Analysis of Offshore Specialty Fabricators, Inc. Website

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Abstract

This paper analyzes the Offshore Specialty Fabricator’s, Inc. website from the user’s perspective, citing needed improvements that will positively affect the site’s usability. It addresses potential problems with the website via a task analysis and a colorblindness study. We find problems with the sight, ranging from aesthetic problems to functional problems, finally calling for a complete redesign of the OSFI site to improve overall appearance and usability.
# Table of Contents

1: Introduction .......................................................................................................................... 4

2: Offshore Specialty Fabricators, Inc. Website ........................................................................ 4

3. Problems with the Offshore Specialty Fabricators, Inc. Website ........................................ 5
   3.1 Incomplete Page Content ................................................................................................. 5
   3.2 Navigation Bar Text, Company Logo Text, and an Unconventional Site Interface .......... 5
   3.3 Redundancies .................................................................................................................. 6
   3.4 Organization of the Turnkey Inventory .......................................................................... 6
   3.5 Drop-Down Menus .......................................................................................................... 7
   3.6 Information Architecture ................................................................................................. 7
   3.7 Other Aesthetics ............................................................................................................. 8
   3.8 Management .................................................................................................................. 8

4. Task Analysis ......................................................................................................................... 8
   4.1 Study and Participants ..................................................................................................... 8
   4.2 Procedure ....................................................................................................................... 9
   4.3 Results ............................................................................................................................. 10

5. Colorblindness Analysis ....................................................................................................... 10
   5.1 Study ................................................................................................................................ 11
   5.2 Procedure ........................................................................................................................ 11
   5.3 Results ............................................................................................................................. 11

6. Recommendations ............................................................................................................... 14
   6.1 Incomplete Page Content ............................................................................................... 14
   6.2 Navigation Bar Text, Company Logo Text, and an Unconventional Site Interface ....... 14
   6.3 Redundancies ................................................................................................................ 14
   6.4 Organization of the Turnkey Inventory ......................................................................... 15
   6.5 Drop-Down Menus ....................................................................................................... 15
   6.6 Information Architecture ............................................................................................... 15
   6.7 Other Aesthetics ........................................................................................................... 15
   6.8 Management ................................................................................................................... 15
   6.9 Complete Website Overhaul ......................................................................................... 16

7. Implications for Further Research and Analysis ..................................................................... 16
   7.1 Colorblindness .............................................................................................................. 16
   7.2 Turnkey Inventory ........................................................................................................ 16

8. Conclusion ............................................................................................................................ 16

Appendix .................................................................................................................................. 17

Resources ................................................................................................................................. 19
1. Introduction

In the summer of 2005, the Offshore Specialty Fabricators, Inc. website received a complete overhaul. At this point, the website was over 8 years old, and it was beginning to show. At the end of the summer, the new OSFI website went live, though still incomplete due to time constraint issues. To the development team’s surprise, the unfinished website produced only positive reviews from upper management and employees. Of course, anything was likely better than OSFI’s previous website. During the creation of the website, the development team hardly considered users of the website.

This paper analyzes OSFI’s website from the user’s perspective, citing needed improvements that will positively affect the site’s usability. It addresses potential problems with the website via a task analysis and a colorblindness study. The paper concludes with recommendations to remedy problems with the website, backed by the analysis and additional research.

2. Offshore Specialty Fabricators, Inc. Website

Offshore Specialty Fabricators, Inc. is an offshore oil platform turnkey company, headquartered in Peru, with additional offices in Houston, TX and Houma, LA. The company website (www.osfi-fw.com) provides information about the company and its past turnkey projects to potential clients and employees. Users search for information within the website by way of the navigation bar, static to every page of the website.

The navigation bar categorizes all of the sites content into one of seven categories: “employment opportunities”, “about us”, “fabrication”, “marine services”, “turnkey”, “employee login”, and “contact us”. Moving the mouse over about us returns two drop-down options, history and management. Moving the mouse over “fabrication” causes the locations of OSFI’s two fabrication yards to appear, Ingleside, TX and Houma, LA. Mousing over “marine services”, on the navigation bar, shows “derrick barges”, “marine barges”, and “boats” as drop-down options. All drop-down options are clickable.

Figure 1. Offshore Specialty Fabricators, Inc. navigation bar
3. Problems with the Offshore Specialty Fabricators, Inc. Website

3.1 Incomplete Page Content
Sections of the website are incomplete. For example, the company history section, found under the about us section of the navigation bar, sports a completely blank page when clicked. The boats section, found in the Marine services drop-down menu is lacking page content as well.

These sections of the website have had no page content for over a year and a half. The website originally went live as a prototype to meet a time constraint and has been hardly update since. The company history page remains empty because only one individual was qualified and agreed to give a comprehensive history of the company. This employee has a very busy schedule, and even though he agreed to write a company history, it is unlikely he will ever do so.

3.2 Navigation Bar Text, Company Logo Text, and an Unconventional Site Interface
The seemingly three-dimensional company logo, located in the upper-left hand corner of every page sacrificed readability for artistic vision. In Figure 1 above, one can hardly make out the name of the company, bent around the company logo, through the artificial lighting and shadow effects cast on the image.

The chosen text colors to represent the first-level options on the navigation bar make the text unnecessarily difficult to read, see Figure 1. Again, this could be in part due to lighting and shadow effects on the navigation bar, but other color combinations would make the navigation bar text easier to discern.
The three-dimensional interface design hinders the loading time of the website. The coloring palettes needed to create shadowing and lighting effects require all of the interface site images to be of .jpeg image type. A two-dimensional website interface could see many of its images converted to .gif type, a type of image compression that gives smaller image file sizes for images using 256 colors or less.

3.3 Redundancies
In the turnkey inventory, the “next turnkey” and “previous turnkey” buttons seen on every single turnkey page are completely redundant. These buttons have the same functionality as the forward and back buttons found on near every modern web browser.

![Figure 3. Turnkey navigational buttons](image)

The buttons only work within their project category, and the projects are not chronologically numbered. Some platform project is missing, and the numbering frequently jumps to different categories. These categories are necessary because the different categories represent different functions the oil platforms will perform. As such, these buttons function only to offer the user a random project, given they do not have the site schema memorized.

In the bottom-left hand corner on every page is a static image containing a phone number for all of OSFI’s offices, see the bottom-left hand corner of Figure 2. The website already has an entire page dedicated to company contact information.

3.4 Organization of the Turnkey Inventory
More thought needs to go into the organization of the turnkey inventory. As it stands, the turnkey inventory is a four to five page categorical list of the company’s past turnkey projects. There was no rhyme or reason as to why the turnkey inventory should possess a categorical organizational structure, other than that is how it appeared on the old website. This may not be the best organizational structure for the turnkey inventory, then again, it very well could be. The long list of turnkeys, even categorically organized, is tedious to sift through for a specific turnkey project. Even though no other turnkey company displays all of their past projects in this manner, the idea to do so is interesting and may be effective. Potential clients can browse every past project OSFI has worked on. Stock design schematics are even available for review in the turnkey inventory.
3.5 Drop-Down Menus
The drop-down menus that appear when moving the mouse over certain options on the navigational bar sometimes do strange things. When the mouse is hovering over a correct option on the navigational bar, sometimes the drop-down menus appear then disappear for no reason, when the user has not even moved the mouse. Sometimes the drop-down menus will not disappear when a user no longer has the mouse over a valid option on the navigational bar. Sometimes more than one drop-down menu will appear for one mouse selection on the bar. The drop-down menus are not consistent with their designed purpose. Either this problem is the result of the placement of invisible CSS layers responsible for hiding the drop-down menus, or the problem is rooted in the Macromedia Dreamweaver drop-down function used in the creation of the navigational bar. The Penn State University Park Housing and Food Services website (http://www.hfs.psu.edu/foodservices/) also uses this Javascript function, and their drop-down menus have similar problems.

3.6 Information Architecture
The development team did not consider mapping out the site’s structure before beginning to code. As a result, the process of finding information on the site is arbitrarily difficult. It is rather obvious when one is searching the site for information and stumbles across a pointless node. Figure 4 provides an example of such a node.

Clicking on the about us option on the navigational bar, rather than choosing clicking on one of the links provided in its respective drop-down menu, will take the user to a page having three images as space-filler, with two links below the images. The existence of this page, and others like it, are a consequence of disregarding the art of information architecture when designing the structure of the site.

Figure 4. A node containing no information and only links to other nodes
3.7 Other Aesthetics
On widescreen computer monitors, the website fails to display properly. The header, navigational bar, and footer images, all of which are static, end abruptly. The development team did not think much about the cross compatibility of the site, and optimized it to their own computer screens. Figure 5 shows what the site looks like on a widescreen, 32” monitor.

![Figure 5. Home page viewed from a 32” widescreen monitor](image)

Having the interface not use the whole display of a widescreen monitor would not be such a problem if the images did not end so abruptly.

3.8 Management
The management page is currently a two-page list of links, with a layout similar to that of the turnkey inventory. Conflict arising from what information to include on the management page produced this poorly organized list. Accompanying the list is several lines of useless goto links, given the short, two-page length of the list. Originally, management desired to have their picture by their name, but revoked that thought. Regardless, this is no reason for the management page layout.

4. Task Analyses
According to Usability.net, task analyses examine “what a user is required to do in terms of actions and/or cognitive processes to achieve a task” (Usability.net). These analyses have several applications but can help pinpoint process flaws, or “predict how long [a user] will take to perform a task” (Ritter, Churchill, p.169). We analyzed the OSFI website using both GOMS and the Keystroke Level Model.

4.1 Study and Participants
This study analyzes the effectiveness of the navigation buttons on each turnkey page, as well as the layout of the management page. Each analysis compares two interfaces, the current version of the interface and a redesigned prototype. All interfaces present the same information, these analyses present evidence as to which interfaces allow for faster information retrieval.
For both analyses, we tested four subjects on each interface. Our first subject is a Penn State Junior majoring in Honors Biology, our second subject is a Penn State Senior majoring in Kinesiology, our third subject is a Penn State Junior majoring in Mechanical Engineering, and our last subject is a Penn State Senior majoring in Information Sciences and Technology.

4.2 Procedure

We first analyzed the pages using GOMS, creating a pseudocode list of goals, methods that included operators, and selection rules. The GOMS model proved useful in bridging the gap between the OSFI website interface and the KLM model. GOMS helped us think of the interface in terms of a series of steps and decision carried out by users of the system in order to find specific information on the website. GOMS also allowed for redundancies in the information searching process to surface. The KLM model tested scientifically our theories about the website, that the management page was badly organized and the navigation buttons on the turnkey pages are useless. Our KLM study compared predicted times for finding target information on the site, to our recorded times running an experiment on four subjects.

For the management page, the experiment consisted of finding a manager name from the list of managers on the page. We verbally provided our subjects with the name of the manager they needed to find on the site when the experiment began. We ran our subjects on two versions of the management page. One page has the current management layout, with several goto links at the top for each of the managers, with one long list of managers. We created a different layout for the management page, where the goto links are gone, and the management names are in two columns, using half the space as before.

The turnkey inventory experiment saw subjects navigating to a turnkey, again verbally presented by us. We ran each subject on two version of the turnkey inventory, one version has navigational buttons on each turnkey page, and the other version does not have the navigational buttons. Once they found this turnkey, they were instructed to use either the browser’s back button to find a second turnkey we verbally provided when they found the first turnkey, or depending on the version of the test, had to use the site’s inherent forward and back navigational buttons.

We conducted the experiment on using a desktop computer. Taking a hint from the paper created by former IST331 students, we set the pointed on the mouse to the bottom right corner of the monitor, to add more control to the times of the experiment (Gadam, Lally, Lara, Tranquillo, Weller). We started each trial with the subject on the homepage of the site, their hands in their lap, and used RUI (acs.ist.psu.edu/rui) to record the start and finish times of each of the subject’s trials. The subjects then progressed through each of the versions of the website we created. The website ran locally from the computer’s hard drive to minimize the effect of server response time on the experiment.
4.3 Results

Our results from the KLM study show most actual times were greater than the predicted times (Tables 1). Our first subject had difficulty understanding the task he was to perform and his times reflect this. Our second subject seemed to believe that every turnkey in the inventory had chronological ordering. This is not the case. The subject’s first exposure to the turnkey inventory returned a poor time because of this belief. The second time through the turnkey inventory, the subject’s time improved.

<table>
<thead>
<tr>
<th>Management V.1</th>
<th>Predicted</th>
<th>Actual S1</th>
<th>Actual S2</th>
<th>Actual S3</th>
<th>Actual S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.35s</td>
<td>23.75</td>
<td>15.48</td>
<td>17.61</td>
<td>16.11</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management V.2</th>
<th>Predicted</th>
<th>Actual S1</th>
<th>Actual S2</th>
<th>Actual S3</th>
<th>Actual S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.35s</td>
<td>12.52</td>
<td>10.46</td>
<td>13.70</td>
<td>15.22</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turnkey Inv. V.1</th>
<th>Predicted</th>
<th>Actual S1</th>
<th>Actual S2</th>
<th>Actual S3</th>
<th>Actual S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.3s</td>
<td>25.00</td>
<td>27.37</td>
<td>18.67</td>
<td>12.33</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turnkey Inv. V.2</th>
<th>Predicted</th>
<th>Actual S1</th>
<th>Actual S2</th>
<th>Actual S3</th>
<th>Actual S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.5s</td>
<td>30.32</td>
<td>19.25</td>
<td>28.88</td>
<td>22.78</td>
<td></td>
</tr>
</tbody>
</table>

Using GOMS and KLM, we found there is a definite learning curve with this particular website. The subject’s second trial frequently saw a decrease in the difference between actual times and predicted times. All of the subjects are more than capable of operating a computer and web browser, but these subjects were not experts with the website interface. It may have been in the experiment’s best interest to let the subjects become more familiar with website before running them through the experiments. The appearance of a learning curve suggests that if the subjects had more time to interact with the interface before the experiments occurred, the difference between their actual times and predicted times would be even smaller, or maybe even negative.

With the management page, we found that the reorganization of the list of managers did indeed make them easier to comprehend. We do feel this list needs better organization, perhaps to eliminate the necessity for scrolling, which would lower the amount of time required to search through the list of managers.

Our results suggest that the navigation buttons within each turnkey page are not an efficient means of navigating the turnkey inventory. Using the navigation buttons increases the amount of time necessary to find a turnkey within the inventory, unless one happens to be searching for the turnkey immediately previous or ahead of the current turnkey. The site navigation buttons even increased the total time spent searching for a turnkey by near double in subject four.

5. Colorblindness Analysis

According to the ABCs of HCI, “an estimated 6% of men and 0.5% of women are deficient in their color discrimination” (Ritter, Churchill, p. 74). Most web developers do not consider the colorblind when creating a website. Certain color combinations can seriously hamper a colorblind user’s interpretation and manipulation of a website. In a July 2007 estimate, the United States census read 301,139,947 individuals. Websites that
disregard the colorblind turn their back on a population of 18,068,397 individuals in the United States alone.

5.1 Study
We tested Offshore Specialty Fabricators, Inc.’s website readiness for colorblind users, analyzing it under three different colorblindness filters, tracking parts of the site that could interpret differently to the three types of colorblindness represented by the filters.

5.2 Procedure
The OSFI website has approximately 90 different pages including the main page. In order to test the usability of the entire website, we processed 10 pages through the Vischeck website (http://www.vischeck.com/vischeck/vischeckURL.php). The Vischeck website allows a user to input a URL and select between three different color deficiency tests for: Deuteranope, Protanope, and Tritanope. The chosen 10 pages represent the 10 possible layouts of information on the site. The other 80 pages use one of the 10 layouts to display their contents. The website employs CSS, creating a uniform color design for the entire site.

We entered each of the 10 pages into the Vischeck colorblindness filter and compared the results to a view of the website unfiltered. We examined the generated website images for any decrease in usability or appeal.

5.3 Results
The various color filters across the website revealed some aspects of the scheme that could be difficult for both people who are color blind and those who are not. One of the most noticeable differences was the change was in shades of blue. The website is primarily composed of blue, which affected the Tritanope color filter; people with this color deficiency have trouble interpreting shades of blue. This may seem insignificant, but made the contrast between shades of blue less distinguished, and made the text more difficult to discern, especially on the navigation bar, where the contrast between text color and the navigation bar color lost contrast. The site is still usable under these filters.
When we applied the Deuteranope and Protanope filters to the website, there were noticeable differences. Red text featured on the Employment Opportunities page distorted when used in contrast to the light blue background. Red becomes a green or brown color, respectively.

Figure 7. Tritanope filter applied to the navigation bar

Figure 8. Employment page, unfiltered (top), Deuteranope filter applied (bottom-left), Protanope Filter applied (bottom-right)
This same problem with red text is apparent when moving the mouse over a link. For most users, the link changes its color from a dark blue to red. For users with Deuteranope and Protonope colorblindness, links change from dark blue to a greenish yellow or brown.

Recognizing the colorblind as an audience for web interfaces, and all interfaces for that matter, is actually time saving. There are thousands of colors available to choose from when designing a website. Developers need only acknowledge colors that are sensitive to the colorblind. Considering the colorblind actually narrows the spectrum of available colors, allowing web developers to come to a quicker decision regarding color schemes for a website. The Vischeck colorblindness filters is applicable to various web-safe color palettes to reveal colors that are undistorted, or lightly distorted, to colorblind users.

Losing the red text may be an improvement to the website. Deuteranope and Protanope colorblind users interpret red as either a green or a dull brown, respectively. A redesigned site may want blue colors that better contrast under all types of color blindness, but for the most part, the website is fully functional to users with all types of colorblindness.
6. Recommendations

6.1 Incomplete Page Content
The development team had not expressed an interest in seeking out another employee qualified and willing to give a company history of OSFI, figuring the individual chosen to write the company history would eventually get around to it. This is a prime example of the idea of “diffusion of responsibility” (Ritter, Churchill, p.144). It would be in the best interest of the development team, and the company, to pursue the creation of content for the empty pages.

6.2 Navigation Bar Text, Company Logo Text, and an Unconventional Site Interface
The OSFI website should remove the three-dimensional effect applied to the company logo, and the user interface. This effect hinders usability, in that it distorts text with artificial shadows and lighting. Three-dimensional effects are not essential to the site’s usability, and give the interface an unconventional appearance. Of course, it does not make sense to have portions of the navigation bar in apparent three-dimensions, and some portions in two-dimensions. In this case, the site would benefit from losing the three-dimensional effect entirely. The company logo text would become easier to read, but the navigation bar text requires extra attention.

The company logo could contract and the navigation bar could expand in both width and height. Doing this could allow the text size of the options on the navigation bar to increase, becoming more readable. Additionally, the navigation bar could use a lighter background color and the text could use to be darker. Dark backgrounds overlaid with light text make the text harder to read (Johansson).

Figure 12. New color scheme idea

Figure 12 is the current navigation bar color scheme inverted. An increase in text size makes the option more readable, and increases the target size of the link embedded in the option, perhaps making the link easier to locate.

6.3 Redundancies
The task analysis proposes that the navigational buttons found on every turnkey page are not performing their intended function efficiently. Removing these buttons from the turnkey pages will not affect the site’s usability, as browser navigation buttons can navigate the turnkey inventory more quickly than the site embedded navigational buttons can. Doing away with these buttons will free up more page space, making the turnkey pages look less “busy”.

Though this static contact image on every page is redundant, it is useful, but could use redesigned and placed in a more appropriate spot. The image’s circular shape in the bottom-left hand corner of every page limits the amount of space available for site
content. Until the website is more complete and has a more professional appearance, it is smart to urge potential clients to contact OSFI’s offices directly.

6.4 Organization of the Turnkey Inventory
The turnkey inventory could use an analysis to find the best way to organize the extensive amount of turnkey pages. To analyze the turnkey inventory, one would have to include the primary users of the site. We were unable to contact the site’s primary users, but we will offer our insight towards a turnkey analysis in Section 7.2.

6.5 Drop-Down Menus
The function powering the drop-down navigation bar menus would benefit from scrutiny. The function is a stock Macromedia function that seems to produce glitches on every website it is apart of. The function calls for dissection, which will likely be difficult, given the way Macromedia designed it. They designed the function for it to be hard to reverse engineer. The variables in the function are misleading as to prevent those attempting to read the code the luxury of quickly coming to an understanding of its purpose. Perhaps another stock function exists that would swap out for the Macromedia function, if not it is probably wise to redesign the function from the ground up.

6.6 Information Architecture
When the site was developed, there was little though put into the presentation of information. Now, certain links on the site lead to pages that are merely placeholders with links to information the user was likely looking for. It is in the best interest of OSFI to have the development team plan out the hierarchy of information for the OSFI site. Planning the information architecture, and introducing a revised information schema, will help alleviate these superfluous nodes. Strategies such as the “card sorting technique” could prove handy during the node planning process (Bernard).

6.7 Other Aesthetics
On widescreen computer monitors, the right half of the website seems to be missing. According to a 2001 StatMarket study, the average browser size is 800 by 600 pixels (Kalbach). This average may have changed since 2001, but without paying $750 - $1500 for a StatMarket account, data that is more relevant is hard to come by. A realistic solution to improving the site’s appearance on widescreen monitors would be to have the header, navigation bar, and footer images end more gracefully. If these images were not just cutoff at their endpoints, but had their endpoints appear intentional, this could pacify the image’s awkward look.

6.8 Management
The second task analysis implies that the current organization of the management page hampers its usability. Combining the long list of managers into two columns reduces the amount of scrolling when navigating the management page. It would be wise to speak with managers of OSFI and ask them what they want in a revamped management page. Would they like contact information on the management page? Would they like their
photo displayed on the page? Depending on their response, more information may appear on the management page.

6.9 Complete Website Overhaul
Unfortunately, the website may need a complete overhaul, if not for the reasons listed above, for the way the navigation bar is constructed. The combination of the contact information at the bottom of every page, and the way the company logo juts out from the navigation bar causes 207 pixels of every page to be unusable. On a monitor with an 800 by 600 resolution, over a quarter of the width of the page on their monitor is dead space. While costly, OSFI is a company dealing in projects that begin in the six-figure range. If the company intends to have a website, it should appear professional and should have as few usability problems as possible. Clients who are unfamiliar with the company may make first impressions based on the website. A less than spectacular website could cost the company thousands to millions in lost contracts.

7. Implications for Further Research and Analysis

7.1 Colorblindness
Do users with Deuteranope and Protanope colorblindness interpret green or brown as red? In our culture, red is a color of danger or warning. A red traffic light notifies drivers to stop. A red fire alarm suggests emergency. The designer of the Offshore Specialty Fabricators, Inc. site chose red because it stands out above other colors, drawing the user’s attention. If these colorblind users believe green or brown to be red, will the colorblind users react to the color red as they would their corresponding color? If time permitted, this would have made an interesting area of study.

7.2 Turnkey Inventory
User input is required to reorganize the turnkey inventory. According to a September 2004 Really Strategies article, there are five main ways to organize webpage content, by location, alphabetically, by time, by category, or hierarchically (Kennedy). The current categorical organization of the turnkey inventory is for no other reason than tradition. Given more time, we could contact the users of the website to gain insight on a potential reorganization of the turnkey inventory. We could also create mock turnkey inventory designs, organized using each of the five main approaches to organization. We could then run task analyses on each of these designs to gather valuable information about their usability.

8. Conclusion
Study and analysis of OSFI’s website suggests the site interface could use improvement, if not a complete redesign. Task analyses support the exclusion of the navigational buttons from the turnkey pages and draw evidence for reorganization of the management page.
A colorblindness analysis of the site gives a picture of the website in a completely new light. Though the website has a passable color scheme, the development team should investigate colors for the site that display more uniformly to colorblind and non-colorblind users.

We have included some recommendations for the website, which we feel, would improve the overall presentation and usability of the site. We feel the website would benefit most from a complete redesign, in order to correct all our proposed problems with the site. The website has the potential to be a major marketing tool for OSFI. Considering turnkey projects begin at six-figures, a more usable website could bring millions of dollars worth of contract work.

Appendix

Keystroke Level Models

Management Page – Versions 1 and 2

Move hand to mouse H
Scan options on the site taskbar M
Point to “About Us” link on the site taskbar P
Scan list of options in the dropdown box M
Point to “Management” link on the “About Us” dropdown box P
Click “Management” link K
Scan the list of managers M
Move mouse to the scrollbar P
Click and hold mouse on the scrollbar K
Drag the scrollbar P
Release the mouse button K
Mouse to the desired manager P
Click the desired manager K

Predicted time = (3(M) + 5(P) + 1(H) + 4(K))
Predicted time = (3(1.35s) + 5(1.1s) + 1(0.4s) + 4(0.1s)) = 10.35s

Turnkey Inventory – Version 1

Move hand to mouse H
Scan options on the site taskbar M
Point to “Turnkey” link on the site taskbar P
Click “Turnkey” link on the site taskbar K
Point mouse to the scrollbar P
Click and hold mouse on the scrollbar K
Scan the list of turnkeys as you drag the scrollbar M
Release the mouse button K
Mouse to the desired turnkey P
Click the desired turnkey K
Mouse the browser’s back navigational button P
Click the browser’s back navigational button K
Click and hold mouse on the scrollbar K
Scan the list of turnkeys as you drag the scrollbar MP
Release the mouse button K
Mouse to the next desired turnkey P
Click the desired turnkey K
Scan turnkey M
Click desired turnkey image K

Predicted time = \( (4(M) + 6(P) + 1(H) + 9(K)) \)
Predicted time = \( (4(1.35s) + 6(1.1s) + 1(0.4s) + 9(0.1s)) = 13.3s \)

**Turnkey Inventory – Version 2**

Move hand to mouse H
Scan options on the site taskbar M
Point to “Turnkey” link on the site taskbar P
Click “Turnkey” link on the site taskbar K
Click and hold mouse on the scrollbar K
Scan the list of turnkeys as you drag the scrollbar MP
Release the mouse button K
Mouse to the desired turnkey P
Click the desired turnkey K
Mouse the site’s inherent back or forward navigational buttons P
Click forward or back K
Scan turnkey M
If not desired turnkey, click forward or back (repeat until desired) K(X-1) + M(X-1)
Click desired turnkey image K

**Note:** \( K(X-1) + M(X-1) \) describes the number of clicks and scans necessary to find the desired turnkey using only the built in navigational buttons.

Predicted Time = \( (X(M) + 4(P) + 1(H) + X(K)) \)
Predicted Time = \( (X(1.35s) + 4(1.1s) + 1(0.4s) + X(0.1s)) \)

Predicted Time Subject 1 = \( (12(1.35s) + 4(1.1s) + 1(0.4s) + 15(0.1s)) = 22.5s \)
Predicted Time Subject 2 = \( (8(1.35s) + 4(1.1s) + 1(0.4s) + 10(0.1s)) = 16.6s \)
Predicted Time Subject 3 = \( (14(1.35s) + 4(1.1s) + 1(0.4s) + 17(0.1s)) = 25.4s \)
Predicted Time Subject 4 = \( (9(1.35s) + 4(1.1s) + 1(0.4s) + 12(0.1s)) = 18.15s \)

**GOMS Model**

Method for goal: find turnkey or manager
Step 1. Accomplish Goal: learn auditory cue
Step 2. Accomplish Goal: move to turnkey or manager
Step 3. Accomplish Goal: task completed

Method for Goal: learn auditory cue
   Step 1. Listen for auditory cue for criteria
   Step 2. Decode auditory cue
   Step 3. Store auditory cue in memory

Method for Goal: move to turnkey or manager
   Step 1. Find appropriate link on page
   Step 2. Move to link on page
   Step 2. Click link
   Step 3. Accomplish Goal: search page

Selection Rule: search page
   If criteria on page
       Task completed
   If criteria not on page
       Step 1. Decide: browser back button or find appropriate link on page
       Step 2. Accomplish Goal: move to turnkey or manager

Method for Goal: task completed
   Step 1. Return task completed

References


