sigma = 6.13 \]

\[ \Sigma (\text{Dark}) = 16.95 \]

\[ \text{Mid (Dark)} = 1.69 \]

\[ \sigma (\text{A}) = 4.18 \]

\[ \sigma (\text{A}) > \sigma (\text{B}) \]

**Conclusion**

By this experiment results show that including the tab menus and buttons structure could enhance accessibility of website.
6 Usability Testing

the term usability testing mostly refers to evaluate the usability of a system, process or application. Designers use usability testing results to increase performance of their web contents according to user information needs. usability testing could help user to access their specific product and become more comfortable with use of them. the test improves benefits of using website. experiments are the approaches to the usability methodology and often employed for basic research, specific hypothesis of formulated [23].variables

Usability testing is crucial part of user centric design process for any software website or information and communication system

Main utility of usability evaluation is to clarify measurements of users ability for each task to be designed. Many resources like time duration and user’s mental effort is needed for system to perform distinct tasks and gain positive response from the overall interaction

6.1 WHAT IS USABILITY

Usability is the method or process researchers use to determine how easy something is to identify, comprehend, and ultimately use. We measure or rate usability by considering five major attributes, or factors

Important part of the research is user test, the test procedure remote usability evaluation and usability testing materials for evaluating various web applications which researchers could clearly rely on.[24] By using usability evaluation techniques, researchers could be ensured about performance of our interactive system which are related to user’s tasks

In the usability testing process users have to do certain tasks during specified time and the outcome results could help web developers to reduce design faults and misconducts that annoys users to do exact tasks. During the evaluation process number of flaws and problems should be recorded for research. After the flaws reports designers and developers have to troubleshoot user’s issues and problems to enhance the quality of
Remote Usability Testing like any other usability testing methods should be taken in usability lab, people become invited to the lab and participate to do distinct tasks by using computer devices which have recording materials. After the test all of the recorded data become used to analysed for the research goals. Usability lab have audio and video recorders to be used for evaluating users actions. Automatic devices record total actions and behavior of users and are useful for this aim. Users interaction become linked to user centric design research prospect in the web design and development industry. As what was mentioned by contemporary design researchers usability tests could be expensive from the human resource aspects. Usability testing is also used for mobile applications to improve the accessibility of users to desired information.

6.2 Elements

This type of usability method is used for measuring the aspects of task completion according to the users behavior. Design is always integrated with action. The concept human computer interaction could not be combined with Usability Analysis. Proper design needs vast knowledge of space and materials related to user, task and computer system. For example some of great design works like Xerox Star and the Apple Lisa/Macintosh don’t have any usability analysis approach. But designers have control over the design and action.

6.3 User-Oriented Evaluation

User centric design articles are publishing more than before and task centric design. Designing a appropriate interactive element between user and machine is always an important issue. According to the responsibility of human-computer machine they should do the exact action to achieve the total organization needs. Also hci systems should have a vivid connection with analytics and implementation methods to be
structured for the system desired behaviors. Design decspline could help system to do desired function according to system principal rules.

The results of mechanism could be used by people to learn and practice them as a way of technical development in each field of computer related tasks.

At this field methods and theories should be exposed in the comprehensive document that the researcher only presents some important part from the overall process. Without practical approach, results would be unreliable and inefficient. Constraints of design space for computation relies on system. Satisfying results could be shown in conclusion. There are soe analytical mdels to suppor the results of interactive devices.

User testing has several steps which is mentioned in the line below:

1- By the estimation of user test objectives, of participated users needs have to be justified for gained consequences

2- Users have to perform selection of tasks to be estimated

3- Statement of users tasks and event Scenarios

4- selected alternatives to be chosen developed to recorded occurrences

5- The establishment of the required test devices and utilities and proper environment for taking the reliable test results (is taken is computer site room (which is called as Usability Lab

6- Proper design rules which has been designated by tester to be used for research preferences

7- Selected questions of design related subjects, Data Analysis process
8- At the final step, results should be presented by the tester or researcher

As the result of research by Spool and Schroeder whom have been taken a test from large amount of people and then they revealed the results for the websites that they studied for more five users to find website problems. According to their research results proved that they showed their experiences based on their levels

6.4 User Research Analytics

User Experience is not the magic to attract everyone to the website but its a solution to create contents and structures which could attract specific website visitors. For measuring UX research testers have to analyze and collect data to estimate the user interactions gathered data is that how many times user clicked the specific item where they surf in website. When they were satisfied and things they searched. By using analytics quality of interaction between human and design could be estimated.

through this research two types of analytics has been taken, the Qualitative (previous chapter) data is gathered by user research (live data test from website users) and the Quantitative (by gathering information using analytics and identifying users behavior in website).

Analytics have four major techniques:
1- **Descriptive Analytics:**

overall data gathered about how many people visit webpage and click on the items.

2- **Diagnostic Analytics:**

following to data that the events on website and their reasons.

3- **Prescriptive Analytics:**

Focusing on the nest action of users to improve the design decisions.

4- **Predictive analytics:**

By using this method researcher could predict the whole scenario of web navigation.

By using Analytics metrics researchers can represent the results of their research.

```
<table>
<thead>
<tr>
<th>Measure</th>
<th>Users</th>
<th>Progress</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>New Website Users</td>
<td>partially</td>
<td>Increase in Users</td>
</tr>
<tr>
<td>Target</td>
<td>1000</td>
<td>37%</td>
<td>18%</td>
</tr>
<tr>
<td>Source</td>
<td>Analytics</td>
<td>Research Plan</td>
<td>Web Metrics</td>
</tr>
<tr>
<td>Frequency</td>
<td>Monthly</td>
<td>Quarterly</td>
<td>Monthly</td>
</tr>
</tbody>
</table>
```

Table 6.1 / measuring the usability factors
By using the key performance indicators (KIPs) research results could be validated. Analytics could be used for research, measurement and analysis of users data.

**Daily Tasks**

Analytics could improve gatherer analytics related UX tasks to estimate the results of each user scenario.

**Optimizing content structure**

By utilizing the analytics researches could understand the weak points of website improve

**Scope**

The research plan was applied on webkaran project (ID pay) and the results has been bathered. ID pay is an online payment service.

**Measurements**

obtained information from both research types identified new model for user experience research which contains all of represented methods in thesis. the (UR18) contains all of the usability methods (simplicity, label ambiguity, interactivity and accessibility) it was applied to the IDpay web application.

<table>
<thead>
<tr>
<th>Measurement plan</th>
<th>Desirable Action by Website users</th>
<th>Web Metrics</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Register in website</td>
<td>Specific request to servers</td>
<td>Specific requests to servers shows how many users tried to register in website “specific” here means</td>
<td></td>
</tr>
</tbody>
</table>
Investigation

By using optimizing hypothesis for macro-conversation issues and using analytics to prove the research ideas. This investigation focuses on traffic solutions. Technical issues, navigation and visual design.

1) Traffic

Determining a main traffic source which causes the reduction in page Accessibility for useful analytics report:

<table>
<thead>
<tr>
<th>Page</th>
<th>Pageviews</th>
<th>% Pageviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>/banks</td>
<td>18,533</td>
<td>9.41%</td>
</tr>
<tr>
<td>/dashboard</td>
<td>10,503</td>
<td>5.33%</td>
</tr>
<tr>
<td>/</td>
<td>7,629</td>
<td>3.87%</td>
</tr>
<tr>
<td>/div/main/file/14056</td>
<td>4,405</td>
<td>2.25%</td>
</tr>
<tr>
<td>/user/login</td>
<td>4,196</td>
<td>2.13%</td>
</tr>
<tr>
<td>/var/bank?amount=240000</td>
<td>3,028</td>
<td>1.54%</td>
</tr>
<tr>
<td>/dashboard/deposit</td>
<td>2,715</td>
<td>1.38%</td>
</tr>
<tr>
<td>/dashboard/plans</td>
<td>2,501</td>
<td>1.30%</td>
</tr>
<tr>
<td>/var/sys?amount=290060</td>
<td>1,877</td>
<td>0.95%</td>
</tr>
</tbody>
</table>

Figure 6.1 / traffic view per pages
Results: page /deposits has extra traffic because its overloading users requests and the server is not responding properly

Solution: use external ports to reduce pressure on internal server

2) Content/visual design issues.

Website doesn’t have forget password option and has change password instead and it only accepts user’s phone number for changing password.

3) User issues

Sometimes users have problems with information accessibility and they could not find the information that they need and have some difficulties with navigation and interaction with website. One of most important user issues is:
Problem: website has international users but it doesn’t have multilingual support

Solution: adding multiple language button in website

4) Devices

Internet usage by mobile devices has been increased sharply and they enable people to easily access and share information. Today highest internet traffic comes from mobile devices and web applications like Idpay are not the exception.
Problem: most of the idpay users are using mobile devices but idpay doesn’t have application for mobile and tablet devices.

solution: creating android and iOS app for idpay
5) Location

User Researchers could find the Locations report under Demographics in the Audience section. Google Analytics identifies locations from a user’s IP addresses and where ISP determines those ranges.

Findings: most of the users are from Iran because idpay doesn’t have international payment services like PayPal or visa card support.

Solution: Webkaran company should establish connection with international payment services like Master card and visa card to increase international users of idpay.

6.5 Discussion

Satisfaction of users is the most important factor in user research. By the evolution of user experience importance of user attraction has been increased. The results of research are useful for marketing and user oriented psychology that develops usability testing and other types of examination.

In chapter 5 some kinds of qualitative research was presented by gathering data from students of Ayandegan university. In chapter 6 quantitative research was taken by examining a analytics of IDpay web application and development of user experience was shown. For the future of this research writer will focus on the digital aspect of user experience and how to develop user satisfaction by implementing the latest technological methods and applications.
7 Conclusion

The UX research is a various compilation of studies which are related to both computer science and human behavior science. The research and experiment in user experience is growing vividly in all branches of technology and industry. UX research implies in the pertaining insights from users to perceive their experience. However, it's necessarily true that to identify users, same as other types of research the experiment is not always objective and sometimes meet the weakness of human though. Emotional and intellectual aspects of usability testing is performed by self-report which the results of research are related to the questions about the experience of users. The research is based on personal perception of users and recording of their personal emotions. In some situations, people could not properly identify or describe their feelings about the website. By using psychological evaluations subjective parts of user data will be removed and tester uses qualified data to prepare the efficient results. In this research main subject was the improvements in usability of websites and design better digital environment for people and website users.
8 FUTURE WORKS

Current methods of gathering information of users’ emotions is inaccurate and limited. For development of user experience new technologies and devices are required to improve the evaluation of users’ feelings and it needs deeper knowledge about neuroscience and biology and psychology. Current tools and methods are easily applicable and it will grow in future. In next studies researcher .will focus on the latest methods of user experience research like eye tracking and EEG devices.
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