IST 331 Final Project:
Analysis of USNEAR.org

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Group 6

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Abstract
We analyze the USNEAR.org website, determine its strengths and weaknesses and make suggestions according to the ABCS (as described by Ritter, Baxter and Churchill in their book, *Foundations for Designing User-Centered Systems: What System Designers Need to Know about People*). Fundamentally, the website is sound; it functions appropriately and adequately as a way for people to easily sign up themselves or others for their local emergency alerts. In this report, our group suggests minor changes to the website and our reasoning, based on the ABCS model.

Essential Background Information for non-IST 331 readers
The group members listed on the cover of this report (Robert, Stephen, Nathan, and Jack) are students of IST 331 during the Spring 2014 semester at The Pennsylvania State University's University Park campus. IST 331 is a course about the organization and design of information systems using user and system principles (as described in its syllabus). The purpose of our final project is to analyze a website (USNEAR.org) based on these user and system principles and offer feedback to our contact at the website for possible changes.

During the course of our semester taking this class, we performed four other analyzes of data, websites and user interactivity tools, such as typing tutorials and reactionary tests. This final project is intended to be a cumulation of the knowledge and skills demonstrated in these previous four labs. It should be noted that the previous four labs will not be necessarily mentioned by name in this paper.

In this paper, we will refer to the book by Ritter, Baxter & Churchill (2014). It is the primary required textbook for our IST 331 class. The book's primary focus is on the ABCS concept, which refers to the use of anthropometrics, behavioral, cognitive and social aspects of systems design.

Anthropometrics refers to the physical interaction between the system and the user. Behavior refers to how the user will interact with the system, usually through the interface's logical process. Cognition refers to how the user thinks while using the system, usually for the purposes of learning new material or correcting errors. Social refers to the ways users interact with other users for the purposes of interacting with the system, usually through awareness of the system's existence from other people.

This paper is not meant to be wholly inclusive of all aspects of the website in question, USNEAR.org. It is meant as an initial attempt to use the aforementioned concepts to analyze a website for important system traits and characteristics.
Introduction

For our Information Sciences and Technology 331 class in the Spring 2014 semester at the University Park campus of The Pennsylvania State University, our class was assigned to analyze websites in groups. Our group decided to analyze USNEAR.org, a website owned by a friend of Stephen Farrington, James Veilleux. USNEAR stands for United States National Emergency Alert Registry. USNEAR's purpose is to provide a single website that people in the United States of America can use to sign themselves and others up for local emergency alerts to be sent to their contact information, usually through the form of text messages to cell phones.

Anthropometrics largely consists of the physical interaction between the user and the system itself. For most desktop computers, this consists of a keyboard and mouse. For most smartphones, this consists of the touchscreen and possible Bluetooth accessories. Anthropometrics is arguably the most important field in the ABCS, as most agents are human, and almost all of us need a physical way to interact with that particular system. Without this basic requirement of interaction, user provided input would be almost impossibly difficult. For example, imagine a smartphone with no accessory capabilities and no keyboard or touchscreen. It would basically function as a glorified pager. We asked ourselves if USNEAR.org could be any physically easier to use or involve a physical connection more positively than it currently does.

Behavioral consists of the behavioral aspects of the user using the system. For example, look at the difference in the layout of a computer keyboard’s number pad and the numbers on a phone, cellular or cored. The phone’s keypad is ordered 1-2-3, as in top to bottom, left to right. The computer’s number pad numbers are probably order 7-8-9, which follows a bottom to top, left to right ordering. We asked ourselves if USNEAR.org could benefit from improvements based on behavioral theory.

Cognition includes concepts such as user learning and changes in user behavior, in relation to the system. Games are seen as an excellent example of cognition in user systems, as the user is heavily encouraged to change their behavior as new challenges appear. We asked ourselves if there were suggestions for improving how users interact with the site through cognition theory, such as thought processes, improving how users thought about using the site itself, etc.

Social discusses the aspects that arise when users interact with each other, in the context of the system. Nowadays, with literally billions of cell phones and people that use them, user sociality is seen as a crucial part of system functionality and design. Many websites prominently feature sharing tools and social network tie-ins, as well as opportunities to
communicate directly with other users of the site. We asked ourselves how USNEAR.org could use social theory to be more effective, and we help answer these questions in the later sections of this work.
Overview of the current USNEAR.org website

The current USNEAR.org desktop website prominently features a two column setup under a blue banner that contains tabs to the various other pages within the USNEAR.org domain. Figure 1 shows most of USNEAR.org’s homepage. The USNEAR logo is above the banner, on the far left side. The left column below the banner features the website’s introduction, which explains the purpose of USNEAR.org and answers some hypothetical questions users may have. The right column is the actual form that the user is expected to fill out. This form is outlined in blue and has a right aligned title over it, to clearly indicate that the fields are separated from the explanatory text contained within the left column.

![Figure 1 - The USNEAR.org desktop website homepage](image-url)
The mobile version of the site is much more succinct; it features all center aligned content, with three orange buttons all on the same line providing information and contact information about USNEAR itself, and below those are 5 blue buttons.

Figure 2 - The USNEAR.org mobile website homepage
Analysis of the USNEAR.org website using the ABCS model

Note that these ABCS analyses are of the current website, and the suggestions are grouped together after describing each of the ABCS.

The current graphical user interface is simple. It is easily understood that the main purpose of the website is to fill out the main form. The main form is on the homepage and any additional information desired is located on the top of every page on the website as buttons linking to their appropriate page counterpart. The colors used are aesthetically comforting with light contrasts to relax the eyes of the user. The whole website is plain and direct. It explicitly shows the main purpose of the site and does not in any way distract from that purpose, almost to the point of boredom. Regarding the direction of the site, its whole system seems fairly appropriate.

We have no suggestions to the website regarding physical ways to interact with it.

The current behavioral analysis covers mainly the reading and typing patterns collected from potential users. The information is relatively straightforward considering the main function of the website is a personal information form. A few available options used in the form raised some of our eyebrows.

For instance, the same form is provided multiple web pages that may give the user a sense that each form has a different task, which may confuse some users. The multiple forms perform the same action, so some users may fill out multiple forms, which could potentially cause some problems such as duplicate actions performed on a single user. However, the result would be at most a minor annoyance.

Another issue we found was excess information. Creating more work and mental effort than need be is a lack of user understanding. Unnecessary information can bog down a user's experience and make the website seem confusing.

Before we discuss Behavior's suggestions section, we present to you our findings from a previous project, which is relevant to our behavioral suggestions.
**Excerpts from Task Analysis Lab**

In an emergency, having appropriate knowledge to handle yourself accordingly is essential. USNEAR and CodeRed are third party services that signs up their users for their relevant local emergency alert systems. We evaluated how users input their information into the USNEAR (Task 1) and CodeRed (Task 2) websites. The results of our studies indicate that there are minor, but noticeable, differences between the two sites. These differences include general presentation, organization of website, organization of fields in the forms and directions for said forms. This paper concludes with a review of experimental limitations and improvements for the future. Task 1 and Task 2 are described below.

**Task 1: Fill out USNEAR form**
The USNEAR website has six different forms for submitting an application to the National Alert Registry, each of which accomplish the same goal. Subjects were randomly assigned roles for their task, their roles being: homeowner, parent, vacation home owner, agency, and journalist. The Valentines Alerts page was ignored. By applying a goal-oriented approach we can simulate a wide range of users. As stated in *A Guide to GOMS Model Usability Evaluation* (Kieras, 1999), one critical process involved in doing a GOMS analysis is deciding what not to describe. We tried to be as clear with our task description as possible, without giving away exactly what needed to be done. Subjects were then told to find the correct form and fill it out properly. Forms were not submitted due to it being a live website with serious importance. One form needed to be submitted in order to properly test the system; terms and conditions were read and acknowledged.

**Task 2: Fill out CodeRed form**
CodeRed Alerts provide similar functionality in a much more simplified design. Subjects were instructed to fill out the form provided. This time, subjects would not have to navigate through several pages to find the correct form as there is only one. This site separates optional fields by excluding them at the start. By clicking on the “+” icon, users can add additional fields. Each subject was instructed to provide at least one phone number and email address. Once again subjects’ forms were not submitted.

**Brief Analysis of USNEAR and CodeRED websites**
The main form on the USNEAR site has eight text fields that need to be filled out and four sets of check boxes. This is shown in Figure 1. The number of options for each set varies between one to four options. A list of 37 mobile service providers are also listed in order of
the top eight most popular, followed by the rest in alphabetical order. The form is nice and compact with little distance between each field. The mobile version of the site fits nicely on a small display and fields are easy to select with touch controls. It should take less than one minute to fill out the entire form. Depending on the location entered, additional forms may need to be filled out at a later time. We did not get confirmation that the form submitted went through. It may be due to the amount of time required to process the request. There is little error to no error correction provided by this system.

The CodeRED form provided by ECN was much easier to fill out, this was reflected in a much smaller average time for completion. There are six mandatory text fields that must be filled out and a number of optional fields can be added (more phone numbers an email addresses). To prevent user error, a drop down of the 50 states is used as opposed to manual entry. If an incorrect ZIP code is entered the user will be notified by an error message near the box. When selecting TDD/TTY (telecommunications device for the deaf/teletypewriter), a warning message is displayed alerting users that this feature is meant for hearing impaired. This feature is a nice addition as most users will not know what TDD/TTY stands for. The form itself is quite large and should be condensed to save space. If these features were combined with the simplified USNEAR form, users will most likely have a much higher rate for completing the form accurately.

![Figure 3 - The default USNEAR.org form.](image)

![Figure 4 - The default codeRED form.](image)
Keypstroke Level Model

Using the RUI key logging tool, we were able to measure how long each subject spent filling out each field. The average results for each field can be found in Table 1 below. Results prove that Task 2 took less time to complete than Task 1 did. On average, subjects spent nearly 20 seconds less on Task 2 in total and roughly 7 seconds less on filling out each field.

Table 1 - Keystroke level task analysis

<table>
<thead>
<tr>
<th>Task 1 - (USNEAR)</th>
<th>Task 2 - (CodeRED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fill out field 1 (Mobile Phone Number) ~.9s</td>
<td>Fill out field 1 (First Name) ~2.1s</td>
</tr>
<tr>
<td>Fill out field 2 (Home/Office Number) ~1s</td>
<td>Fill out field 2 (Last Name) ~2.1s</td>
</tr>
<tr>
<td>Fill out field 3 (Email:) ~2.3s</td>
<td>Select dropdown menu 3 (Address Name) ~2.1s</td>
</tr>
<tr>
<td>Fill out field 4 (Address:) ~12.4s</td>
<td>Fill out field 4 (Address to be notified) ~2s</td>
</tr>
<tr>
<td>Fill out field 5 (First Name) ~2.1s</td>
<td>Fill out field 5 (City) ~1.8s</td>
</tr>
<tr>
<td>Fill out field 6 (Last Name) ~2.6s</td>
<td>Select dropdown menu 6 (State) ~1s</td>
</tr>
<tr>
<td>Select checkboxes (I Prefer Alert Via) ~2.3s</td>
<td>Fill out field 7 (zipcode) ~1.7s</td>
</tr>
<tr>
<td>Select checkboxes (This Is For) ~2.1s</td>
<td>Fill out field 8 (Phone Number:) ~.4s</td>
</tr>
</tbody>
</table>

In the paper “Analysis of Alternative Keyboards Using Learning Curves” (Anderson, Mirka and Kaber, 2008), there is a very similar set of findings, but their findings revolved around typing a fixed set of characters in an unlimited (but tracked) amount of time, and our findings revolved typing an unlimited set of characters in a limited set of time. Hence, our graphs display a positive correlation (number of correct characters typed or speed vs time), and their findings show a negative correlation (time to complete the task per trial).
We also used an HTML editor to reformat the homepage form itself and cut down on unnecessary information. The change was minimal, but a small step can go a long way. The home/office phone number section was removed as many participants only provided one number to be used. To reduce the number of errors, the "check if none" option was removed from mobile phones. Each of the phone fields were then combined into one to reduce confusion. We left the “Email” text field for field for an alternative contact method. We also recommend these changes be made to the rest of the forms.

Figure 5 - A schematic highlighting the changes that we're suggesting for USNEAR's main form

We recommend to alter USNEAR's banner box formatting color change that occurs when you mouse over the desktop version's tab as the way the tab should look when you're on that page. This tab formatting change is already implemented for a different use case.

Figure 6 – On top, the current tab banner. Below, the current tab highlighted.
We recommend that each of the fields has an example (e.g.: phone number: 999-999-9999). We also recommend that certain fields, such as the email field, display a status notification that the field has been filled out properly or improperly (such as a green check for properly and a red x for improperly). These changes will help ensure that the data that is being sent is formatted properly.

The current cognitive structure of the website is acceptable. The form itself is relatively easy on the user’s eyes. The edges around the form are rounded which is partially responsible for this. Edges are more natural and organic. According to scientific research by the Barrow Neurological Institute, “perceived salience of a corner varies linearly with the angle of the corner. Sharp angles generated stronger illusory salience than shallow angles.” Visual acuity and color deficiencies play a major role in cognition. “The cognitive operations are essential ingredients of perception itself” (Arnheim, 1969).

The contrasting colors used in the site were relatively small in contrast. By creating a large contrast in the two colors, we had hoped that it would give characters more definition, making it easier to read. Subjects noted that these sections were still difficult to read, if not harder than previous tests.

We performed two tests related to visibility and readability, one concerning picking up on colored pixels from a white background, and the other was a series of re-ability tests concerning font, font size, and font color (solid colors against varying solid backgrounds). The results of these two tests indicated that color played a crucial role in understanding visual content, and that color, spacing, and font types can be optimized for a particular task.

Adjusting the background color of pages increased the readability of previously hard to read color choices. Each font showed up quite well when compared to their white counterparts. A possible action to take would be to have a white background in the form and in the text field have a blue hue since most of the reading is done outside of the text fields. Luminance changes proved that it was also much more difficult to read text that begins to blend into the background. As in the Font Type and Size on the Legibility test (Bernard, 2001), we found that readers performed better with larger font sizes. So, increasing the font size up a point or two wouldn’t hurt.
Readers also preferred characters to be spaced adequately (variable font spacing) over monospacing and fullwidth characters. This holds true for line spacing as well. Single spacing in combination with smaller font sizes tends to make text much more difficult to read when compared to medium to large sized fonts with line spacing from 1.15 to 1.5 lines. The form itself can definitely be helped by increasing the line space by at least .25 lines.

Social aspects include the way users interact with other users. Currently, the website does not offer much social relations to the website itself. There is a page dedicated to a guardian's concern for their children. It includes a special form to help them sign up for the emergency service system. The site currently has no affiliation with any type of social media. There are no website specific login options or options to comment or post any type of information.

As with any addition to a website, careful considerations must be made as to their purpose, placement, importance, etc. Although it definitely could be distracting and make some users unable to use the USNEAR.org website, we recommend that social media and sharing tools be included on the main website so that people can more easily share USNEAR.org's presence with each other.
Figure 7 - An example of social sharing options from Engadget.com. Note that the image has been edited to show three distinct individual sharing options from the headline of the story, below the story and in the comments section.

Conclusion
While it can be seen that the owner, James Veilleux, of USNEAR.org took major steps to not only make the website not only work like a professional website; he also took major steps to make it work like a professional website. We were able to use numerous different types of analyses and concepts that we gathered from the course and the textbook, *Foundations for Designing User-Centered Systems: What System Designers Need to Know about People* (Ritter, Baxter and Churchill, 2014), to breakdown the website and identify various problems in the design and the use of the website by the users.

1. We more specifically took a look at the tabs and the forms found on the website.
2. We found that on some of the forms, the way the text boxes were set up, it could cause someone to be confused.
3. We also found that some of the information found on the forms were not really needed. So in the end we redesigned the forms to make the act of filling them out to
be easier and quicker, while still gathering all the important information that is needed.

We also found based on running visibility and usability testing, that the color and text size and the spacing of certain items on the website played a role in how the user used the website. So we changed the colors and text size and space of the items that we found the users had the most trouble with. The website, USNEAR.org, was functional and well-designed. Changes we suggested were to fix some of the problems users recognized and to better serve the objective the owner and company had in place when the website was designed.
References


